JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

COURSE STRUCTURE & SYLLABUS M.Tech ECE
VLSI, VLSI Design, VLSI System Design,
VLSI Micro-Electronic Programme

(Applicable for batches admitted from 2019-2020)

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I Semester

S.No	Course No	Course Name	P.Os	Category	L	T	P	Credits
1	PC	CMOS Analog IC Design			3	0	0	3
2	PC	CMOS Digital IC design			3	0	0	3
3	PE	1. VLSI Technology 2. Nanomaterials and Nanotechnology 3. MEMS Technology			3	0	0	3
4	PE	1. Device Modeling 2.Nano-electronics 3.Photonics			3	0	0	3
5		Research methodology and IPR			2	0	0	2
6	Lab 1	CMOS Analog IC Design Lab			0	0	4	2
7	Lab 2	CMOS Digital IC Design Lab			0	0	4	2
8	Aud 1	Audit course-1			2	0	0	0
				Total				18

II Semester

S.No	Course No	Course Name	P.Os	Category	L	T	P	Credits
1	PC	Mixed Signal & RF IC Design			3	0	0	3
2	PC	Physical Design Automation			3	0	0	3
3	PE	1. Design For Testability 2. IOT & its Applications 3. VLSI Signal Processing			3	0	0	3
4	PE	1.Network Security & Cryptography 2.Microcontrollers & programmable Digital Signal Processors 3. Low Power VLSI Design			3	0	0	3
5	Lab 1	Mixed Signal IC Design Lab			0	0	4	2
6	Lab 2	Physical Design Automation Lab			0	0	4	2
7	MP	Mini Project			0	0	4	2
8	Aud 2	Audit Course – 2			2	0	0	0
				Total				18

*Students be encouraged to go to Industrial Training/Internship for at least 2-3 weeks during semester break.

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III Semester*								
S.No	**Course No**	**Course Name**	**P.Os**	**Category**	**L**	**T**	**P**	**Credits**
1	PE	1.Scripting Languages for VLSI 2. Digital System Design & Verification 3.Hardware Software co-design			3	0	0	3
2	OE	1. Business Analytics 2. Industrial Safety 3. Operations Research 4. Cost Management of Engineering Projects 5. Composite Materials 6. Waste to Energy			3	0	0	3
3	Dissertation	Dissertation Phase -I /Industrial Project **(to be continued and evaluated next semester)**			0	0	20	10[#]
				Total				16

[#]Evaluated and Displayed in IV Semester Marks list.

*Students going for Industrial Project/Thesis will complete these courses through MOOCs

IV Semester								
S.No	**Course No**	**Course Name**	**P.Os**	**Category**	**L**	**T**	**P**	**Credits**
1	Dissertation	Project/ Dissertation Phase-II **(continued from III semester)**			0	0	32	16
				Total				16

Audit Course 1& 2

1. English for Research Paper Writing
2. Disaster Management
3. Sanskrit for Technical Knowledge
4. Value Education
5. Constitution of India
6. Pedagogy Studies
7. Stress Management by Yoga
8. Personality Development through Life Enlightenment Skills

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I Year I Semester

L	P	C
3	0	3

CMOS Analog IC Design

Course objectives:

- This course focuses on theory, analysis and design of analog integrated circuits in both Bipolar and Metal-Oxide-Silicon (MOS) technologies.
- Basic design concepts, issues and tradeoffs involved in analog IC design are explored.
- Intuitive understanding and real-life applications are emphasized throughout the course.
- To learn about Design of CMOS Op Amps, Compensation of Op Amps, Design of Two-Stage Op Amps, Power Supply Rejection Ratio of Two-Stage Op Amps, Cascade Op Amps, Measurement Techniques of OP Amp.
- To know about Characterization of Comparator, Two-Stage, Open-Loop Comparators, Improving the Performance of Open-Loop Comparators, Discrete-Time Comparators etc.

UNIT -I

Basic MOS Device Physics – General Considerations, MOS I/V Characteristics, Second Order effects, MOS Device models. Short Channel Effects and Device Models. Single Stage Amplifiers – Basic Concepts, Common Source Stage, Source Follower, Common Gate Stage, Cascode Stage.

UNIT -II:

Differential Amplifiers – Single Ended and Differential Operation, Basic Differential Pair, CommonMode Response, Differential Pair with MOS loads, Gilbert Cell. Passive and Active Current Mirrors– Basic Current Mirrors, Cascode Current Mirrors, Active Current Mirrors.

UNIT -III:

Frequency Response of Amplifiers – General Considerations, Common Source Stage, SourceFollowers, Common Gate Stage, Cascode Stage, Differential Pair. Noise – Types of Noise, Representation of Noise in circuits, Noise in single stage amplifiers, Noise in Differential Pairs.

UNIT -IV:

Feedback Amplifiers – General Considerations, Feedback Topologies, Effect of Loading.OperationalAmplifiers – General Considerations, One Stage Op Amps, Two Stage Op Amps, Gain Boosting,Common – Mode Feedback, Input Range limitations, Slew Rate, Power Supply Rejection, Noise in Op Amps. Stability and Frequency Compensation.

UNIT -V:

Characterization of Comparator, Two-Stage, Open-Loop Comparators, Other Open-Loop Comparators, Improving the Performance of Open-Loop Comparators, Discrete-Time Comparators.

Text Books:

1. B.Razavi, "Design of Analog CMOS Integrated Circuits", 2nd Edition, McGraw Hill Edition2016.
2. Paul. R.Gray& Robert G. Meyer, "Analysis and Design of Analog Integrated Circuits", Wiley, 5th Edition, 2009.

Reference Books:

1. T. C. Carusone, D. A. Johns & K. Martin, "Analog Integrated Circuit Design", 2nd Edition,Wiley, 2012.
2. P.E.Allen&D.R. Holberg, "CMOS Analog Circuit Design", 3rd Edition, Oxford University Press, 2011.
3. R. Jacob Baker, "CMOS Circuit Design, Layout, and Simulation", 3rd Edition, Wiley, 2010.
4. Recent literature in Analog IC Design.

Course Outcomes:

At the end of the course, students will be able to:

- Design MOSFET based analog integrated circuits.
- Analyze analog circuits at least to the first order.
- Appreciate the trade-offs involved in analog integrated circuit design.
- Understand and appreciate the importance of noise and distortion in analog circuits.
- Analyze complex engineering problems critically in the domain of analog IC design for conducting research.
- Solve engineering problems for feasible and optimal solutions in the core area of analog ICs.

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I Year I Semester

L	P	C
3	0	3

CMOS Digital IC design

Course objectives:

- To understand the fundamental properties of digital Integrated circuits using basic MOSFET equations and to develop skills for various logic circuits using CMOS related design styles.
- The course also involves analysis of performance metrics.
- To teach fundamentals of CMOS Digital integrated circuit design such as importance of Pseudo logic, Combinational MOS logic circuits, and Sequential MOS logic circuits.
- To teach the fundamentals of Dynamic logic circuits and basic semiconductor memories which are the basics for the design of high performance digital integrated circuits.

UNIT-I: MOS Design

Pseudo NMOS Logic – Inverter, Inverter threshold voltage, Output high voltage, Output Low voltage, Gain at gate threshold voltage, Transient response, Rise time, Fall time, Pseudo NMOS logic gates, Transistor equivalency, CMOS Inverter logic.

UNIT-II: Combinational MOS Logic Circuits:

MOS logic circuits with NMOS loads, Primitive CMOS logic gates – NOR & NAND gate, Complex Logic circuits design – Realizing Boolean expressions using NMOS gates and CMOS gates, AOI and OAI gates, CMOS full adder, CMOS transmission gates, Designing with Transmission gates.

UNIT-III: Sequential MOS Logic Circuits

Behaviour of bistable elements, SR Latch, Clocked latch and flip flop circuits, CMOS D latch and edge triggered flip-flop.

UNIT-IV: Dynamic Logic Circuits

Basic principle, Voltage Bootstrapping, Synchronous dynamic pass transistor circuits, Dynamic CMOS transmission gate logic, High performance Dynamic CMOS circuits.

UNIT-V: Semiconductor Memories

Types, RAM array organization, DRAM – Types, Operation, Leakage currents in DRAM cell and refresh operation, SRAM operation Leakage currents in SRAM cells, Flash Memory- NOR flash and NAND flash.

Text Books:

1. Digital Integrated Circuit Design – Ken Martin, Oxford University Press, 2011.
2. CMOS Digital Integrated Circuits Analysis and Design – Sung-Mo Kang, Yusuf Leblebici,TMH, 3rd Ed., 2011.

Reference Books:

1. Introduction to VLSI Systems: A Logic, Circuit and System Perspective – Ming-BO Lin, CRC Press, 2011
2. Digital Integrated Circuits – A Design Perspective, Jan M. Rabaey, Anantha Chandrakasan Borivoje Nikolic, 2nd Ed., PHI.

Course Outcomes:

At the end of the course, students will be able to:

- Demonstrate advanced knowledge in Static and dynamic characteristics of CMOS, Alternative CMOS Logics, Estimation of Delay and Power, Adders Design.
- Classify different semiconductor memories.
- Analyze, design and implement combinational and sequential MOS logic circuits.
- Analyze complex engineering problems critically in the domain of digital IC design for conducting research.
- Solve engineering problems for feasible and optimal solutions in the core area of digital ICs.

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I Year I Semester

L	P	C
3	0	3

VLSI Technology
(Elective I)

UNIT 1: MOS Transistors

Introduction, The Structure of MOS Transistors, The Fluid Model, The MOS Capacitor, The MOS Transistor, Modes of Operation of MOS Transistors, Electrical Characteristics of MOS Transistors, Threshold Voltage, Transistor Trans conductance g_m, Figure of Merit, Body Effect, Channel-Length Modulation, MOS Transistors as a Switch, Transmission Gate

UNIT 2: MOS Fabrication Technology

Introduction, Basic Fabrication Processes, Wafer Fabrication, Oxidation, Mask Generation, Photolithography, Diffusion, Deposition. N-MOS Fabrication Steps, CMOS Fabrication Steps, n-Well Process, p-Well Process, Twin-Tub Process, Latch-Up Problem and Its Prevention, Use of Guard Rings, Use of Trenches, Short-Channel Effects-Channel Length Modulation Effect. Drain-Induced Barrier Lowering, Channel Punch Through, Hot carrier effect, Velocity Saturation Effect

UNIT 3: Layout Design Rules

Scaling Theory, Scalable CMOS Design Rules, CMOS Process Enhancements, Transistors, Interconnects, Circuit Elements, Efficient layout Design techniques

UNIT 4: Combinational Logic Networks

Layouts for logic networks. Delay through networks. Power optimization.Switch logic networks. Combinational logic testing

UNIT 5: Sequential Systems

Memory cells and Arrays, clocking disciplines, sequential circuit Design, Performance Analysis,Power optimization, Design validation and testing.

Text Books:

1.Principals of CMOS VLSI Design-N.H.EWeste, K. Eshraghian, 2nd Edition, Addison Wesley.

2. CMOS Digital Integrated Circuits Analysis and Design – Sung-Mo Kang, Yusuf Leblebici, TMH, 3rd Ed., 2011.

3.Low-Power VLSI Circuits and Systems,Ajit Pal, SPRINGER PUBLISHERS

4. Modern VLSI Design – Wayne Wolf, 3rd Ed., 1997, Pearson Education.

Reference Books:

1. Digital Integrated Circuit Design – Ken Martin, Oxford University Press, 2011.

2. Digital Integrated Circuits – A Design Perspective, Jan M. Rabaey, AnanthaChandrakasan, Borivoje Nikolic, 2nd Ed., PHI.

Course outcomes

At the end of the course the student able to

- Understand the basics of MOS transistors and also the characteristics of MOS transistors.
- Learn about the MOS fabrication process and short channel effects.
- Learn about the basic rules in layout designing.
- Analyse various combinational logic networks and sequential systems.

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I Year I Semester

L	P	C
3	0	3

NANOMATERIALS AND NANOTECHNOLOGY
(Elective I)

UNIT I
Introduction of nano materials and nanotechnologies, Features of nanostructures, Applications of nano materials and technologies. Nano dimensional Materials 0D, 1D, 2D structures – Size Effects – Fraction of Surface Atoms –Specific Surface Energy and Surface Stress – Effect on the Lattice Parameter – Phonon Density of States – the General Methods available for the Synthesis of Nanostructures – precipitate – reactive– hydrothermal/solvo thermal methods – suitability of such methods for scaling – potential Uses.

UNIT II
Fundamentals of nano materials, Classification, Zero-dimensional nano materials, One-dimensional nano materials, Two-dimensional nano materials, Three dimensional nano materials. Low-Dimensional Nano materials and its Applications, Synthesis, Properties, and Applications of Low-Dimensional Carbon-Related Nano materials.

UNIT III
Micro- and Nanolithography Techniques, Emerging Applications Introduction to Micro electro mechanical Systems (MEMS), Advantages and Challenges of MEMS, Fabrication Technologies, Surface Micromachining, Bulk Micromachining, Molding. Introduction to Nano Phonics.

UNIT IV
Introduction, Synthesis of CNTs - Arc-discharge, Laser-ablation, Catalytic growth, Growth mechanisms of CNT's - Multi-walled nano tubes, Single-walled nano tubes Optical properties of CNT's, Electrical transport in perfect nano tubes, Applications as case studies. Synthesis and Applications of CNT's.

UNIT V
Ferroelectric materials, coating, molecular electronics and nano electronics, biological and environmental, membrane based application, polymer based application.

Text Books:

1. Kenneth J. Klabunde and Ryan M. Richards, "Nanoscale Materials in Chemistry", 2nd edition,John Wiley and Sons, 2009.
2. I Gusev and A ARempel, "Nanocrystalline Materials", Cambridge International Science Publishing, 1st Indian edition by Viva Books Pvt. Ltd. 2008.
3. B. S. Murty, P. Shankar, Baldev Raj, B. B. Rath, James Murday, "Nanoscience and Nanotechnology", Tata McGraw Hill Education 2012.

Reference Books:

1. Bharat Bhushan, "Springer Handbook of Nanotechnology", Springer, 3rd edition, 2010.
2. Kamal K. Kar, "Carbon Nanotubes: Synthesis, Characterization and Applications", Research Publishing Services; 1 st edition, 2011, ISBN-13: 978-9810863975.

Course Outcomes:

At the end of the course, students will be able to:

- To understand the basic science behind the design and fabrication of nano scale systems.
- To understand and formulate new engineering solutions for current problems and competing technologies for future applications.
- To be able make inter disciplinary projects applicable to wide areas by clearing and fixing the boundaries in system development.
- To gather detailed knowledge of the operation of fabrication and characterization devices to achieve precisely designed systems

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I Year I Semester	L	P	C
	3	0	3

MEMS Technology
(Elective I)

UNIT-I: Introduction to MEMS

Introduction to MEMS & Real world Sensor/Actuator examples (DMD, Air-bag, pressure sensors). MEMS Sensors in Internet of Things (IoT), Bio-Medical Applications

UNIT-II: MEMS Materials and Their Properties

Materials (eg. Si, SiO2, SiN, Cr, Au, Ti, SU8, PMMA, Pt); Important properties: Young modulus, Poisson's ratio, density, piezo-resistive coefficients, TCR, Thermal Conductivity, Material Structure. Understanding Selection of materials based on applications.

UNIT-III: MEMS Fab Processes – 1

Understanding MEMS Processes & Process parameters for: Cleaning, Growth &Deposition, Ion Implantation & Diffusion, Annealing, Lithography. Understanding selection of Fab processes based on Applications.

UNIT-IV: MEMS Fab Processes – 2

Understanding MEMS Processes & Process parameters for: Wet & Dry etching, Bulk& Surface Micromachining, Die, Wire & Wafer Bonding, Dicing, Packaging. Understanding selection of Fab processes based on Applications

UNIT-V: MEMS Devices

Architecture, working and basic quantitative behaviour of Cantilevers, Micro heaters, Accelerometers, Pressure Sensors, Micro mirrors in DMD, Inkjet printer-head. Understanding steps involved in Fabricating above devices

Text Books:

1. An Introduction to Micro electromechanical Systems Engineering; 2nd Ed - by N.Maluf, K Williams; Publisher: Artech House Inc
2. Practical MEMS - by Ville Kaajakari; Publisher: Small Gear Publishing
3. Micro system Design - by S. Senturia; Publisher: Springer

Reference Books:

1. Analysis and Design Principles of MEMS Devices - MinhangBao; Publisher:Elsevier Science.
2. Fundamentals of Micro fabrication - by M. Madou; Publisher: CRC Press; 2 edition
3. Micro Electro Mechanical System Design - by J. Allen; Publisher: CRC Press
4. Micro machined Transducers Sourcebook - by G. Kovacs; Publisher: McGraw-Hill

Course Outcomes:

At the end of the course, students will be able to:

- To understand the basic concepts of MEMS technology and working of MEMS devices.
- To understand and selecting different materials for current MEMS devices and competing Technologies for future applications
- To understanding the concepts of fabrication process of MEMS, Design and Packaging Methodology.
- To analyze the various fabrication techniques in the manufacturing of MEMS Devices.

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	L	P	C
I Year I Semester	**3**	**0**	**3**

Device Modelling
(Elective II)

UNIT I

2-terminal MOS device: threshold voltage modelling (ideal case as well as considering the effects of Qf, Φms and Dit.).

UNIT II

C-V characteristics (ideal case as well as taking into account the effects of Qf, Φms and Dit);MOS capacitor as a diagnostic tool (measurement of non-uniform doping profile, estimation of Qf, Φms and Dit)

UNIT III

4-terminal MOSFET: threshold voltage (considering the substrate bias); above threshold I-V modelling (SPICE level 1,2,3 and 4).

UNIT IV

Sub threshold current model; scaling; effect of threshold tailoring implant (analytical modelling of threshold voltage using box approximation); buried channel MOSFET. Short channel, DIBL and narrow width effects; small signal analysis of MOSFETs (Meyer'smodel)

UNIT V

SOI MOSFET: basic structure; threshold voltage modelling Advanced topics: hot carriers in channel; EEPROMs; CCDs; high-K gate dielectrics.

Text Books:

1. D.G.Ong , "Modern MOS Technology: Processes, Devices and Design", McGraw Hill,1984.
2. Y.Taur and T.H.Ning, "Fundamentals of modern VLSI Devices" Cambridge Univ. Press,1998.
3. S.M.Sze, "Physics of Semiconductor Devices" Wiley,1981.

Course Outcomes:

At the end of the course, students will be able to:

- To understand the physics of 2-terminal MOSoperation and its characteristics
- To understand the physics of 4-terminal MOSFEToperation and its characteristics
- To analyze the SOI MOSFET electrical characteristics

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	L	P	C
I Year I Semester	**3**	**0**	**3**

Nano-electronics
(Elective II)

UNIT I
Properties of Individual Nanoparticles: Introduction, Metal Nano Clusters, Semiconducting Nanoparticles, Rare Gas and Molecular Clusters, Methods of Synthesis.

UNIT II
The nanoscale MOSFET, FinFETs, Vertical MOSFETs, limits to scaling, system integration limits (interconnect issues etc.), Resonant Tunnelling Transistors.
Carbon NanoStructures: Introduction, Carbon Molecules, Carbon Clusters, Carbon Nano Tubes, Application of Carbon Nanotubes.

UNIT III
Carbon Nanotubes for Data Processing – Introduction, Electronic Properties, Synthesis of Carbon Nanotubes, Carbon Nanotube Interconnects, Carbon Nanotubes Field Effect Transistors (CNTFETs), Nanotubes for Memory Applications, Prospects of an All-CNT Nanoelectronics.
Neuroelectronic Interfacing: Semiconductor Chips with Ion Channels, Nerve Cells, and Brain: Introduction, Iono-Electronic Interface, Neuron-Silicon Circuits, Brain-Silicon Chips.

UNIT IV
Optical 3-D Time-of-Flight Imaging System: Introduction, Taxonomy of Optical 3-D Techniques, CMOS Imaging, CMOS 3-D Time-of-Flight Image Sensor, Application Examples
Pyroelectric Detector Arrays for IR Imaging: Introduction, Operation Principle of Pyroelectric IR Detectors, Pyroelectric Materials, Realized Devices, Characterization, and Processing Issues

UNIT V
Electronic Noses: Introduction, Operating Principles of Gas Sensor Elements, Electronic Noses, Signal Evaluation, Dedicated Examples. 2-D Tactile Sensors and Tactile Sensor Arrays: Introduction, Definitions and Classifications, Resistive Touch screens, Ultrasonic Touch screens, Robot Tactile Sensors, Fingerprint Sensors

Text Books:

1. Introduction to Nanotechnology, C.P. Poole Jr., F.J. Owens, Wiley (2003),
2. Nano electronics and Information Technology (Advanced Electronic Materials and Novel Devices), WaserRanier ,Wiley-VCH,2003

Reference Books:

1. Nanosystems, K.E. Drexler,Wiley (1992).
2. The Physics of Low-Dimensional Semiconductors, John H. Davies, "Cambridge University Press, "1998

Course Outcomes:

At the end of the course, students will be able to:

- To understand and challenges due to scaling on CMOS devices
- To analyze and explain working of novel MOS based silicon devices and various multi gate devices.
- To understand working of spin electronic devices
- To understand nanoelectronic systems and building blocks such as: low dimensional semiconductors, heterostructures, carbon nanotubes, quantum dots, nano wires etc.

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I Year I Semester

L	P	C
3	0	3

PHOTONICS

(Elective II)

UNIT - I: Laser systems

General description, Laser structure, Single mode laser theory, Excitation mechanism andworking of: CO2, Nitrogen, Argon ion, Excimer, X-ray, Free-electron, Dye, Nd:YAG,Alexanderite and Ti:sapphire lasers, Diode pumped solid state laser, Optical parametricoscillator (OPO) lasers. Optical amplifiers- Semiconductor optical amplifiers, Erbium dopedwaveguide optical amplifiers, Raman amplifiers, Fiber Lasers. Laser Applications-Lasers inIsotope separation, Laser interferometry and speckle metrology, Velocity measurements.

UNIT - II: Properties of laser Radiation

Introduction, Laser linewidth, Laser frequency stabilization, Beam divergence, Beamcoherence, Brightness, Focusing properties of laser radiation, Q-switching, Methods of Q- switching:Rotating-mirror method, Electro-optic Q-switching, Acoustic-optic Q-switching and Passive Q-switching, Mode locking, Methods of mode locking: Active and passive modelocking techniques, Frequency doubling and Phase conjugation

UNIT - III: Opto-electronic Devices -I

Introduction, P-N junction diode, Carrier recombination and diffusion in P-N junction,Injection efficiency, Internal quantum efficiency, Hetero-junction, Double hetero-junction,Quantum well, Quantum dot and Super lattices; LED materials, Device configuration andefficiency.

UNIT - IV: Opto-electronic Devices -II

Light extraction from LEDs, LED structures-single heterostructures, doubleheterostructures, Device performances and applications, Quantum well lasers; Photodiodeand Avalanche photodiodes (APDs), Laser Diodes-Amplification, Feedback and oscillation,Power and efficiency, Spectral and spatial characteristics.

UNIT – V: Modulation of Light

Introduction, Birefringence, Electro-optic effect, Pockels and Kerr effects, Electro-opticPhasemodulation, Electro-optic amplitude modulation, Electro-optic modulators: scanning and switching, Acousto-optic effect, Acousto-optic modulation, Raman-Nath and Bragg modulators: deflectors and spectrum analyzer, Magneto-optic effect, Faraday rotator as anoptical isolator. Advantages of optical modulation.

Text books:

1. Lasers: Principles and applications by J.WilsonAndJ.F.B.Hawkes, Prentice, Hall of India, New Delhi, 1996.
2. Laser fundamentals, W.T.Silfvast, Foundation books, New Delhi, 1999.
3.Semi conductoropto electronics devices, P. Bhattacharya, Prentice – Hall of India, New Delhi, 1995.17

Reference Books:

1. Optical fiber communications, John M. Senior, Prentice-Hall of India, New Delhi, 2001
2. Optoelectronics: An Introduction, J.WilsonAndJ.F.B.Hawkes, Prentice-Hall of India, New Delhi, 1996.
3.Electro-Optical devices, M.A. Karim, Boston, Pws-Kent Publishers, 1990

Course Outcomes:

At the end of the course, students will be able to:

- Classify the Optical sources and detectors and to discuss their principle.
- Familiar with Design considerations of fiber optic systems.
- To perform characteristics of optical fiber, sources and detectors, design as well as conduct experiments in software and hardware, analyze the results to provide valid conclusions.
- apply the principles of atomic physics to materials used in optics and photonics;
- calculate properties of and design modern optical fibres and photonic crystals;
- use the tools, methodologies, language and conventions of physics to test and communicate ideas and explanations;
- integrate several components of the course in the context of a new situation (unique to postgraduate coursework).

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I Year I Semester	L	P	C
	2	0	2

Research Methodology and IPR

Unit 1:
Meaning of research problem, Sources of research problem, Criteria Characteristics ofa good research problem, Errors in selecting a research problem, Scope and objectives ofresearch problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations

Unit 2:
Effective literature studies approaches, analysis Plagiarism, Research ethics. Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee

Unit 3:
Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process ofPatenting and Development: technological research, innovation, patenting, development.International Scenario: International cooperation on Intellectual Property. Procedure for grantsof patents, Patenting under PCT.

Unit 4:
Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patentinformation and databases. Geographical Indications.

Unit 5:
New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies,IPR and IITs.

Text Books:

1. Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students'"
2. Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction"
3. Ranjit Kumar, 2nd Edition , "Research Methodology: A Step by Step Guide for beginners"
4. Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd ,2007.

Reference Books:

1. Mayall , "Industrial Design", McGraw Hill, 1992.
2. Niebel , "Product Design", McGraw Hill, 1974.
3. Asimov , "Introduction to Design", Prentice Hall, 1962.
4. Robert P. Merges, Peter S. Menell, Mark A. Lemley, " Intellectual Property in New
5. Technological Age", 2016.
6. T. Ramappa, "Intellectual Property Rights Under WTO", S. Chand, 2008

Course Outcomes:

At the end of this course, students will be able to

- Understand research problem formulation.
- Analyze research related information
- Follow research ethics
- Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.
- Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.
- Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.

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I Year I Semester	L	P	C
	0	4	2

CMOS Analog IC Design Lab

- The students are required to design and implement any TEN Experiments using CMOS 130nm Technology with Mentor Graphics Tool/ Cadence/ Synopsys/Industry Equivalent Standard Software.
- The students are required to implement LAYOUTS of any SIX Experiments using CMOS 130nm Technology with Mentor Graphics Tool/ Cadence/ Synopsys/Industry Equivalent Standard Software. and Compare the results with Pre-Layout Simulation.

List of Experiments:

1. MOS Device Characterization and parametric analysis
2. Common Source Amplifier
3. Common Source Amplifier with source degeneration
4. Cascode amplifier
5. simple current mirror
6. cascode current mirror.
7. Wilson current mirror.
8. Differential Amplifier
9. Operational Amplifier
10. Sample and Hold Circuit
11. Direct-conversion ADC
12. R-2R Ladder Type DAC

Lab Requirements:
Software:
Mentor Graphics – Pyxis Schematic, IC Station, Calibre, ELDO Simulator
Hardware:
Personal Computer with necessary peripherals, configuration and operating System.

Course Outcomes:

1. Have the ability to explain the VLSI Design Methodologies using Mentor Graphics Tools
2. Grasp the significance of various cmos analog circuits in full-custom IC Design flow
3. Have the ability to explain the Physical Verification in Layout Design
4. Fully Appreciate the design and analyze of analog and mixed signal simulation
5. Grasp the Significance of Pre-Layout Simulation and Post-Layout Simulation

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	L	P	C
I Year I Semester	**0**	**4**	**2**

CMOS Digital IC design Lab

- The students are required to design and implement the Circuit and Layout of any TEN Experiments using CMOS 130nm Technology with Mentor Graphics Tool/ Cadence/ Synopsys/Industry Equivalent Standard Software.

List of Experiments:

1. Inverter Characteristics.
2. NAND and NOR Gate
3. XOR and XNOR Gate
4. 2:1 Multiplexer
5. Full Adder
6. RS-Latch
7. Clock Divider
8. JK-Flip Flop
9. Synchronous Counter
10. Asynchronous Counter
11. Static RAM Cell
12. Dynamic Logic Circuits
13. Linear Feedback Shift Register

Lab Requirements:

Software:

Mentor Graphics Tool/ Cadence/ Synopsys/Industry Equivalent Standard Software

Hardware:

Personal Computer with necessary peripherals, configuration and operating System.

Course Outcomes:

1. Have the ability to explain the VLSI Design Methodologies using Mentor Graphics Tools
2. Grasp the significance of various design logic Circuits in full-custom IC Design.
3. Have the ability to explain the Physical Verification in Layout Extraction
4. Fully Appreciate the design and analyze of CMOS Digital Circuits
5. Grasp the Significance of Pre-Layout Simulation and Post-Layout Simulation

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Mixed Signal & RF IC Design

Course Objectives:

- To understand the design of basic cells like Op-Amp, against process and temperature variations meeting the mixed signal specifications.
- To be able to design comparators that can meet the high speed requirements of digital circuitry.
- To be able to design a complete mixed signal system that includes efficient data conversion and RF circuits with minimizing switching.
- To understand the design bottlenecks specific to RF IC design, linearity related issues, and ISI.
- To have a comprehensive idea about different multiple access techniques, wireless standards and various transceiver architectures

UNIT -I

Basic Building Blocks, OpAmp, Capacitors, Switches, Non-overlapping Clocks, Basic Operation and Analysis, ResistorEquivalence of a Switched Capacitor, Parasitic-Sensitive Integrator,Parasitic-InsensitiveIntegrators, Signal-Flow-Graph Analysis, Noise in Switched-CapacitorCircuit

UNIT -II:

Ideal D/A Converter, Ideal A/D Converter, Quantization Noise, Deterministic Approach, Stochastic Approach, Signed Codes, Performance Limitations, Resolution, Offset and Gain
Error, Accuracy and Linearity
Integrating Converters, Successive-Approximation Converters, DAC-Based SuccessiveApproximation, Charge-Redistribution A/D, Resistor-Capacitor Hybrid, Speed Estimate forCharge-Redistribution Converters, Error Correction in Successive-Approximation Converters

UNIT -III:

Basic Phase-Locked Loop Architecture, Voltage Controlled Oscillator, Divider PhaseDetector, Loop Filer, The PLL in Lock, Linearized Small-Signal Analysis, Second-Order PLL Model,Limitations of the Second-Order Small-Signal Model, PLL Design Example, Jitter andPhase Noise, Period Jitter , P-Cycle Jitter, Adjacent Period Jitter, other SpectralRepresentations of Jitter, Probability Density Function of Jitter, Ring Oscillators , LCOscillators , phase Noise of Oscillators, jitter and Phase Noise in PLLS

UNIT -IV:

INTRODUCTION TO RF AND WIRELESS TECHNOLOGY: Complexity comparison, Design bottle necks, Applications, Analog and digital systems, Choice of Technology. BASICCONCEPTS IN RF DESIGN: Nonlinearity and time variance, ISI, Random process and noise, sensitivity and dynamic range, passive impedance transformation.

UNIT -V:

Multiple Access: Techniques and wireless standards, mobile RF communication,FDMA, TDMA, CDMA, Wireless standards.
Transceiver Architectures: General considerations, receiver architecture, Transmitter Architecture, transceiver performance tests,case studies.
Amplifiers, Mixers And Oscillators: LNAs, down conversion mixers, CascadedStages, oscillators, Frequency synthesizers.

Text Books:

1. David A Johns, Ken Martin: Analog IC design, Wiley 2008.
2. R Gregorian and G C Temes: Analog MOS integrated circuits for signal processing, Wiley 1986

Reference Books:

1. Roubik Gregorian: Introduction to CMOS Op-amps and comparators, Wiley, 2008.
2. Behzad Razavi, RF Microelectronics Prentice Hall of India, 2001
3. Thomas H. Lee, The Design of CMOS Radio Integrated Circuits, Cambridge University Press.

Course Outcomes:
At the end of the course, students will be able to:

- Design basic cells like Op-Amp, against process and temperature variations meeting the mixed signal specifications
- Design comparators that can meet the high speed requirements of digital circuitry.
- Design a complete mixed signal system that includes efficient data conversion and RF circuits with minimizing switching.
- Understand the design bottlenecks specific to RF IC design, linearity related issues and ISI
- Comprehend different multiple access techniques, wireless standards and various transceiver architectures

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Physical Design Automation

Course Objectives:

- To understand the relationship between design automation algorithms and various constraints posed by VLSI fabrication and design technology.
- To learn the design algorithms to meet the critical design parameters.
- To know the layout optimization techniques and map them to the algorithms
- To understand proto-type EDA tools and know how to test its efficacy

UNIT -I

VLSI design Cycle, Physical Design Cycle, Design Rules, Layout of Basic Devices, and Additional Fabrication, Design styles: full custom, standard cell, gate arrays, field programmable gate arrays, sea of gates and comparison, system packaging styles, multi-chip modules. Design rules, layout of basic devices, fabrication process and its impact on physical design, interconnect delay, noise and cross talk, yield and fabrication cost.

UNIT -II:

Factors, Complexity Issues and NP-hard Problems, Basic Algorithms (Graph and Computational Geometry): graph search algorithms, spanning tree algorithms, shortest path algorithms, matching algorithms, min-cut and max-cut algorithms, Steiner tree algorithms

UNIT -III:

Basic Data Structures, atomic operations for layout editors, linked list of blocks, bin based methods, neighbour pointers, corner stitching, multi-layer operations.

UNIT -IV:

Graph algorithms for physical design: classes of graphs, graphs related to a set of lines, graphs related to set of rectangles, graph problems in physical design, maximum clique and minimum coloring, maximum k-independent set algorithm, algorithms for circle graphs.

UNIT -V:

Partitioning algorithms: design style specific partitioning problems, group migrated algorithms, simulated annealing and evolution, and Floor planning and pin assignment, Routing and placement algorithms

Text Books:

1. NaveedShervani, Algorithms for VLSI Physical Design Automation, 3rd Edition, Kluwer Academic, 1999.
2. Charles J Alpert, Dinesh P Mehta, Sachin S Sapatnekar, Handbook of Algorithms forPhysical Design Automation, CRC Press, 2008

Course Outcomes:

At the end of the course, students will be able to:

- Understand the relationship between design automation algorithms and Various constraints posed by VLSI fabrication and design technology.
- Adapt the design algorithms to meet the critical design parameters.
- Identify layout optimization techniques and map them to the algorithms
- Develop proto-type EDA tool and test its efficacy

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Design for Testability
(Elective III)

UNIT -I
Testing Philosophy, Role of Testing, Digital and Analog VLSI Testing, VLSI TechnologyTrends affecting Testing, Types of Testing, Fault Modeling: Defects, Errors and Faults,Functional Versus Structural Testing, Levels of Fault Models, Single Stuck-at Fault.

UNIT -II:
Simulation for Design Verification and Test Evaluation, Modeling Circuits for Simulation, Algorithms for True-value Simulation, Algorithms for Fault Simulation.

UNIT -III:
SCOAP Controllability and Observability, High Level Testability Measures, Digital DFT and Scan Design: Ad-Hoc DFT Methods, Scan Design, Partial-Scan Design, Variations of Scan.

UNIT -IV:
The Economic Case for BIST, Random Logic BIST: Definitions, BIST Process, PatternGeneration, Response Compaction, Built-In Logic Block Observers, Test-Per-Clock, Test-PerScanBISTSystems,CircularSelf-TestPathSystem,MemoryBIST, DelayFaultBIST.

UNIT -V:
Motivation, System Configuration with Boundary Scan: TAP Controller and Port, BoundaryScan Test Instructions, Pin Constraints of the Standard, Boundary Scan Description Language: BDSL Description Components, Pin Descriptions.

Text Books:

1. Essentials of Electronic Testing for Digital, Memory and Mixed Signal VLSI Circuits -M.L. Bushnell, V. D. Agrawal, Kluwer Academic Pulishers.

Reference Books:

1. Digital Systems and Testable Design - M. Abramovici, M.A.Breuer and A.D Friedman, Jaico Publishing House.
2. Digital Circuits Testing and Testability - P.K. Lala, Academic Press.

Course Outcomes:
At the end of the course, students will be able to:

- Demonstrate advanced knowledge in The basic faults that occur in digital systems, Testing of stuck at faults for digital circuits, Design for testability.
- Analyze testing issues in the field of digital system design critically for conducting research.
- Solve engineering problems by modeling different faults for fault free simulation in digital circuits.
- Apply appropriate research methodologies and techniques to develop new testing strategies for digital and mixed signal circuits and systems.

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IOT and its Applications
(Elective III)

UNIT I:Fundamentals of IoT- Evolution of Internet of Things, Enabling Technologies, IoT Architectures,oneM2M, IoT World Forum (IoTWF) and Alternative IoT models, Simplified IoT Architecture and Core IoT Functional Stack, Fog, Edge and Cloud in IoT, Functional blocks of an IoT ecosystem, Sensors, Actuators, Smart Objects and Connecting Smart Objects.

IoT Platform overview: Overview of IoT supported Hardware platforms such as: Raspberry pi, ARM Cortex Processors, Arduino and Intel Galileo boards.

UNIT II: IoT Protocols- IT Access Technologies: Physical and MAC layers, topology and Security of IEEE 802.15.4, 802.15.4g, 802.15.4e, 1901.2a, 802.11ah and Lora WAN, Network Layer: IP versions, Constrained Nodes and Constrained Networks, Optimizing IP for IoT: From 6LoWPAN to 6Lo, Routing over Low Power and Lossy Networks, Application Transport Methods: Supervisory Control and Data Acquisition, Application Layer Protocols: CoAP and MQTT.

UNIT III: Design And Development- Design Methodology, Embedded computing logic, Microcontroller, System on Chips, IoT system building blocks, Arduino, Board details, IDE programming, Raspberry Pi, Interfaces and Raspberry Pi with Python Programming.

UNIT IV: Data Analytics And Supporting Services- Structured Vs Unstructured Data and Data in Motion Vs Data in Rest, Role of Machine Learning – No SQL Databases, Hadoop Ecosystem, Apache Kafka, Apache Spark, Edge Streaming Analytics and Network Analytics, Xively Cloud for IoT, Python Web Application Framework, Django, AWS for IoT, System Management with NETCONF-YANG

UNIT V: Case Studies/Industrial Applications: IoT applications in home, infrastructures, buildings, security, Industries, Home appliances, other IoT electronic equipments. Use of Big Data and Visualization in IoT, Industry 4.0 concepts.

Sensors and sensor Node and interfacing using any Embedded target boards (Raspberry Pi / Intel Galileo/ARM Cortex/ Arduino)

Text Books:

1.IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, Cisco Press, 2017

Reference Books:

1. Internet of Things – A hands-on approach, ArshdeepBahga, Vijay Madisetti, Universities Press, 2015
2. The Internet of Things – Key applications and Protocols, Olivier Hersent, David Boswarthick, Omar Elloumi and Wiley, 2012 (for Unit 2).
3. "From Machine-to-Machine to the Internet of Things – Introduction to a New Age of Intelligence",Jan Ho¨ ller, VlasiosTsiatsis, Catherine Mulligan, Stamatis, Karnouskos, Stefan Avesand. David Boyle and Elsevier, 2014.
4. Architecting the Internet of Things,Dieter Uckelmann, Mark Harrison, Michahelles and Florian (Eds), Springer, 2011.
5. Recipes to Begin, Expand, and Enhance Your Projects, 2nd Edition,Michael Margolis, Arduino Cookbook and O'Reilly Media, 2011.

Course Outcomes:

At the end of this course, students will be able to

- Apply the Knowledge in IOT Technologies and Data management.
- Determine the values chains Perspective of M2M to IOT.
- Implement the state of the Architecture of an IOT.
- Compare IOT Applications in Industrial & real world.
- Demonstrate knowledge and understanding the security and ethical issues of an IOT.

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VLSI Signal Processing
(Elective III)

UNIT -I
Introduction to DSP: Typical DSP algorithms, DSP algorithms benefits, Representation of DSP algorithms Pipelining and Parallel Processing
Introduction, Pipelining of FIR Digital filters, Parallel Processing, Pipelining and Parallel Processing for Low Power Retiming Introduction, Definitions and Properties, Solving System of Inequalities, Retiming Techniques

UNIT –II
Folding and Unfolding: Folding- Introduction, Folding Transform, Register minimization Techniques, Register minimization in folded architectures, folding of Multirate systems
Unfolding- Introduction, An Algorithm for Unfolding, Properties of Unfolding, critical Path, Unfolding and Retiming, Applications of Unfolding

UNIT -III
Systolic Architecture Design: Introduction, Systolic Array Design Methodology, FIR Systolic Arrays, Selection of Scheduling Vector, Matrix Multiplication and 2D Systolic Array Design, Systolic Design for Space Representations contain Delays.

UNIT -IV
Fast Convolution: Introduction – Cook-Toom Algorithm – Winograd algorithm – Iterated Convolution – Cyclic Convolution – Design of Fast Convolution algorithm by Inspection

Unit 5: Digital lattice filter structures, bit level arithmetic, architecture, redundant arithmetic. Numerical strength reduction, synchronous, wave and asynchronous pipe lines, low power design.
Low Power Design:Scaling Vs Power Consumption, Power Analysis, Power Reduction techniques, Power Estimation Approaches

Text Books:

1. Keshab K. Parthi[A1] , VLSI Digital signal processing systems, design and implementation[A2] , Wiley, Inter Science, 1999.
2. Mohammad Isamail and Terri Fiez, Analog VLSI signal and information processing, McGraw Hill, 1994
3. S.Y. Kung, H.J. White House, T. Kailath, VLSI and Modern Signal Processing, Prentice Hall, 1985.

Course Outcomes
On successful completion of the module, students will be able to:

1. Ability to modify the existing or new DSP architectures suitable for VLSI.
2. Understand the concepts of folding and unfolding algorithms and applications.
3. Ability to implement fast convolution algorithms.
   Low power design aspects of processors for signal processing and wireless applications.

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Network Security and Cryptography
(Elective IV)

Unit 1:Security
Need, security services, Attacks, OSI Security Architecture, one time passwords, Model forNetwork security, Classical Encryption Techniques like substitution ciphers, Transpositionciphers, Cryptanalysis of Classical Encryption Techniques.

Number Theory
Introduction, Fermat's and Euler's Theorem, The Chinese Remainder Theorem, EuclideanAlgorithm, Extended Euclidean Algorithm, and Modular Arithmetic.

Unit 2: Private-Key (Symmetric) Cryptography
Block Ciphers, Stream Ciphers, RC4 Stream cipher, Data Encryption Standard (DES),AdvancedEncryption Standard (AES), Triple DES, RC5, IDEA, Linear and DifferentialCryptanalysis.

Unit 3:Public-Key (Asymmetric) Cryptography

RSA, Key Distribution and Management, Diffie-Hellman Key Exchange, Elliptic CurveCryptography, Message Authentication Code, hash functions, message digest algorithms:MD4 MD5, Secure Hash algorithm, RIPEMD-160, HMAC.

Unit 4:Authentication
IP and Web Security Digital Signatures, Digital Signature Standards, Authentication Protocols,Kerberos, IP security Architecture, Encapsulating Security Payload, Key Management, WebSecurity Considerations, Secure Socket Layer and Transport Layer Security, Secure ElectronicTransaction.

Unit 5:System Security
Intruders, Intrusion Detection, Password Management, Worms, viruses, Trojans, VirusCountermeasures, Firewalls, Firewall Design Principles, Trusted Systems.

Text Books:

1. William Stallings, "Cryptography and Network Security, Principles and Practices", Pearson Education, 3rd Edition.
2. Charlie Kaufman, Radia Perlman and Mike Speciner, "Network Security, Private
3. Communication in a Public World", Prentice Hall, 2nd Edition

Reference Books:

1. Christopher M. King, Ertem Osmanoglu, Curtis Dalton, "Security Architecture, Design Deployment and Operations", RSA Pres,
2. Stephen Northcutt, LenyZeltser, Scott Winters, Karen Kent, and Ronald W. Ritchey,
3. "Inside Network Perimeter Security", Pearson Education, 2nd Edition
4. Richard Bejtlich, "The Practice of Network Security Monitoring: Understanding Incident

Course Outcomes:

At the end of the course, students will be able to:

- Identify and utilize different forms of cryptography techniques.
- Incorporate authentication and security in the network applications.
- Distinguish among different types of threats to the system and handle the same.

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I Year II Semester

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Microcontrollers and Programmable Digital Signal Processors
(Elective IV)

Unit 1:
ARM Cortex-M3 processor: Applications, Programming model – Registers, Operationmodes,Exceptions and Interrupts, Reset Sequence Instruction Set, Unified Assembler Language,Memory Maps, Memory Access Attributes, Permissions, Bit-Band Operations, Unaligned andExclusive Transfers. Pipeline, Bus Interfaces

Unit 2:
Exceptions, Types, Priority, Vector Tables, Interrupt Inputs and Pending behavior, Fault Exceptions, Supervisor and Pendable Service Call, Nested Vectored Interrupt Controller, BasicConfiguration, SYSTICK Timer, Interrupt Sequences, Exits, Tail Chaining, Interrupt Latency.

Unit 3:
LPC 17xx microcontroller- Internal memory, GPIOs, Timers, ADC, UART and other serialinterfaces, PWM, RTC, WDT

Unit 4:
Programmable DSP (P-DSP) Processors:Harvard architecture, Multi port memory, architectural structure of P-DSP- MAC unit, Barrelshifters, Introduction to TI DSP processor family

Unit 5:
VLIW architecture and TMS320C6000 series, architecture study, data paths, cross paths,Introduction to Instruction level architecture of C6000 family, Assembly Instructions memoryaddressing, for arithmetic, logical operationsCode Composer Studio for application development for digital signal processing,On chip peripherals, Processor benchmarking

Text Books:

1. Joseph Yiu, “The definitive guide to ARM Cortex-M3”, Elsevier, 2nd Edition
2. Venkatramani B. and Bhaskar M. “Digital Signal Processors: Architecture, Programming and Applications” , TMH , 2nd Edition
3. Sloss Andrew N, Symes Dominic, Wright Chris, “ARM System Developer's Guide: Designing and Optimizing”, Morgan Kaufman Publication

Reference Books:

1.. Steve furber, “ARM System-on-Chip Architecture”, Pearson Education
2. Frank Vahid and Tony Givargis, “Embedded System Design”, Wiley
3. Technical references and user manuals on www.arm.com, NXP Semiconductorwww.nxp.com and Texas Instruments www.ti.com

Course Outcomes:
At the end of this course, students will be able to

- Compare and select ARM processor core based SoC with several features/peripherals based on requirements of embedded applications.
- Identify and characterize architecture of Programmable DSP Processors
- Develop small applications by utilizing the ARM processor core and DSP processor basedplatform.

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LOW POWER VLSI DESIGN
(Elective IV)

UNIT-I: Sources of Power Dissipation

Introduction, Short-Circuit Power Dissipation, Switching Power Dissipation, Dynamic Power for a Complex Gate, Reduced Voltage Swing, Switching Activity, Leakage Power Dissipation, p–n Junction Reverse-Biased Current, Band-to-Band Tunneling Current, Sub threshold Leakage Current, Short-Channel Effects

UNIT 2: Supply Voltage Scaling for Low Power

Device Feature Size Scaling, Constant-Field Scaling, Constant-Voltage Scaling, Architectural-Level Approaches: Parallelism for Low Power, Pipelining for Low Power, Combining Parallelism with Pipelining, Voltage Scaling Using High-Level Transformations: Multilevel Voltage Scaling Challenges in MVS Voltage Scaling Interfaces, Static Timing Analysis Dynamic Voltage and Frequency Scaling

UNIT-3: Switched Capacitance Minimization

Probabilistic Power Analysis: Random logic signals, probability and frequency, probabilistic power analysis techniques, signal entropy, Bus Encoding: Gray Coding, One-Hot Coding, Bus-Inversion, T0 Coding, Clock Gating, Gated-Clock FSMs FSM State Encoding, FSM Partitioning, Pre computation, Glitching Power Minimization

UNIT 4: Leakage Power Minimization

Fabrication of Multiple Threshold Voltages, Multiple Channel Doping, Multiple Oxide CMOS, Multiple Channel Length, Multiple Body Bias, VTCMOS Approach, MTCMOS Approach, Power Gating, Clock Gating Versus Power Gating, Power-Gating Issues, Isolation Strategy, State Retention Strategy, Power-Gating Controller, Power Management, Combining DVFS and Power Management

UNIT 5: Low power clock distribution & Simulation Power Analysis

Low power clock distribution: Power dissipation in clock distribution, single driver versus distributed buffers, Zero skew versus tolerable skew, chip and package co design for clock network.

Simulation Power Analysis: SPICE circuit simulators, gate level logic simulation, capacitive power estimation, architecture level analysis, data correlation analysis of DSP systems, Monte Carlo Simulation

Text Books:

1. Low-Power VLSI Circuits and Systems,Ajit Pal, SPRINGER PUBLISHERS
2. Practical Low Power Digital VlsiDesign , Gary Yeap Motorola, Springer Science Business Media, LLC.

Reference Books:

1. Low Power CMOS Design – Anantha Chandrakasan, IEEE Press/Wiley International, 1998. 2
2. MassoudPedram, Jan M. Rabaey , "Low power design methodologies ", Kluwer Academic Publishers.
3. Low Power CMOS VLSI Circuit Design – A. Bellamour, M. I. Elamasri, Kluwer Academic Press, 1995.

Course Outcomes:

At the end of the course, students will be able to:

- Identify the sources of power dissipation in digital IC systems & understand the impact of power on system performance and reliability.
- Characterize and model power consumption & understand the basic analysis methods.
- Understand leakage sources and reduction techniques.

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Mixed Signal IC Design Lab

Detailed Syllabus:
Cycle 1:
1) Fully compensated op-amp with resistor and miller compensation
2) High speed comparator design
i. Two stage cross coupled clamped comparator
ii. Strobed Flip-flop
3) Data converter

Cycle 2:
1) Switched capacitor circuits
i. Parasitic sensitive integrator
ii. Parasitic insensitive integrator
2) Design of PLL
3) Design of VCO
4) Bandgap reference circuit
5) Layouts of All the circuits Designed and Simulated

Software:

Mentor Graphics/ Cadence/ Tanner/Industry Equivalent Standard Software Tools

Hardware:

Personal Computer with necessary peripherals, configuration and operating System.

Reading:
1) David A johns, Ken Martin, Analog Integrated Circuit Design, Wiley, 2008.
2) R. Gregorian and G.C Ternes, Analog MOS Integrated Circuits for Signal Processing, Wiley, 1986.
3) Roubik Gregorian, Introduction to CMOS OpAmp and Comparators, Wiley, 1999.
4) Alan Hastlings, The art of Analog Layout, Wiley, 2005.

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I Year II Semester	**0**	**4**	**2**

Physical Design Automation Lab

Detailed syllabus:
Cycle 1:

1) Graph algorithms
a) Graph search algorithms
i. Depth first search
ii. Breadth first search
b) Spanning tree algorithm
i. Kruskal's algorithm
c) Shortest path algorithm
i. Dijkstra algorithm
ii. Floyd- Warshall algorithm
d) Steiner tree algorithm

2) Computational geometry algorithm
a) Line sweep method
b) Extended line sweep method

Cycle 2:

3) Partitioning algorithms
I) Group migration algorithms
a) Kernighan –Lin algorithm
b) Extensions of Kernighan-Lin algorithm
i) Fiduccias –Mattheyses algorithm
ii) Goldberg and Burstein algorithm
II) Simulated annealing and evolution algorithms
a) Simulated annealing algorithm
b) Simulated evolution algorithm
III) Metric allocation method

4) Floor planning algorithms
i) Constraint based methods
ii) Integer programming based methods
iii) Rectangular dualization based methods
iv) Hierarchical tree based methods
v) Simulated evolution algorithms
vi) Time driven Floorplanning algorithms

5) Routing algorithms

I) Two terminal algorithms
a) Maze routing algorithms
i)Lee's algorithm
ii) Soukup's algorithm
iii) Hadlock algorithm
b) Line-Probe algorithm
c) Shortest path based algorithm
II) Multi terminal algorithm
a) Stenier tree based algorithm
i) SMST algorithm
ii) Z-RST algorithm

Software required: C/C++ Programming Language /Relevant software

Reading:

1) Naveed Shervani, Algorithms for Physical Design Automation, 3rd Edition, Kluwer Academic,1998.
2) Charles J Alpert, Dinesh P Mehta, Sachin S. Sapatnekar, Handbook of Algorithms for Physical Design Automation, CRC Press,2008.

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I Year II Semester

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0	4	2

MINI PROJECT

Syllabus Contents

The students are required to search / gather the material / information on a specific a topic comprehend it and present / discuss in the class.

Course Outcomes

At the end of this course, students will be able to

1. Understand of contemporary / emerging technology for various processes and systems.
2. Share knowledge effectively in oral and written form and formulate documents

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Scripting Languages for VLSI
(Elective V)

UNIT-I:
Introduction to Scripts and Scripting: Basics of Linux, Origin of Scripting languages, scriptingtoday, Characteristics and uses of scripting languages.
PERL: Introduction to PERL, Names and values, Variables and assignment, Scalar expressions,Control structures, Built-in functions, Collections of Data, working with arrays, Lists and hashes,
Simple input and output, Strings, Patterns and regular expressions, Subroutines, Scripts witharguments.

UNIT-II:
Advanced PERL: Finer points of Looping, Subroutines, Using Pack and Unpack, working with files, Type globs, Eval, References, Data structures, Packages, Libraries and modules, Objects, Objectsand modules in action, tied variables, interfacing to the operating systems, Security issues.

UNIT-III:
TCL: The TCL phenomena, Philosophy, Structure, Syntax, Parser, Variables and data in TCL,Control flow, Data structures, Simple input/output, Procedures, Working with Strings, Patterns,Filesand Pipes, Example code.

UNIT-IV:
Advanced TCL: The eval, source, exec and up-level commands, Libraries and packages,Namespaces, trapping errors, Event-driven programs, Making applications 'Internet-aware','Nuts-and-bolts' internet programming, Security issues, TCL and TK integration.

UNIT-V:
PYTHON: Introduction to PYTHON language, PYTHON-syntax, statements, functions, Built-in functionsand Methods, Modules in PYTHON, Exception Handling.

Text Books:

1. The World of Scripting Languages- David Barron, Wiley Student Edition, 2010.
2. PYTHON Web Programming, Steve Holden and David Beazley, New Riders Publications

References:

1. TCL/TK: A Developer's Guide- ClifFlynt, 2003, Morgan Kaufmann Series.
2. Core PYTHON Programming, Chun, Pearson Education, 2006.
3. Learning Perl, Randal L. Schwartz, O' Reilly publications 6th edition 2011.
4. Linux: The Complete Reference", Richard Peterson McGraw Hill Publications, 6th Edition,2008.

Course Outcomes:

At the end of this course, the student will be able to:

- Gain fluency in programming with scripting languages
- Create and run scripts using PERL/TCL/PYTHON in CAD Tools
- Demonstrate the use of PERL/PYTHON/ TCL in developing system and web applications

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Digital Design and Verification
(Elective V)

Unit 1
Revision of basic Digital systems: Combinational Circuits, Sequential Circuits, Logic families.Synchronous FSM and asynchronous design, Meta-stability, Clock distribution and issues, basicbuilding blocks like PWM module, pre-fetch unit, programmable counter, FIFO, Booth'smultiplier, ALU, Barrel shifter etc.

Unit 2
Verilog/VHDL Comparisons and Guidelines, Verilog: HDL fundamentals, simulation, and testbenchdesign, Examples of Verilog codes for combinational and sequential logic, Verilog AMS. IP and Prototyping: IP in various forms: RTL Source code, Encrypted Source code, Soft IP,Netlist, Physical IP, and Use of external hard IP during prototyping, Case studies, and Speedissues.

Unit 3
System Verilog and Verification: Verification guidelines, Data types, procedural statements androutines, connecting the test bench and design, Assertions, Basic OOP concepts, Randomization. Testing of logic circuits: Fault models, BIST, JTAG interface Introduction to basic scripting language: Perl, Tcl/Tk

Unit 4
Current challenges in physical design: Roots of challenges, Delays: Wire load models GenericPDflow, Challenges in PD flow at different steps, SI Challenge - Noise & Crosstalk, IR Drop,Process effects: Process Antenna Effect &Electro migration

Unit 5
Programmable Logic Devices: Introduction, Evolution: PROM, PLA, PAL, Architecture of PAL's,Applications, Programming PLD's, FPGA with technology: Anti-fuse, SRAM, EPROM, MUX,FPGA structures, and ASIC Design Flows, Programmable Interconnections, Coarse grainedreconfigurable devices

Text Books:

1. Douglas Smith, “HDL Chip Design: A Practical Guide for Designing, Synthesizing &
2. Simulating ASICs & FPGAs Using VHDL or Verilog”, Doone publications, 1998.
3. Samir Palnitkar, “Verilog HDL: A guide to Digital Design and Synthesis”, Prentice Hall,2nd Edition, 2003.

Reference Books:

1. Doug Amos, Austin Lesea, Rene Richter, "FPGA based Prototyping Methodology Manual", Synopsys Press, 2011.
2. Christophe Bobda, "Introduction to Reconfigurable Computing, Architectures, Algorithmsand Applications", Springer, 2007.
3. Janick Bergeron, "Writing Testbenches: Functional Verification of HDL Models", SecondEdition, Springer, 2003.

Course Outcomes:

At the end of this course, students will be able to

- Familiarity of Front end design and verification techniques and create reusable test environments.
- Verify increasingly complex designs more efficiently and effectively.
- Use EDA tools like Cadence, Mentor Graphics.

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HARDWARE SOFTWARE CO-DESIGN
(Elective V)

UNIT-I:

Co- Design Issues: Co- Design Models, Architectures, Languages, A Generic Co-design Methodology.

Co- Synthesis Algorithms: Hardware software synthesis algorithms: hardware – software partitioning distributed system co-synthesis.

UNIT-II:

Prototyping and Emulation

Prototyping and emulation techniques, prototyping and emulation environments, future developments in emulation and prototyping architecture specialization techniques, system communication infrastructure

Target Architectures

Architecture Specialization techniques, System Communication infrastructure, Target Architecture and Application System classes, Architecture for control dominated systems (8051-Architectures for High performance control), Architecture for Data dominated systems (ADSP21060, TMS320C60), Mixed Systems.

UNIT-III:

Compilation Techniques and Tools for Embedded Processor Architectures

Modern embedded architectures, embedded software development needs, compilation technologies, practical consideration in a compiler development environment.

UNIT-IV:

Design Specification and Verification

Design, co-design, the co-design computational model, concurrency coordinating concurrent computations, interfacing components, design verification, implementation verification, verification tools, Interface verification.

UNIT-V: Languages for System-Level Specification and Design-I

System-level specification, design representation for system level synthesis, system level specification languages. **Languages for System-Level Specification and Design-II**

Heterogeneous specifications and multi language co-simulation, the cosyma system and Lycos system.

Text Books:

1. Hardware / Software Co- Design Principles and Practice – Jorgen Staunstrup, Wayne Wolf – 2009, Springer.
2. Hardware / Software Co- Design - Giovanni De Micheli, Mariagiovanna Sami, 2002, Kluwer Academic Publishers.

Reference Books:

1. A Practical Introduction to Hardware/Software Co-design -Patrick R. Schaumont - 2010 – Springer Publications.

Course outcomes

At the end of the course the student able to

- About the Hardware-Software Code sign Methodology.
- How to select a target architecture and how a prototype is built and how emulation of a prototype is done.
- Brief view about compilation technologies and compiler development environment.
- Understand the importance of system level specification languages and multi-language co-simulation.

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(DISSERTATION) DISSERTATION PHASE – I AND PHASE – II

Syllabus Contents:

The dissertation / project topic should be selected / chosen to ensure the satisfaction of the urgent need to establish a direct link between education, national development and productivity and thus reduce the gap between the world of work and the world of study. The dissertation should have the following

- Relevance to social needs of society
- Relevance to value addition to existing facilities in the institute
- Relevance to industry need
- Problems of national importance
- Research and development in various domain

The student should complete the following:

- Literature survey Problem Definition
- Motivation for study and Objectives
- Preliminary design / feasibility / modular approaches
- Implementation and Verification
- Report and presentation

The dissertation stage II is based on a report prepared by the students on dissertation allotted to them. It may be based on:

- Experimental verification / Proof of concept.
- Design, fabrication, testing of Communication System.
- The viva-voce examination will be based on the above report and work.

Guidelines for Dissertation Phase – I and II at M. Tech. (Electronics):

- As per the AICTE directives, the dissertation is a yearlong activity, to be carried out and evaluated in two phases i.e. Phase – I: July to December and Phase – II: January to June.
- The dissertation may be carried out preferably in-house i.e. department's laboratories and centers OR in industry allotted through department's T & P coordinator.
- After multiple interactions with guide and based on comprehensive literature survey, the student shall identify the domain and define dissertation objectives. The referred literature should preferably include IEEE/IET/IETE/Springer/Science Direct/ACM journals in the areas of Computing and Processing (Hardware and Software), Circuits-Devices and Systems, Communication-Networking and Security, Robotics and Control Systems, Signal Processing and Analysis and any other related domain. In case of Industry sponsored projects, the relevant application notes, while papers, product catalogues should be referred and reported.
- Student is expected to detail out specifications, methodology, resources required, critical issues involved in design and implementation and phase wise work distribution, and

submit the proposal within a month from the date of registration.

- Phase – I deliverables: A document report comprising of summary of literature survey, detailed objectives, project specifications, paper and/or computer aided design, proof of concept/functionality, part results, A record of continuous progress.
- Phase – I evaluation: A committee comprising of guides of respective specialization shall assess the progress/performance of the student based on report, presentation and Q &A. In case of unsatisfactory performance, committee may recommend repeating the Phase-I work.
- During phase – II, student is expected to exert on design, development and testing of the proposed work as per the schedule. Accomplished results/contributions/innovations should be published in terms of research papers in reputed journals and reviewed focused conferences OR IP/Patents.
- Phase – II deliverables: A dissertation report as per the specified format, developed system in the form of hardware and/or software, a record of continuous progress.
- Phase – II evaluation: Guide along with appointed external examiner shall assess the progress/performance of the student based on report, presentation and Q &A. In case of unsatisfactory performance, committee may recommend for extension or repeating the work

Course Outcomes:

At the end of this course, students will be able to

- Ability to synthesize knowledge and skills previously gained and applied to an in-depth study and execution of new technical problem.
- Capable to select from different methodologies, methods and forms of analysis to produce a suitable research design, and justify their design.
- Ability to present the findings of their technical solution in a written report.
- Presenting the work in International/ National conference or reputed journals.

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BUSINESS ANALYTICS
(Open Elective)

Unit1:
Business analytics: Overview of Business analytics, Scope of Business analytics, Business Analytics Process, Relationship of Business Analytics Process and organisation, competitive advantages of Business Analytics.
Statistical Tools: Statistical Notation, Descriptive Statistical methods,
Review of probability distribution and data modelling, sampling and estimation methods overview.

Unit 2:
Trendiness and Regression Analysis: Modelling Relationships and Trends in Data, simple Linear Regression.Important Resources, Business Analytics Personnel, Data and modelsfor Business analytics, problem solving, Visualizing and Exploring Data, Business Analytics Technology

Unit 3:
Organization Structures of Business analytics, Team management, Management Issues, Designing Information Policy, Outsourcing, Ensuring Data Quality, Measuring contribution of Business analytics, Managing Changes.Descriptive Analytics, predictive analytics, predicative Modelling, Predictive analytics analysis,DataMining,Data Mining Methodologies, Prescriptive analytics and its step in the business analytics Process, Prescriptive Modelling, nonlinear Optimization.

Unit 4:
Forecasting Techniques: Qualitative and Judgmental Forecasting, Statistical Forecasting Models, Forecasting Models for Stationary Time Series, Forecasting Models for Time Series with a Linear Trend, Forecasting Time Series with Seasonality, Regression Forecasting with Casual Variables, Selecting Appropriate Forecasting Models.
Monte Carlo Simulation and Risk Analysis: Monte CarleSimulation
Using Analytic Solver Platform, New-Product Development Model, Newsvendor Model, Overbooking Model, Cash Budget Model.

Unit 5:
Decision Analysis: Formulating Decision Problems, DecisionStrategies with the without Outcome Probabilities, Decision Trees, The Value of Information, Utility and Decision Making.
Recent Trends in : Embedded and collaborative business intelligence,Visual data recovery, Data Storytelling and Data journalism

Reference:

1. Business analytics Principles, Concepts, and Applications by Marc J. Schniederjans, Dara G. Schniederjans, Christopher M. Starkey, Pearson FTPress.
2. Business Analytics by James Evans, personsEducation.

Course Outcomes:

- Students will demonstrate knowledge of data analytics.
- Students will demonstrate the ability of think critically in making decisions based on data and deep analytics.
- Students will demonstrate the ability to use technical skills in predicative and prescriptive modeling to support business decision-making.
- Students will demonstrate the ability to translate data into clear, actionable insights

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INDUSTRIAL SAFETY
(Open Elective)

Unit-1:

Industrial safety: Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, wash rooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc, Safety color codes. Fire prevention and firefighting, equipment and methods.

Unit-2:

Fundamentals of maintenance engineering: Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment.

Unit-3:

Wear and Corrosion and their prevention: Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working and applications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication, Definition, principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods.

Unit-4:

Fault tracing: Fault tracing-concept and importance, decision treeconcept, need and applications, sequence of fault finding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic,automotive, thermal and electrical equipment's like, I. Any one machine tool, ii. Pump iii. Air compressor, iv. Internal combustion engine,v. Boiler,vi .Electrical motors, Types of faults in machine tools and their generalcauses.

Unit-5:

Periodic and preventive maintenance: Periodic inspection-concept and need, degreasing, cleaning and repairing schemes, overhauling of mechanical components, overhauling of electrical motor, common troubles and remedies of electric motor, repair complexities and its use, definition, need, steps and advantages of preventive maintenance. Steps/procedure for periodic and preventive maintenance of: I. Machine tools, ii. Pumps, iii.Air compressors, iv. Diesel generating (DG) sets, Program and schedule of preventive maintenance of mechanical and electrical equipment, advantages of preventive maintenance. Repair cycle concept and importance

Reference:

1. Maintenance Engineering Handbook, Higgins & Morrow, Da InformationServices.
2. Maintenance Engineering, H. P. Garg, S. Chand andCompany.
3. Pump-hydraulic Compressors, Audels, McgrewHillPublication.
4. Foundation Engineering Handbook, Winterkorn, Hans, Chapman &HallLondon

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OPERATIONS RESEARCH
(Open Elective)

Unit 1:
Optimization Techniques, Model Formulation, models, General L.R Formulation, Simplex Techniques, Sensitivity Analysis, Inventory Control Models

Unit 2
Formulation of a LPP - Graphical solution revised simplex method - duality theory - dual simplex method - sensitivity analysis - parametric programming

Unit 3:
Nonlinear programming problem - Kuhn-Tucker conditions min cost flow problem - max flow problem - CPM/PERT

Unit 4
Scheduling and sequencing - single server and multiple server models - deterministic inventory models - Probabilistic inventory control models - Geometric Programming.

Unit 5
Competitive Models, Single and Multi-channel Problems, Sequencing Models, Dynamic Programming, Flow in Networks, Elementary Graph Theory, Game Theory Simulation

References:

1. H.A. Taha, Operations Research, An Introduction, PHI, 2008
2. H.M. Wagner, Principles of Operations Research, PHI, Delhi, 1982.
3. J.C. Pant, Introduction to Optimisation: Operations Research, Jain Brothers, Delhi, 2008
4. Hitler Libermann Operations Research: McGraw Hill Pub. 2009
5. Pannerselvam, Operations Research: Prentice Hall of India 2010
6. Harvey M Wagner, Principles of Operations Research: Prentice Hall of India 2010

Course Outcomes:

At the end of the course, the student should be able to

1. Students should able to apply the dynamic programming to solve problems of discreet and continuous variables.
2. Students should able to apply the concept of non-linear programming
3. Students should able to carry out sensitivity analysis
4. Student should able to model the real world problem and simulate it.

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COST MANAGEMENT OF ENGINEERING PROJECTS
(Open Elective)

Introduction and Overview of the Strategic Cost Management Process

Cost concepts in decision-making; Relevant cost, Differential cost, Incremental cost and Opportunity cost. Objectives of a Costing System; Inventory valuation; Creation of a Database for operational control; Provision of data for Decision-Making.

Project: meaning, Different types, why to manage, cost overruns centres, various stages of project execution: conception to commissioning. Project execution as conglomeration of technical and non- technical activities.Detailed Engineering activities. Pre project execution main clearances and documents Project team: Role of each member. Importance Project site: Data required with significance. Project contracts.Types and contents. Project execution Project cost control. Bar charts and Network diagram. Project commissioning: mechanical and process

Cost Behavior and Profit Planning Marginal Costing; Distinction between Marginal Costing and Absorption Costing; Break-even Analysis, Cost-Volume-Profit Analysis. Various decision-making problems. Standard costing and Variance Analysis. Pricing strategies: Pareto Analysis. Target costing, Life Cycle Costing. Costing of service sector.Just-in-time approach, Material Requirement Planning, Enterprise Resource Planning, Total Quality Management and Theory of constraints.Activity-Based Cost Management, Bench Marking; Balanced Score Card and Value-Chain Analysis.Budgetary Control; Flexible Budgets;Performance budgets; Zero-based budgets.Measurement of Divisional profitability pricing decisions including transfer pricing.

Quantitative techniques for cost management, Linear Programming, PERT/CPM, Transportation problems, Assignment problems, Simulation, Learning Curve Theory.

References:

1. Cost Accounting A Managerial Emphasis, Prentice Hall of India, New Delhi
2. Charles T. Horngren and George Foster, Advanced Management Accounting
3. Robert S Kaplan Anthony A. Alkinson, Management & Cost Accounting
4. Ashish K. Bhattacharya, Principles & Practices of Cost Accounting A. H. Wheeler publisher
5. N.D. Vohra, Quantitative Techniques in Management, Tata McGraw Hill Book Co. Ltd.

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COMPOSITE MATERIALS
(Open Elective)

UNIT–I:
INTRODUCTION: Definition – Classification and characteristics of Composite materials. Advantages and application of composites. Functional requirements of reinforcement and matrix.Effect of reinforcement (size, shape, distribution, volume fraction) on overall composite performance.

UNIT – II:
REINFORCEMENTS: Preparation-layup, curing, properties and applications of glass fibers, carbon fibers, Kevlar fibers and Boron fibers. Properties and applications of whiskers, particle reinforcements. Mechanical Behavior of composites: Rule of mixtures, Inverse rule of mixtures. Isostrain and Isostress conditions.

UNIT – III:
Manufacturing of Metal Matrix Composites: Casting – Solid State diffusion technique, Cladding – Hot isostaticpressing. Properties and applications. Manufacturing of Ceramic Matrix Composites: Liquid Metal Infiltration – Liquid phase sintering. Manufacturing of Carbon – Carbon composites: Knitting, Braiding, Weaving. Properties and applications.

UNIT–IV:
Manufacturing of Polymer Matrix Composites: Preparation of Moulding compounds and prepregs – hand layup method – Autoclave method – Filament winding method – Compression moulding – Reaction injection moulding. Properties and applications.

UNIT – V:
Strength: Laminar Failure Criteria-strength ratio, maximum stress criteria, maximum strain criteria, interacting failure criteria, hygrothermal failure. Laminate first play failure-insight strength; Laminate strength-ply discount truncated maximum strain criterion; strength design using caplet plots; stress concentrations.

TEXT BOOKS:

1. Material Science and Technology – Vol 13 – Composites by R.W.Cahn – VCH, West Germany.
2. Materials Science and Engineering, An introduction. WD Callister, Jr., Adapted by R. Balasubramaniam, John Wiley & Sons, NY, Indian edition,2007.

References:

1. Hand Book of CompositeMaterials-ed-Lubin.
2. Composite Materials – K.K.Chawla.
3. Composite Materials Science and Applications – Deborah D.L.Chung.
4. Composite Materials Design and Applications – Danial Gay, Suong V. Hoa, and Stephen W. Tasi.

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WASTE TO ENERGY
(Open Elective)

Unit-I:
Introduction to Energy from Waste: Classification of waste as fuel – Agro based, Forest residue, Industrial waste - MSW – Conversion devices – Incinerators, gasifiers, digestors

Unit-II:
Biomass Pyrolysis: Pyrolysis – Types, slow fast – Manufacture of charcoal – Methods - Yields and application – Manufacture of pyrolytic oils and gases, yields and applications.

Unit-III:
Biomass Gasification: Gasifiers – Fixed bed system – Downdraft and updraft gasifiers – Fluidized bed gasifiers – Design, construction and operation – Gasifier burner arrangement for thermal heating – Gasifier engine arrangement and electrical power – Equilibrium and kinetic consideration in gasifier operation

Unit-IV:
Biomass Combustion: Biomass stoves – Improved chullahs, types, some exotic designs, Fixed bed combustors, Types, inclined grate combustors, Fluidized bed combustors, Design, construction and operation - Operation of all the above biomass combustors.

Unit-V:
Biogas: Properties of biogas (Calorific value and composition) - Biogas plant technology and status - Bio energy system - Design and constructional features - Biomass resources and their classification - Biomass conversion processes - Thermo chemical conversion - Direct combustion - biomass gasification - pyrolysis and liquefaction - biochemical conversion - anaerobic digestion - Types of biogas Plants – Applications - Alcohol production from biomass - Bio diesel production - Urban waste to energy conversion - Biomass energy programme in India.

References:

1. Non Conventional Energy, Desai, Ashok V., Wiley Eastern Ltd., 1990.
2. Biogas Technology - A Practical Hand Book - Khandelwal, K. C. and Mahdi, S. S., Vol. I & II, Tata McGraw Hill Publishing Co. Ltd., 1983.
3. Food, Feed and Fuel from Biomass, Challal, D. S., IBH Publishing Co. Pvt. Ltd., 1991.
4. Biomass Conversion and Technology, C. Y. WereKo-Brobby and E. B. Hagan, John Wiley & Sons, 1996.

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AUDIT 1 and 2: ENGLISH FOR RESEARCH PAPER WRITING

Course objectives:
Students will be able to:
Understand that how to improve your writing skills and level of readability
Learn about what to write in each section
Understand the skills needed when writing a Title Ensure the good quality of paper at very first-time submission

Syllabus

Units	CONTENTS	Hours
1	Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness	4
2	Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticising, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction	4
3	Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check.	4
4	key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature,	4
5	skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions	4
6	useful phrases, how to ensure paper is as good as it could possibly be the first- time submission	4

Suggested Studies:

1. Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books)
2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press
3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman'sbook .
4. Adrian Wallwork , English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011

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AUDIT 1 and 2: DISASTER MANAGEMENT

Course Objectives: -Students will be able to:

learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.

critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.

develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.

critically understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home country or the countries they work in

Syllabus

Units	CONTENTS	Hours
1	**Introduction** Disaster: Definition, Factors And Significance; Difference Between Hazard And Disaster; Natural And Manmade Disasters: Difference, Nature, Types And Magnitude.	4
2	**Repercussions Of Disasters And Hazards**: Economic Damage, Loss Of Human And Animal Life, Destruction Of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts.	4
3	**Disaster Prone Areas In India** Study Of Seismic Zones; Areas Prone To Floods And Droughts, Landslides And Avalanches; Areas Prone To Cyclonic And Coastal Hazards With Special Reference To Tsunami; Post-Disaster Diseases And Epidemics	4
4	**Disaster Preparedness And Management** Preparedness: Monitoring Of Phenomena Triggering A Disaster Or Hazard; Evaluation Of Risk: Application Of Remote Sensing, Data From Meteorological And Other Agencies, Media Reports: Governmental And Community Preparedness.	4
5	**Risk Assessment** Disaster Risk: Concept And Elements, Disaster Risk Reduction, Global And National Disaster Risk Situation. Techniques Of Risk Assessment, Global Co-Operation In Risk Assessment And Warning, People's Participation In Risk Assessment. Strategies for Survival.	4
6	**Disaster Mitigation** Meaning, Concept And Strategies Of Disaster Mitigation, Emerging Trends In Mitigation. Structural Mitigation And Non-Structural Mitigation, Programs Of Disaster Mitigation In India.	4

Suggested Readings:

1. R. Nishith, Singh AK, "Disaster Management in India: Perspectives, issues and strategies "'New Royal book Company.
2. Sahni, PardeepEt.Al. (Eds.)," Disaster Mitigation Experiences And Reflections", Prentice Hall Of India, New Delhi.
3. Goel S. L. , Disaster Administration And Management Text And Case Studies" ,Deep &Deep Publication Pvt. Ltd., New Delhi.

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AUDIT 1 and 2: SANSKRIT FOR TECHNICAL KNOWLEDGE

Course Objectives

1. To get a working knowledge in illustrious Sanskrit, the scientific language in the world
2. Learning of Sanskrit to improve brain functioning
3. Learning of Sanskrit to develop the logic in mathematics, science & other subjects enhancing the memory power
4. The engineering scholars equipped with Sanskrit will be able to explore the huge knowledge from ancient literature

Syllabus

Unit	Content	Hours
1	• Alphabets in Sanskrit, • Past/Present/Future Tense, • Simple Sentences	8
2	• Order • Introduction of roots • Technical information about Sanskrit Literature	8
3	• Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics	8

Suggested reading

1. "Abhyaspustakam" – Dr.Vishwas, Samskrita-Bharti Publication, New Delhi
2. "Teach Yourself Sanskrit" Prathama Deeksha-Vempati Kutumbshastri, Rashtriya Sanskrit Sansthanam, New Delhi Publication
3. "India's Glorious Scientific Tradition" Suresh Soni, Ocean books (P) Ltd., New Delhi.

Course Output

Students will be able to

1. Understanding basic Sanskrit language
2. Ancient Sanskrit literature about science & technology can be understood
3. Being a logical language will help to develop logic in students

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AUDIT 1 and 2: VALUE EDUCATION

Course Objectives

Students will be able to

1. Understand value of education and self- development
2. Imbibe good values in students
3. Let the should know about the importance of character

Syllabus

Unit	Content	Hours
1	• Values and self-development –Social values and individual attitudes. Work ethics, Indian vision of humanism. • Moral and non- moral valuation. Standards and principles. • Value judgements	4
2	• Importance of cultivation of values. • Sense of duty. Devotion, Self-reliance. Confidence, Concentration. Truthfulness, Cleanliness. • Honesty, Humanity. Power of faith, National Unity. • Patriotism.Love for nature ,Discipline	6
3	• Personality and Behavior Development - Soul and Scientific attitude. Positive Thinking. Integrity and discipline. • Punctuality, Love and Kindness. • Avoid fault Thinking. • Free from anger, Dignity of labour. • Universal brotherhood and religious tolerance. • True friendship. • Happiness Vs suffering, love for truth. • Aware of self-destructive habits. • Association and Cooperation. • Doing best for saving nature	6
4	• Character and Competence –Holy books vs Blind faith. • Self-management and Good health. • Science of reincarnation. • Equality, Nonviolence ,Humility, Role of Women. • All religions and same message. • Mind your Mind, Self-control. • Honesty, Studying effectively	6

Suggested reading

1 Chakroborty, S.K. “Values and Ethics for organizations Theory and practice”, Oxford University Press, New Delhi

Course outcomes

Students will be able to 1.Knowledge of self-development
2.Learn the importance of Human values 3.Developing the overall personality

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AUDIT 1 and 2: CONSTITUTION OF INDIA

Course Objectives:
Students will be able to:

1. Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
2. To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
3. To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

Syllabus

Units	Content	Hours
1	**History of Making of the Indian Constitution:** History Drafting Committee, (Composition & Working)	4
2	**Philosophy of the Indian Constitution:** Preamble Salient Features	4
3	**Contours of Constitutional Rights & Duties:** Fundamental Rights Right to Equality Right to Freedom Right against Exploitation Right to Freedom of Religion Cultural and Educational Rights Right to Constitutional Remedies Directive Principles of State Policy Fundamental Duties.	4
4	**Organs of Governance:** Parliament Composition Qualifications and Disqualifications Powers and Functions Executive President Governor Council of Ministers Judiciary, Appointment and Transfer of Judges, Qualifications Powers and Functions	4

5	**Local Administration:** District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CE of Municipal Corporation. Pachayati raj: Introduction, PRI: ZilaPachayat. Elected officials and their roles, CEO ZilaPachayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy	O 4
6	**Election Commission:** Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.	4

Suggested reading

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

Course Outcomes:

Students will be able to:

1. Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
2. Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
3. Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
4. Discuss the passage of the Hindu Code Bill of 1956.

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AUDIT 1 and 2: PEDAGOGY STUDIES

Course Objectives:

Students will be able to:

4. Review existing evidence on the review topic to inform programme design and policy making undertaken by the DfID, other agencies and researchers.
5. Identify critical evidence gaps to guide the development.

Syllabus

Units	Content	Hours
1	**Introduction and Methodology:** • Aims and rationale, Policy background, Conceptual framework and terminology • Theories of learning, Curriculum, Teacher education. • Conceptual framework, Research questions**.** • Overview of methodology and Searching.	4
2	• Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. • Curriculum, Teacher education.	2
3	• Evidence on the effectiveness of pedagogical practices • Methodology for the in depth stage: quality assessment of included studies. • How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy? • Theory of change. • Strength and nature of the body of evidence for effective pedagogical practices. • Pedagogic theory and pedagogical approaches. • Teachers' attitudes and beliefs and Pedagogic strategies.	4
4	• Professional development: alignment with classroom practices and follow-up support • Peer support • Support from the head teacher and the community. • Curriculum and assessment • Barriers to learning: limited resources and large class sizes	4
5	**Research gaps and future directions** • Research design • Contexts • Pedagogy • Teacher education • Curriculum and assessment • Dissemination and research impact.	2

Suggested reading

1. Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31 (2): 245-261.
2. Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3): 361-379.
3. Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London: DFID.
4. Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 33 (3): 272–282.
5. Alexander RJ (2001) Culture and pedagogy: International comparisons in primary education. Oxford and Boston: Blackwell.
6. Chavan M (2003) Read India: A mass scale, rapid, 'learning to read' campaign. www.pratham.org/images/resource%20working%20paper%202.pdf.

Course Outcomes:

Students will be able to understand:

1. What pedagogical practices are being used by teachers in formal and informal classrooms in developing countries?
2. What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?
3. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?

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AUDIT 1 and 2: STRESS MANAGEMENT BY YOGA

Course Objectives

1. To achieve overall health of body and mind
2. To overcome stress

Syllabus

Unit	Content	Hours
1	• Definitions of Eight parts of yog. (Ashtanga)	8
2	Yam and Niyam. Do`s and Don't's in life. i) Ahinsa, satya, astheya, bramhacharya and aparigraha ii) Shaucha, santosh, tapa, swadhyay, ishwarpranidhan	8
3	• Asan and Pranayam 1. Various yog poses and their benefits for mind & body 2. Regularization of breathing techniques and its effects-Types of pranayam	8

Suggested reading

1. 'Yogic Asanas for Group Tarining-Part-I" : Janardan Swami YogabhyasiMandal, Nagpur
2. "Rajayoga or conquering the Internal Nature" by Swami Vivekananda, Advaita Ashrama (Publication Department), Kolkata

Course Outcomes:

Students will be able to:

1. Develop healthy mind in a healthy body thus improving social health also
2. Improve efficiency

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AUDIT 1 and 2: PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS

Course Objectives

1. To learn to achieve the highest goal happily
2. To become a person with stable mind, pleasing personality and determination
3. To awaken wisdom in students

Syllabus

Unit	Content	Hours
1	Neetisatakam-Holistic development of personality • Verses- 19,20,21,22 (wisdom) • Verses- 29,31,32 (pride & heroism) • Verses- 26,28,63,65 (virtue) • Verses- 52,53,59 (dont's) • Verses- 71,73,75,78 (do's)	8
2	• Approach to day to day work and duties. • Shrimad Bhagwad Geeta : Chapter 2-Verses 41, 47,48, • Chapter 3-Verses 13, 21, 27, 35, Chapter 6-Verses 5,13,17, 23, 35, • Chapter 18-Verses 45, 46, 48.	8
3	• Statements of basic knowledge. • Shrimad Bhagwad Geeta: Chapter2-Verses 56, 62, 68 • Chapter 12 -Verses 13, 14, 15, 16,17, 18 • Personality of Role model. Shrimad Bhagwad Geeta: Chapter2-Verses 17, Chapter 3-Verses 36,37,42, • Chapter 4-Verses 18, 38,39 • Chapter18 – Verses 37,38,63	8

Suggested reading

1. "Srimad Bhagavad Gita" by Swami Swarupananda Advaita Ashram (Publication Department), Kolkata
2. Bhartrihari's Three Satakam (Niti-sringar-vairagya) by P.Gopinath, Rashtriya Sanskrit Sansthanam, New Delhi.

Course Outcomes

Students will be able to

1. Study of Shrimad-Bhagwad-Geeta will help the student in developing his personality and achieve the highest goal in life
2. The person who has studied Geeta will lead the nation and mankind to peace and prosperity
3. Study of Neetishatakam will help in developing versatile personality of students

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

COURSE STRUCTURE & SYLLABUS M.Tech CSE for COMPUTER SCIENCE & ENGINEERING PROGRAMME

(Applicable for batches admitted from 2019-2020)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

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KAKINADA – 533 003, Andhra Pradesh, India

I-SEMESTER

S.No	Course Code	Courses	Category	L	T	P	C
1	MTCSE1101	**Program Core-1** Mathematical Foundations of Computer Science	PC	3	0	0	3
2	MTCSE1102	**Program Core-2** Advanced Data Structures & Algorithms	PC	3	0	0	3
3	MTCSE1103	**Program Elective-1** 1. Big Data Analytics 2. Digital Image Processing 3. Advanced Operating Systems	PE	3	0	0	3
4	MTCSE1104	**Program Elective-2** 1. Advanced Computer Networks 2. Internet of Things 3. Object Oriented Software Engineering	PE	3	0	0	3
5	MTCSE1105	**Research Methodology and IPR**	CC			0	2
6	MTCSE1106	**Laboratory-1** Advanced Data Structures & Algorithms Lab	LB	0	0	4	2
7	MTCSE1107	**Laboartory-2** Advanced Computing Lab	LB	0	0	4	2
8	MTCSE1108	**Audit Course-1***	AC	2	0	0	0
Total Credits							18

Student has to choose any one audit course listed below.

II SEMESTER

S.No	Course Code	Courses	Cate Gory	L	T	P	C
1	MTCSE1201	**Program Core-3** Machine learning	PC	3	0	0	3
2	MTCSE1202	**Program Core-4** MEAN Stack Technologies	PC	3	0	0	3
3	MTCSE1203	**Program Elective-3** 1. Advanced Databases and Mining 2. Ad Hoc & Sensor Networks 3. Soft Computing	PE	3	0	0	3
4	MTCSE1204	**Program Elective-4** 1. Cloud Computing 2. Principles of computer security 3. High Performance Computing	PE	3	0	0	3
5	MTCSE1205	**Laboratory-3** Machine Learning with python lab	LB	0	0	4	2
6	MTCSE1206	**Laboartory-4** MEAN Stack Technologies Lab	LB	0	0	4	2
7	MTCSE1207	**Mini Project with Seminar**	MP	2	0	0	2
8	MTCSE1208	**Audit Course-2 ***	AC	2	0	0	0
Total Credits							18

Student has to choose any one audit course listed below.

Audit Course 1 & 2:

1. English for Research Paper
5. Constitution of India

Writing
2. Disaster Management
3. Sanskrit for Technical Knowledge
4. Value Education
6. Pedagogy Studies
7. Stress Management by Yoga
8. Personality Development through Life Enlightenment Skills

III-SEMESTER

S.No	Course Code	Courses	Category	L	T	P	C
1	MTCSE2101	**Program Elective-5** 1. Deep Learning 2. Social Network Analysis 3. MOOCs-1 (NPTEL/SWAYAM) 12 Week Program related to the programme which is not listed in the course structure	PE	3	0	0	3
2	MTCSE2102	**Open Elective** 1. MOOCs-2 (NPTEL/SWAYAM)-Any 12 Week Course on Engineering/ Management/ Mathematics offered by other than parent department 2. Course offered by other departments in the college	OE	3	0	0	3
3	MTCSE2103	**Dissertation-I/ Industrial Project #**	PJ	0	0	20	10
Total Credits							16

#Students going for Industrial Project/Thesis will complete these courses through MOOCs

M. Tech. (CSE) IV SEMESTER							
S.No	**Course Code**	**Courses**	**Category**	**L**	**T**	**P**	**C**
1	MTCSE2201	**Dissertation-II**	PJ	0	0	32	16
Total Credits							16

Open Electives offered by the Department of CSE

1. Python Programming
2. Principles of Cyber Security
3. Internet of Things
4. Machine Learning
5. Digital forensics
6. Next Generation Databases

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I Year - I Semester		L	T	P	C
		3	0	0	3

Mathematical Foundations of Computer Science (MTCSE1101)

Course Objectives: This course is aimed at enabling the students to

- To understand the mathematical fundamentals that is prerequisites for variety of courses like Data mining, Network protocols, analysis of Web traffic, Computer security, Software engineering, Computer architecture, operating systems, distributed systems bioinformatics, Machine learning.
- To develop the understanding of the mathematical and logical basis to many modern techniques in computer science technology like machine learning, programming language design, and concurrency.
- To study various sampling and classification problems.

Course Outcomes:

After the completion of the course, student will be able to

- To apply the basic rules and theorems of probability theory such as Baye's Theorem, to determine probabilities that help to solve engineering problems and to determine the expectation and variance of a random variable from its distribution.
- Able to perform and analyze of sampling, means, proportions, variances and estimates the maximum likelihood based on population parameters.
- To learn how to formulate and test hypotheses about sample means, variances and proportions and to draw conclusions based on the results of statistical tests.
- Design various ciphers using number theory.
- Apply graph theory for real time problems like network routing problem.

UNIT I: Basic Probability and Random Variables: Random Experiments, Sample Spaces Events, the Concept of Probability the Axioms of Probability, Some Important Theorems on Probability Assignment of Probabilities, Conditional Probability Theorems on Conditional Probability, Independent Events, Bayes Theorem or Rule. Random Variables, Discrete Probability Distributions, Distribution Functions for Random Variables, Distribution Functions for Discrete Random Variables, Continuous Random Variables

UNIT II: Sampling and Estimation Theory: Population and Sample, Statistical Inference Sampling With and Without Replacement Random Samples, Random Numbers Population Parameters Sample Statistics Sampling Distributions, Frequency Distributions, Relative Frequency Distributions, Computation of Mean, Variance, and Moments for Grouped Data. Unbiased Estimates and Efficient Estimates Point Estimates and Interval Estimates. Reliability Confidence Interval Estimates of Population Parameters, Maximum Likelihood Estimates

UNIT III: Tests of Hypothesis and Significance: Statistical Decisions Statistical Hypotheses. Null Hypotheses Tests of Hypotheses and Significance Type I and Type II Errors Level of Significance Tests Involving the Normal Distribution One-Tailed and Two-Tailed Tests P Value Special Tests of Significance for Large Samples Special Tests of Significance for Small Samples Relationship between Estimation Theory and Hypothesis Testing Operating Characteristic Curves. Power of a Test Quality Control Charts Fitting Theoretical Distributions to Sample Frequency Distributions, The Chi-Square Test for Goodness of Fit Contingency Tables Yates' Correction for Continuity Coefficient of Contingency.

UNIT IV: Algebraic Structures and Number Theory: Algebraic Systems, Examples, General Properties, Semi Groups and Monoids, Homomorphism of Semi Groups and Monoids, Group, Subgroup,

Abelian Group, Homomorphism, Isomorphism. Properties of Integers, Division Theorem, The Greatest Common Divisor, Euclidean Algorithm, Least Common Multiple, Testing for Prime Numbers, The Fundamental Theorem of Arithmetic, Modular Arithmetic (Fermat's Theorem and Euler's Theorem)

UNIT V: Graph Theory: Basic Concepts of Graphs, Sub graphs, Matrix Representation of Graphs: Adjacency Matrices, Incidence Matrices, Isomorphic Graphs, Paths and Circuits, Eulerian and Hamiltonian Graphs, Multigraphs, Planar Graphs, Euler's Formula, Graph Colouring and Covering, Chromatic Number, Spanning Trees, Algorithms for Spanning Trees (Problems Only and Theorems without Proofs).

Text Books:

1. Foundation Mathematics for Computer Science, John Vince, Springer.
2. Probability & Statistics, 3rd Edition, Murray R. Spiegel, John J. Schiller and R. Alu Srinivasan, Schaum's Outline Series, Tata McGraw-Hill Publishers
3. Probability and Statistics with Reliability, K. Trivedi, Wiley.
4. Discrete Mathematics and its Applications with Combinatorics and Graph Theory, 7th Edition, H. Rosen, Tata McGraw Hill.

Reference Books:

1. Probability and Computing: Randomized Algorithms and Probabilistic Analysis, M. Mitzenmacher and E. Upfal.
2. Applied Combinatorics, Alan Tucker, Wiley.

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I Year - I Semester		L	T	P	C
		3	0	0	3

Advanced Data Structures & Algorithms (MTCSE1102)

Course Objectives: From the course the student will learn

- Single Linked, Double Linked Lists, Stacks, Queues, Searching and Sorting techniques, Trees, Binary trees, representation, traversal, Graphs- storage, traversal.
- Dictionaries, ADT for List, Stack, Queue, Hash table representation, Hash functions, Priority queues, Priority queues using heaps, Search trees.
- AVL trees, operations of AVL trees, Red- Black trees, Splay trees, comparison of search trees.

Course Outcomes:

After the completion of the course, student will be able to

- Ability to write and analyze algorithms for algorithm correctness and efficiency
- Master a variety of advanced abstract data type (ADT) and data structures and their Implementation
- Demonstrate various searching, sorting and hash techniques and be able to apply and solve problems of real life
- Design and implement variety of data structures including linked lists, binary trees, heaps, graphs and search trees
- Ability to compare various search trees and find solutions for IT related problems

UNIT I: Introduction to Data Structures, Singly Linked Lists, Doubly Linked Lists, Circular Lists-Algorithms. **Stacks and Queues**: Algorithm Implementation using Linked Lists.

UNIT II: Searching-Linear and Binary, Search Methods, **Sorting**-Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort. **Trees**- Binary trees, Properties, Representation and Traversals (DFT, BFT), Expression Trees (Infix, prefix, postfix). **Graphs**-Basic Concepts, Storage structures and Traversals.

UNIT III: Dictionaries, ADT, The List ADT, Stack ADT, Queue ADT, Hash Table Representation, Hash Functions, Collision Resolution-Separate Chaining, **Open Addressing**-Linear Probing, Double Hashing.

UNIT IV: Priority queues- Definition, ADT, Realizing a Priority Queue Using Heaps, Definition, Insertion, Deletion .**Search Trees**- Binary Search Trees, Definition, ADT, Implementation, **Operations**-Searching, Insertion, Deletion.

UNIT V: Search Trees- AVL Trees, Definition, Height of AVL Tree, Operations-, Insertion, Deletion and Searching, Introduction to Red-Black and Splay Trees, B-Trees, Height of B-Tree, Insertion, Deletion and Searching, Comparison of Search Trees.

Text Books:

1. Data Structures: A Pseudo Code Approach, 2/e, Richard F.Gilberg, Behrouz A. Forouzon and Cengage
2. Data Structures, Algorithms and Applications in java, 2/e, Sartaj Sahni, University Press

Reference Books:

1. Data Structures and Algorithm Analysis, 2/e, Mark Allen Weiss, Pearson.
2. Data Structures and Algorithms, 3/e, Adam Drozdek, Cengage
3. C and Data Structures: A Snap Shot Oriented Treatise Using Live Engineering Examples, N.B.Venkateswarulu, E.V.Prasad and S Chand & Co, 2009

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I Year - I Semester		L	T	P	C
		3	0	0	3

Big Data Analytics (MTCSE11XX)

Course Objectives: This course is aimed at enabling the students to

- To provide an overview of an exciting growing field of big data analytics.
- To introduce the tools required to manage and analyze big data like Hadoop, NoSQL, Map Reduce, HIVE, Cassandra, Spark.
- To teach the fundamental techniques and principles in achieving big data analytics with scalability and streaming capability.
- To optimize business decisions and create competitive advantage with Big Data analytics

Course Outcomes:

After the completion of the course, student will be able to

- Illustrate on big data and its use cases from selected business domains.
- Interpret and summarize on No SQL, Cassandra
- Analyze the HADOOP and Map Reduce technologies associated with big data analytics and explore on Big Data applications Using Hive.
- Make use of Apache Spark, RDDs etc. to work with datasets.
- Assess real time processing with Spark Streaming.

UNIT I: What is big data, why big data, convergence of key trends, unstructured data, industry examples of big data, web analytics, big data and marketing, fraud and big data, risk and big data, credit risk management, big data and algorithmic trading, big data and healthcare, big data in medicine, advertising and big data, big data technologies, introduction to Hadoop, open source technologies, cloud and big data, mobile business intelligence, Crowd sourcing analytics, inter and trans firewall analytics.

UNIT II: Introduction to NoSQL, aggregate data models, aggregates, key-value and document data models, relationships, graph databases, schema less databases, materialized views, distribution models, sharding, master-slave replication, peer- peer replication, sharding and replication, consistency, relaxing consistency, version stamps, Working with Cassandra ,Table creation, loading and reading data.

UNIT III: Data formats, analyzing data with Hadoop, scaling out, Architecture of Hadoop distributed file system (HDFS), fault tolerance ,with data replication, High availability, Data locality , Map Reduce Architecture, Process flow, Java interface, data flow, Hadoop I/O, data integrity, compression, serialization. Introduction to Hive, data types and file formats, HiveQL data definition, HiveQL data manipulation, Logical joins, Window functions, Optimization, Table partitioning, Bucketing, Indexing, Join strategies.

UNIT IV: Apache spark- Advantages over Hadoop, lazy evaluation, In memory processing, DAG, Spark context, Spark Session, RDD, Transformations- Narrow and Wide, Actions, Data frames ,RDD to Data frames, Catalyst optimizer, Data Frame Transformations, Working with Dates and Timestamps, Working with Nulls in Data, Working with Complex Types, Working with JSON, Grouping, Window Functions, Joins, Data Sources, Broadcast Variables, Accumulators, Deploying Spark- On-Premises Cluster Deployments, Cluster Managers- Standalone Mode, Spark on YARN , Spark Logs, The Spark UI- Spark UI History Server, Debugging and Spark First Aid

UNIT V: Spark-Performance Tuning, Stream Processing Fundamentals, Event-Time and State full Processing - Event Time, State full Processing, Windows on Event Time- Tumbling Windows, Handling Late Data with Watermarks, Dropping Duplicates in a Stream, Structured Streaming Basics - Core Concepts, Structured Streaming in Action, Transformations on Streams, Input and Output.

Text Books:

1. Big Data, Big Analytics: Emerging, Michael Minnelli, Michelle Chambers, and Ambiga Dhiraj
2. SPARK: The Definitive Guide, Bill Chambers & Matei Zaharia, O'Reilley, 2018 Edition
3. Business Intelligence and Analytic Trends for Today's Businesses", Wiley, 2013
4. P. J. Sadalage and M. Fowler, "NoSQL Distilled: A Brief Guide to the Emerging World Polyglot Persistence", Addison-Wesley Professional, 2012
5. Tom White, "Hadoop: The Definitive Guide", Third Edition, O'Reilley, 2012

Reference Books:

1. "Hadoop Operations", O'Reilley, Eric Sammer, 2012
2. "Programming Hive", O'Reilley, E. Capriolo, D. Wampler, and J. Rutherglen, 2012
3. "HBase: The Definitive Guide", O'Reilley, Lars George, 2011
4. "Cassandra: The Definitive Guide", O'Reilley, Eben Hewitt, 2010
5. "Programming Pig", O'Reilley, Alan Gates, 2011

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I Year - I Semester		L	T	P	C
		3	0	0	3
Digital Image Processing (MTCSE11XX)					

Course Objectives:

- Describe and explain basic principles of digital image processing.
- Design and implement algorithms that perform basic image processing (e.g. noise removal and image enhancement).
- Design and implement algorithms for advanced image analysis (e.g. image compression, image segmentation).
- Assess the performance of image processing algorithms and systems.

Course Outcomes:

After the completion of the course, student will be able to

- Demonstrate the components of image processing
- Explain various filtration techniques.
- Apply image compression techniques.
- Discuss the concepts of wavelet transforms.
- Analyze the concept of morphological image processing.

UNIT I: Introduction: Fundamental steps in Image Processing System, Components of Image Processing System, Elements of Visual Perception, Image Sensing and acquisition, Image sampling & Quantization, Basic Relationship between pixels. **Image Enhancement Techniques**: Spatial Domain Methods: Basic grey level transformation, Histogram equalization, Image subtraction, image averaging.

UNIT II: Spatial filtering: Smoothing, sharpening filters, Laplacian filters, Frequency domain filters, Smoothing and sharpening filters, Homomorphism is filtering. **Image Restoration & Reconstruction**: Model of Image Degradation/restoration process, Noise models, Spatial filtering, Inverse filtering, Minimum mean square Error filtering, constrained least square filtering, Geometric mean filter, Image reconstruction from projections. Color Fundamentals, Color Models, Color Transformations.

UNIT III: Image Compression: Redundancies- Coding, Interpixel, Psycho visual; Fidelity, Source and Channel Encoding, Elements of Information Theory; Loss Less and Lossy Compression; Run length coding, Differential encoding, DCT, Vector quantization, Entropy coding, LZW coding; Image Compression Standards-JPEG, JPEG 2000, MPEG; Video compression.

UNIT IV: Wavelet Based Image Compression: Expansion of functions, Multi-resolution analysis, Scaling functions, MRA refinement equation, Wavelet series expansion, Discrete Wavelet Transform (DWT), Continuous, Wavelet Transform, Fast Wavelet Transform, 2-D wavelet Transform, JPEG-2000 encoding.

UNIT V: Image Segmentation: Discontinuities, Edge Linking and boundary detection, Thresholding, Region Based Segmentation, Watersheds; Introduction to morphological operations; binary morphology-erosion, dilation, opening and closing operations, applications; basic gray-scale morphology operations; Feature extraction; Classification; Object recognition. **Digital Image Watermarking**: Introduction, need of Digital Image Watermarking, applications of watermarking in copyright protection and Image quality analysis.

Text Books:

1. Digital Image Processing. 2nd ed. Gonzalez, R.C. and Woods, R.E. India: Person Education, (2009)

Reference Books:

1. Digital Image Processing. John Wiley, Pratt, W. K, (2001)
2. Digital Image Processing, Jayaraman, S., Veerakumar, T. and Esakkiranjan, S. (2009),Tata McGraw-Hill

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I Year - I Semester		L	T	P	C
		3	0	0	3

Advanced Operating Systems (MTCSE11XX)

Course Objectives: This course is aimed at enabling the students to

- To provide comprehensive and up-to-date coverage of the major developments in distributed Operating System, Multi-processor Operating System and Database Operating System and to cover important theoretical foundations including Process Synchronization, Concurrency, Event ordering, Mutual Exclusion, Deadlock, Agreement Protocol, Security, Recovery and fault tolerance.

Course Outcomes:
After the completion of the course, student will be able to

- Illustrate on the fundamental concepts of distributed operating systems, its architecture and distributed mutual exclusion.
- Analyze on deadlock detection algorithms and agreement protocols.
- Make use of algorithms for implementing DSM and its scheduling.
- Apply protection and security in distributed operating systems.
- Elaborate on concurrency control mechanisms in distributed database systems.

UNIT-1: Architectures of Distributed Systems, System Architecture types, issues in distributed operating systems, communication networks, communication primitives. Theoretical Foundations, inherent limitations of a distributed system, lamp ports logical clocks, vector clocks, casual ordering of messages, global state, cuts of a distributed computation, termination detection. Distributed Mutual Exclusion, introduction, the classification of mutual exclusion and associated algorithms, a comparative performance analysis.

UNIT-2: Distributed Deadlock Detection, Introduction, deadlock handling strategies in distributed systems, issues in deadlock detection and resolution, control organizations for distributed deadlock detection, centralized and distributed deadlock detection algorithms, hierarchical deadlock detection algorithms. Agreement protocols, introduction-the system model, a classification of agreement problems, solutions to the Byzantine agreement problem, and applications of agreement algorithms. Distributed resource management: introduction-architecture, mechanism for building distributed file systems design issues, log structured file systems.

UNIT- 3: Distributed shared memory, Architecture, algorithms for implementing DSM, memory coherence and protocols, design issues. Distributed Scheduling, introduction, issues in load distributing, components of a load distributing algorithm, stability, load distributing algorithm, performance comparison, selecting a suitable load sharing algorithm, requirements for load distributing, task migration and associated issues. Failure Recovery and Fault tolerance: introduction, basic concepts, classification of failures, backward and forward error recovery, backward error recovery, recovery in concurrent systems, consistent set of check points, synchronous and asynchronous check pointing and recovery, check pointing for distributed database systems, recovery in replicated distributed databases.

UNIT- 4: Protection and security, preliminaries, the access matrix model and its implementations.-safety in matrix model, advanced models of protection. Data security, cryptography: Model of cryptography, conventional cryptography modern cryptography, private key cryptography, data encryption standard public key cryptography, multiple encryptions, authentication in distributed systems.

UNIT-5: Multiprocessor operating systems, basic multiprocessor system architectures, inter connection networks for multiprocessor systems, caching hypercube architecture. Multiprocessor Operating System, structures of multiprocessor operating system, operating system design issues, threads, process synchronization and scheduling. Database Operating systems: Introduction, requirements of a database operating system Concurrency control :Theoretical aspects, introduction, database systems, a concurrency control model of database systems, the problem of concurrency control, serializability theory, distributed database systems, concurrency control algorithms, introduction, basic synchronization primitives, lock based algorithms, timestamp based algorithms, optimistic algorithms, concurrency control algorithms, data replication.

Text Books:

1. "Advanced concepts in operating systems: Distributed, Database and multiprocessor operating systems", Mukesh Singhal, Niranjan and G.Shivaratri, TMH, 2001

Reference Books:

1. "Modern operating system", Andrew S.Tanenbaum, PHI, 2003
2. "Distributed operating system-Concepts and design", Pradeep K.Sinha, PHI, 2003
3. "Distributed operating system", Pearson education, AndrewS.Tanenbaum, 2003

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I Year - I Semester		L	T	P	C
		3	0	0	3

ADVANCED COMPUTER NETWORKS (MTCSE11YY)

Course Objectives: This course is aimed at enabling the students to

- The course is aimed at providing basic understanding of Computer networks starting with OSI Reference Model, Protocols at different layers with special emphasis on IP, TCP & UDP and Routing algorithms.
- Some of the major topics which are included in this course are CSMA/CD, TCP/IP implementation, LANs/WANs, internetworking technologies, Routing and Addressing.
- Provide the mathematical background of routing protocols.
- Aim of this course is to develop some familiarity with current research problems and research methods in advance computer networks.

Course Outcomes:

After the completion of the course, student will be able to

- Illustrate reference models with layers, protocols and interfaces.
- Describe the routing algorithms, Sub netting and Addressing of IP V4and IPV6.
- Describe and Analysis of basic protocols of computer networks, and how they can be used to assist in network design and implementation.
- Describe the concepts Wireless LANS, WIMAX, IEEE 802.11, Cellular telephony and Satellite networks
- Describe the emerging trends in networks-MANETS and WSN

Unit-I:**Network layer:** Network Layer design issues: store-and forward packet switching, services provided transport layers, implementation connection less services, implementation connection oriented services, comparison of virtual –circuit and datagram subnets, Routing Algorithms-shortest path routing, flooding, distance vector routing, link state routing, Hierarchical routing, **congestion control algorithms :**Approaches to congestion control, Traffic aware routing, Admission control, Traffic throttling, choke Packets, Load shedding, Random early detection, Quality of Service, Application requirements, Traffic shaping, Leaky and Token buckets

Unit-II: Internetworking and IP protocols: How networks differ, How net works can be connected, internetworking, tunneling, The network layer in the internet,IPV4 Protocol, IP addresses, Subnets, CIDR, classful and Special addressing, network address translation (NAT),IPV6 Address structure address space, IPV6 Advantages, packet format, extension Headers, Transition from IPV4 to IPV6 , Internet Control Protocols-IMCP, ARP, DHCP

Unit-III: Transport Layer Protocols: Introduction, Services, Port numbers,
User Datagram Protocol: User datagram, UDP services, UDP Applications, Transmission control Protocol: TCP services, TCP features, Segment, A TCP connection, State transition diagram, Windows in TCP, Flow control and error control, TCP Congestion control, TCP Timers, **SCTP:** SCTP services SCTP features, packet format, An SCTP association, flow control, error control.

Unit- IV: Wireless LANS: Introduction, Architectural comparison, Access control, The IEEE 802.11 Project: Architecture, MAC sub layer, Addressing Mechanism, Physical Layer, Bluetooth: Architecture, Bluetooth Layers **Other Wireless Networks:** WIMAX: Services, IEEE project 802.16, Layers in project 802.16, Cellular Telephony: Operations, First Generation (1G), Second Generation (2G), Third Generation (3G), Fourth Generation (4G), Satellite Networks: Operation, GEO Satellites, MEO satellites, LEO satellites.

Unit–V: Emerging trends in Computer networks:
Mobile computing: Motivation for mobile computing, Protocol stack issues in mobile computing environment, mobility issues in mobile computing, security issues in mobile networks, MOBILE Ad Hoc Networks: Applications of Ad Hoc Networks, Challenges and Issues in MANETS, MAC Layer Issues Routing Protocols in MANET, Transport Layer Issues, Ad hoc Network Security. **Wireless Sensor Networks:** WSN functioning, Operating system support in sensor devices, WSN characteristics, sensor network operation, Sensor Architecture: Cluster management, Wireless Mesh Networks: WMN design , Issues in WMNs, Computational Grids, Grid Features, Issues in Grid construction design, Grid design features,P2P Networks: Characteristics of P2P Networks, Classification of P2P systems, Gnutella, BitTorrent, Session Initiation Protocol(SIP) , Characteristics and addressing, Components of SIP, SIP establishment, SIP security.

Text Books:
1. Data communications and networking 4th edition Behrouz A Fourzan,TMH
2. Computer networks 4th edition Andrew S Tanenbaum, Pearson
3. Computer networks, Mayank Dave, CENGAGE

Reference Books:
1. Computer networks, A system Approach, 5th ed, Larry L Peterson and Bruce S Davie, Elsevier

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I Year - I Semester		L	T	P	C
		3	0	0	3

Internet of Things (MTCSE11YY)

Course Objectives:

- To Understand Smart Objects and IoT Architectures.
- To learn about various IOT-related protocols
- To build simple IoT Systems using Arduino and Raspberry Pi.
- To understand data analytics and cloud in the context of IoT
- To develop IoT infrastructure for popular applications.

Course Outcomes:

After the completion of the course, student will be able to

- Summarize on the term 'internet of things' in different contexts.
- Analyze various protocols for IoT.
- Design a PoC of an IoT system using Rasperry Pi/Arduino
- Apply data analytics and use cloud offerings related to IoT.
- Analyze applications of IoT in real time scenario

UNIT I: FUNDAMENTALS OF IoT: Evolution of Internet of Things, Enabling Technologies, IoT Architectures,oneM2M, IoT World Forum (IoTWF) and Alternative IoT models, Simplified IoT Architecture and Core IoT Functional Stack, Fog, Edge and Cloud in IoT, Functional blocks of an IoT ecosystem, Sensors, Actuators, Smart Objects and Connecting Smart Objects.

UNIT II: IoT PROTOCOLS: IT Access Technologies: Physical and MAC layers, topology and Security of IEEE 802.15.4, 802.15.4g, 802.15.4e, 1901.2a, 802.11ah and Lora WAN, Network Layer: IP versions, Constrained Nodes and Constrained Networks, Optimizing IP for IoT: From 6LoWPAN to 6Lo, Routing over Low Power and Lossy Networks, Application Transport Methods: Supervisory Control and Data Acquisition, Application Layer Protocols: CoAP and MQTT.

UNIT III: DESIGN AND DEVELOPMENT: Design Methodology, Embedded computing logic, Microcontroller, System on Chips, IoT system building blocks, Arduino, Board details, IDE programming, Raspberry Pi, Interfaces and Raspberry Pi with Python Programming.

UNIT IV: DATA ANALYTICS AND SUPPORTING SERVICES: Structured Vs Unstructured Data and Data in Motion Vs Data in Rest, Role of Machine Learning – No SQL Databases, Hadoop Ecosystem, Apache Kafka, Apache Spark, Edge Streaming Analytics and Network Analytics, Xively Cloud for IoT, Python Web Application Framework, Django, AWS for IoT, System Management with NETCONF-YANG.

UNIT V: CASE STUDIES/INDUSTRIAL APPLICATIONS: Cisco IoT system, IBM Watson IoT platform, Manufacturing, Converged Plant wide Ethernet Model (CPwE), Power Utility Industry, Grid Blocks Reference Model, Smart and Connected Cities: Layered architecture, Smart Lighting, Smart Parking Architecture and Smart Traffic Control.

Text Books:

1.IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, Cisco Press, 2017

Reference Books:

1. Internet of Things – A hands-on approach, Arshdeep Bahga, Vijay Madisetti, Universities Press, 2015

2. The Internet of Things – Key applications and Protocols, Olivier Hersent, David Boswarthick, Omar Elloumi and Wiley, 2012 (for Unit 2).
3. "From Machine-to-Machine to the Internet of Things – Introduction to a New Age of Intelligence", Jan Ho¨ ller, Vlasios Tsiatsis, Catherine Mulligan, Stamatis, Karnouskos, Stefan Avesand. David Boyle and Elsevier, 2014.
4. Architecting the Internet of Things, Dieter Uckelmann, Mark Harrison, Michahelles and Florian (Eds), Springer, 2011.
5. Recipes to Begin, Expand, and Enhance Your Projects, 2nd Edition, Michael Margolis, Arduino Cookbook and O'Reilly Media, 2011.

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I Year - I Semester		L	T	P	C
		3	0	0	3

Object Oriented Software Engineering (MTCSE11YY)

Course Objectives:

- To elicit, analyze and specify software requirements through a productive working relationship with various stakeholders of the project.
- To understand the what software life cycle is, how software projects are planned and managed, types of resources involved in software development projects, risks are identified and assessed, predictions and assessments are made.
- To identify, formulate, and solve software engineering problems, including the specification, design, implementation, and testing of software systems that meet specification, performance, maintenance and quality requirements

Course Outcomes:

After the completion of the course, student will be able to

- Apply the Object Oriented Software-Development Process to design software
- Analyze and Specify software requirements through a SRS documents.
- Design and Plan software solutions to problems using an object-oriented strategy.
- Model the object oriented software systems using Unified Modeling Language (UML)
- Estimate the cost of constructing object oriented software.

UNIT I: Introduction to Software Engineering: Software, Software Crisis, Software Engineering definition, Evolution of Software Engineering Methodologies, Software Engineering Challenges. Software Processes: Software Process, Process Classification, Phased development life cycle, Software Development Process Models, Process, use, applicability and Advantages/limitations.

UNIT II: Object oriented Paradigm, Object oriented Concepts, Classes, Objects, Attributes, Methods and services, Messages, Encapsulation, Inheritance, Polymorphism, Identifying the elements of object model, management of object oriented Software projects, Object Oriented Analysis, Domain Analysis, Generic Components of OOA model,OOA Process, Object Relationship model, Object Behavior Model.

UNIT III: Object Oriented Design: Design for Object- Oriented systems, The Generic components of the OO design model, The System design process, The Object design process, Design Patterns, Object Oriented Programming.

UNIT IV: Object Oriented testing: Broadening the view of Testing, Testing of OOA and OOD models, Object-Oriented testing strategies, Test case design for OO software, testing methods applicable at the class level, Interclass test case design.

UNIT V: Technical Metrics for Object Oriented Systems: The Intent of Object Oriented metrics, The distinguishing Characteristics, Metrics for the OO Design model, Class-Oriented metrics, Operation-Oriented Metrics, Metrics foe Object Oriented testing, Metrics for Object Oriented projects. CASE Tools.

Text Books:

1. Object oriented and Classical Software Engineering, 7/e, Stephen R. Schach, TMH.
2. Object oriented and Classical Software Engineering, Timothy Lethbridge, Robert Laganiere, TMH
3. Software Engineering by Roger S Pressman, Tata McGraw Hill Edition.

Reference Books:

1. Component based software engineering: 7th International symposium, ivicaCrnkovic, Springer, CBSE 2004

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I Year - I Semester		L	T	P	C
		2	0	0	2
RESEARCH METHODOLOGY AND IPR					

UNIT 1:
Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations

UNIT 2:
Effective literature studies approaches, analysis Plagiarism, Research ethics, Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee

UNIT 3:
Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

UNIT 4:
Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.

UNIT 5:
New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

REFERENCES:

(1) Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students'"
(2) Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction"
(3) Ranjit Kumar, 2nd Edition, "Research Methodology: A Step by Step Guide for beginners"
(4) Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd ,2007.
(5) Mayall, "Industrial Design", McGraw Hill, 1992.
(6) Niebel, "Product Design", McGraw Hill, 1974.
(7) Asimov, "Introduction to Design", Prentice Hall, 1962.
(8) (8) Robert P. Merges, Peter S. Menell, Mark A. Lemley, " Intellectual Property in New Technological Age", 2016.
(9) T. Ramappa, "Intellectual Property Rights Under WTO", S. Chand, 2008

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I Year - I Semester		L	T	P	C
		0	0	4	2

Advanced Data Structures & Algorithms Lab (MTCSE1106)

Course Objectives:

From the course the student will learn

- Knowing about oops concepts for a specific problem.
- Various advanced data structures concepts like arrays, stacks, queues, linked lists, graphs and trees.

Course Outcomes:

After the completion of the course, student will be able to

- Identify classes, objects, members of a class and relationships among them needed for a specific problem.
- Examine algorithms performance using Prior analysis and asymptotic notations.
- Organize and apply to solve the complex problems using advanced data structures (like arrays, stacks, queues, linked lists, graphs and trees.)
- Apply and analyze functions of Dictionary

Experiment 1:
Write a java program to perform various operations on single linked list

Experiment 2:
Write a java program for the following
a) Reverse a linked list
b) Sort the data in a linked list
c) Remove duplicates
d) Merge two linked lists

Experiment 3:
Write a java program to perform various operations on doubly linked list.

Experiment 4:
Write a java program to perform various operations on circular linked list.

Experiment 5:
Write a java program for performing various operations on stack using linked list.

Experiment 6:
Write a java program for performing various operations on queue using linked list.

Experiment 7:
Write a java program for the following using stack
a) Infix to postfix conversion.
b) Expression evaluation.
c) Obtain the binary number for a given decimal number.

Experiment 8:
Write a java program to implement various operations on Binary Search Tree
Using Recursive and Non-Recursive methods.

Experiment 9:
Write a java program to implement the following for a graph.
a) BFS b) DFS

Experiment 10:
Write a java program to implement Merge & Heap Sort of given elements.

Experiment 11:
Write a java program to implement Quick Sort of given elements.

Experiment 12:
Write a java program to implement various operations on AVL trees.

Experiment 13:
Write a java program to perform the following operations:
a) Insertion into a B-tree b) Searching in a B-tree

Experiment 14:
Write a java program to implementation of recursive and non-recursive functions to Binary tree Traversals

Experiment 15:
Write a java program to implement all the functions of Dictionary (ADT) using Hashing.

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I Year - I Semester		L	T	P	C
		0	0	4	2
Advanced Computing Lab (MTCSE1107)					

Course Objectives:
From the course the student will learn

- The student should have hands on experience in using various sensors like temperature, humidity, smoke, light, etc. and should be able to use control web camera, network, and relays connected to the Pi.

Course Outcomes:
After the completion of the course, student will be able to

- The student should have hands on experience in using various sensors like temperature, humidity, smoke, light, etc. and should be able to use control web camera, network, and relays connected to the Pi.
- Development and use of s IoT technology in Societal and Industrial Applications.
- Skills to undertake high quality academic and industrial research in Sensors and IoT.
- To classify Real World IoT Design Constraints, Industrial Automation in IoT.

Experiment 1: Start Raspberry Pi and try various Linux commands in command terminal window: ls, cd, touch, mv, rm, man, mkdir, rmdir, tar, gzip, cat, more, less, ps, sudo, cron, chown, chgrp, ping etc.

Experiment 2: Study and Install IDE of Arduino and different types of Arduino.

Experiment 3: Study and Implement Zigbee Protocol using Arduino / RaspberryPi.

Experiment 4: Write a map reduce program that mines weather data. Weather sensors collecting data every hour at many locations across the globe gather a large volume of log data, which is a good candidate for analysis with Map Reduce, since it is semi structured and record-oriented.

Experiment 5: Data analytics using Apache Spark on Amazon food dataset, find all the pairs of items frequently reviewed together.
Write a single Spark application that

- Transposes the original Amazon food dataset, obtaining a PairRDD of the type<user_id>→ <list of the product_ ids reviewed by user_id>
- Counts the frequencies of all the pairs of products reviewed together.
- Writes on the output folder all the pairs of products that appear more than once and their frequencies. The pairs of products must be sorted by frequency.

Experiment 6:
Write a program to Implement Bankers algorithm for Dead Lock Avoidance.

Experiment 7:
Write a program to Producer-consumer problem Using semaphores.

Experiment 8:
Write a program for an image enhancement using pixel operation.

Experiment 9:
Write a Program to enhance image using image arithmetic and logical operations.

Experiment 10:
Write a program of bit stuffing used by Data Link Layer.

Experiment 11:
Write a program to configure a Network using Distance Vector Routing protocol.

Experiment 12:
Write a program to perform the function oriented diagram: DFD and Structured chart.

Experiment 13:
Write a program to perform the system analysis: Requirement analysis, SRS.

Experiment 14:
Write a program to draw the structural view diagram: Class diagram, object diagram.

Experiment 15:
Write C programs for implementing the Demorgan's law.

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I Year - II Semester		L	T	P	C
		3	0	0	3
Machine Learning					

Course Objectives:

Machine Learning course will

- Develop an appreciation for what is involved in learning from data.
- Demonstrate a wide variety of learning algorithms.
- Demonstrate how to apply a variety of learning algorithms to data.
- Demonstrate how to perform evaluation of learning algorithms and model selection.

Course Outcomes:

After the completion of the course, student will be able to

- Domain Knowledge for Productive use of Machine Learning and Diversity of Data.
- Demonstrate on Supervised and Computational Learning
- Analyze on Statistics in learning techniques and Logistic Regression
- Illustrate on Support Vector Machines and Perceptron Algorithm
- Design a Multilayer Perceptron Networks and classification of decision tree

Unit I: Introduction: Towards Intelligent Machines Well posed Problems, Example of Applications in diverse fields, Data Representation, Domain Knowledge for Productive use of Machine Learning, Diversity of Data: Structured / Unstructured, Forms of Learning, Machine Learning and Data Mining, Basic Linear Algebra in Machine Learning Techniques.

Unit II: Supervised Learning: Rationale and Basics: Learning from Observations, Bias and Why Learning Works: Computational Learning Theory, Occam's Razor Principle and Over fitting Avoidance Heuristic Search in inductive Learning, Estimating Generalization Errors, Metrics for assessing regression, Metris for assessing classification.

Unit III: Statistical Learning: Machine Learning and Inferential Statistical Analysis, Descriptive Statistics in learning techniques, Bayesian Reasoning: A probabilistic approach to inference, K-Nearest Neighbor Classifier. Discriminant functions and regression functions, Linear Regression with Least Square Error Criterion, Logistic Regression for Classification Tasks, Fisher's Linear Discriminant and Thresholding for Classification, Minimum Description Length Principle.

Unit IV: Support Vector Machines (SVM): Introduction, Linear Discriminant Functions for Binary Classification, Perceptron Algorithm, Large Margin Classifier for linearly seperable data, Linear Soft Margin Classifier for Overlapping Classes, Kernel Induced Feature Spaces, Nonlinear Classifier, and Regression by Support vector Machines.

Learning with Neural Networks: Towards Cognitive Machine, Neuron Models, Network Architectures, Perceptrons, Linear neuron and the Widrow-Hoff Learning Rule, The error correction delta rule.

Unit V: Multilayer Perceptron Networks and error back propagation algorithm, Radial Basis Functions Networks. **Decision Tree Learning**: Introduction, Example of classification decision tree, measures of impurity for evaluating splits in decision trees, ID3, C4.5, and CART decision trees, pruning the tree, strengths and weakness of decision tree approach.

Textbooks:

1. Applied Machine Learning,1st edition, M.Gopal, McGraw Hill Education,2018
2. Machine Learning: An Algorithmic Perspective, Stephen Marsland, Taylor & Francis (CRC) 1st Edition-2014

Reference Books:

1. Machine Learning Methods in the Environmental Sciences, Neural Networks, William WHsieh, Cambridge Univ Press. *1* edition (August 31, 2009)
2. Richard o. Duda, Peter E. Hart and David G. Stork, pattern classification, John Wiley &SonsInc., 2nd Edition-2001
3. Chris Bishop, Neural Networks for Pattern Recognition, Oxford University Press, 1995.
4. Machine Learning by Peter Flach , Cambridge-1st Edition 2012

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I Year - II Semester		L	T	P	C
		3	0	0	3
MEAN Stack Technologies					

Course Objectives:
From the course the student will learn

- Translate user requirements into the overall architecture and implementation of new systems and Manage Project and coordinate with the Client.
- Writing optimized front end code HTML and JavaScript.
- Monitor the performance of web applications & infrastructure and Troubleshooting web application with a fast and accurate a resolution
- Design and implementation of Robust and Scalable Front End Applications.

Course Outcomes:

- After the completion of the course, student will be able to
- Identify the Basic Concepts of Web & Markup Languages.
- Develop web Applications using Scripting Languages & Frameworks.
- Make use of Express JS and Node JS frameworks
- Illustrate the uses of web services concepts like restful, react js.
- Adapt to Deployment Techniques & Working with cloud platform.

UNIT I: Introduction to Web: Internet and World Wide Web, Domain name service, Protocols: HTTP, FTP, SMTP. **Html5** concepts, **CSS3**, Anatomy of a web page. **XML:** Document type Definition, XML schemas, Document object model, XSLT, DOM and SAX Approaches.

UNIT II: JavaScript: The Basic of JavaScript: Objects, Primitives Operations and Expressions, Control Statements, Arrays, Functions, Constructors, Pattern Matching using Regular Expressions. **Angular Java Script** Angular JS Expressions: ARRAY, Objects, $eval, Strings, Angular JS Form Validation & Form Submission, Single Page Application development using Angular JS

UNIT III: Node.js: Introduction, Advantages, Node.js Process Model, Node JS Modules. **Express.js:** Introduction to Express Framework, Introduction to Nodejs , What is Nodejs, Getting Started with Express, Your first Express App, Express Routing, Implementing MVC in Express, Middleware, Using Template Engines, Error Handling , API Handling , Debugging, Developing Template Engines, Using Process Managers, Security & Deployment.

UNIT IV: RESTful Web Services: Using the Uniform Interface, Designing URIs,
Web Linking, Conditional Requests. **React Js:** Welcome to React, Obstacles and Roadblocks, React's Future, Keeping Up with the Changes, Working with the Files, Pure React, Page Setup, The Virtual DOM, React Elements, ReactDOM, Children, Constructing Elements with Data, React Components, DOM Rendering, Factories

UNIT V: Mongo DB: Introduction, Architecture, Features, Examples, Database Creation & Collection in Mongo DB. Deploying Applications: Web hosting & Domains, Deployment Using Cloud Platforms.

Text Books:

1. Programming the World Wide Web, Robet W Sebesta, 7ed, Pearson.
2. Web Technologies, Uttam K Roy, Oxford
3. Pro Mean Stack Development, ELadElrom, Apress
4. Restful Web Services Cookbook, Subbu Allamraju, O'Reilly
5. JavaScript & jQuery the missing manual, David sawyer mcfarland, O'Reilly

6. Web Hosting for Dummies, Peter Pollock, John Wiley Brand

Reference Books:

1. Ruby on Rails up and Running, Lightning fast Web development, Bruce Tate, Curt Hibbs, Oreilly (2006)
2. Programming Perl, 4ed, Tom Christiansen, Jonathan Orwant, Oreilly (2012)
3. Web Technologies, HTML< JavaScript, PHP, Java, JSP, XML and AJAX, Black book, Dream Tech
4. An Introduction to Web Design, Programming, Paul S Wang, Sanda S Katila, Cengage Learning
5. Express.JS Guide, The Comprehensive Book on Express.js, Azat Mardan, Lean Publishing.

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I Year - II Semester		L	T	P	C
		3	0	0	3
Advanced Databases and Mining					

Course Objectives:

- This Subject deals with dealing data in the real world, maintaining data without any redundancy, several techniques involved in DBMS to recover the problems caused due to redundancy, storing data for quick insertion, manipulation and deletion operations in order to retrieve data from the database.
- This subject provides an introduction to multidisciplinary field of data mining, the general data features, techniques for data preprocessing, general implementation of data warehouses and OLAP, the relationship between data warehousing and other generalization methods
- The concepts of data clustering includes a different methods of clustering such as k-means, k-mediods, db scan algorithm, role of data mining in web mining.

Course Outcomes:

After the completion of the course, student will be able to

- Analyze on normalization techniques.
- Elaborate on concurrency control techniques and query optimization.
- Summarize the concepts of data mining, data warehousing and data preprocessing strategies.
- Apply data mining algorithms.
- Assess various classification & cluster techniques.

UNIT I: Introduction: Concepts and Definitions, Relational models, Data Modeling and Query Languages, Database Objects. **Normalization Techniques:** Functional Dependency, 1NF, 2NF, 3NF, BCNF; Multi valued Dependency; Loss-less Join and Dependency Preservation.

UNIT II: Transaction Processing: Consistency, Atomicity, Isolation and Durability, Serializable Schedule, Recoverable Schedule, Concurrency Control, Time-stamp based protocols, Isolation Levels, Online Analytical Processing,

Database performance Tuning and Query optimization: Query Tree, Cost of Query, Join, Selection and Projection Implementation Algorithms and Optimization Database Security: Access Control, MAC, RBAC, Authorization, SQL Injection Attacks.

UNIT III: Data Mining: stages and techniques, knowledge representation methods, data mining approaches (OLAP, DBMS, Statistics and ML). **Data warehousing:** data warehouse and DBMS, multidimensional data model, OLAP operations. **Data processing:** cleaning, transformation, reduction, filters and discretization with weka.

UNIT IV: Knowledge representation: background knowledge, representing input data and output knowledge, visualization techniques and experiments with weka. **Data mining algorithms:** association rules, mining weather data, generating item sets and rules efficiently, correlation analysis.

UNIT V: Classification & Clustering: 1R algorithm, decision trees, covering rules, task prediction, statistical classification, Bayesian network, instance based methods, linear models, Cluster/2, Cobweb, k-means, Hierarchical methods. **Mining real data:** preprocessing data from a real medical domain, data mining techniques to create a comprehensive and accurate model of data. **Advanced topics:** text mining, text classification, web mining, data mining software.

Text Books:

1. Fundamentals of Database Systems, RamezElmasri, Shamkant B. Navathe, Addison-Wesley,6th edition-
2. Data Mining: Concepts and Techniques, J. Han and M. Kamber, Morgan Kaufmann C.J. Date, Database Systems, Pearson, 3rd edition-

Reference Books:

1. Principles of Distributed Database Systems, Prentice Hall, P. Valduriez, M. TamerOzsu 3rd edition-2000
2. Database systems: Design, implementation and Management, C.M. Coronel, S. Morris, P. Rob, Boston: Cengage Learning,9th edition-2011

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I Year - II Semester		L	T	P	C
		3	0	0	3
Ad Hoc & Sensor Networks					

Course Objectives:

- Architect sensor networks for various application setups.
- Devise appropriate data dissemination protocols and model links cost.
- Understandings of the fundamental concepts of wireless sensor networks and have a basic knowledge of the various protocols at various layers.
- Evaluate the performance of sensor networks and identify bottlenecks

Course Outcomes:

After the completion of the course, student will be able to

- Explain the Fundamental Concepts and applications of ad hoc and wireless sensor networks
- Discuss the MAC protocol issues of ad hoc networks
- Enumerate the concept of routing protocols for ad hoc wireless networks with respect to TCP design issues
- Analyze & Specify the concepts of network architecture and MAC layer protocol for WSN
- Discuss the WSN routing issues by considering QoS measurements

UNIT I: Introduction : Fundamentals of Wireless Communication Technology, The Electromagnetic Spectrum, Radio propagation Mechanisms ,Characteristics of the Wireless channel mobile ad hoc networks (MANETs), **Wireless Sensor Networks (WSNs):** concepts and architectures, Applications of Ad Hoc and Sensor Networks, Design Challenges in Ad hoc and Sensor Networks.

UNIT II: MAC Protocols For Ad Hoc Wireless Networks: Issues in designing a MAC Protocol, Issues in Designing a MAC Protocol for Ad Hoc Wireless Networks, Design Goals of a MAC Protocol for Ad Hoc Wireless Networks, Classification of MAC Protocols, Contention based protocols, Contention based protocols with Reservation Mechanisms, Contention based protocols with Scheduling Mechanisms, Multi channel MAC - IEEE 802.11.

UNIT III: Routing Protocols And Transport Layer In Ad Hoc Wireless Networks: Routing Protocol: Issues in designing a routing protocol for Ad hoc networks, Classification, proactive routing, reactive routing (on-demand), hybrid routing, Transport Layer protocol for Ad hoc networks, Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks, Classification of Transport Layer solutions-TCP over Ad hoc wireless, Network Security, Security in Ad Hoc Wireless Networks, Network Security Requirements.

UNIT IV: Wireless Sensor Networks (WSNS) And Mac Protocols: Single node architecture - hardware and software components of a sensor node, **WSN Network architecture:** typical network architectures, data relaying and aggregation strategies, **MAC layer protocols:** self-organizing, Hybrid TDMA/FDMA and CSMA based MAC -IEEE 802.15.4.

UNIT V: WSN Routing, Localization & Qos: Issues in WSN routing, OLSR, Localization, Indoor and Sensor Network Localization, absolute and relative localization, triangulation, QOS in WSN, Energy Efficient Design, Synchronization.

Text Books:

1. "Ad Hoc Wireless Networks: Architectures and Protocols ", C. Siva Ram Murthy, and B. S. Manoj, Pearson Education, 2008
2. “Wireless Adhoc and Sensor Networks”, Labiod. H, Wiley, 2008

3. “Wireless ad -hoc and sensor Networks: theory and applications”, Li, X, Cambridge University Press, 2008.

Reference Books:

1. “Ad Hoc & Sensor Networks: Theory and Applications”, 2nd edition, Carlos De Morais Cordeiro, Dharma Prakash Agrawal ,World Scientific Publishing Company, 2011
2. "Wireless Sensor Networks", Feng Zhao and Leonides Guibas,Elsevier Publication.
3. “Protocols and Architectures for Wireless Sensor Networks”, Holger Karl and Andreas Willig,Wiley, 2005 (soft copy available)
4. “Wireless Sensor Networks Technology, Protocols, and Applications”, Kazem Sohraby, Daniel Minoli, & TaiebZnati, John Wiley, 2007. (soft copy available)

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I Year - II Semester		L	T	P	C
		3	0	0	3
Soft Computing					

Course Objectives:

- To introduce soft computing concepts and techniques and foster their abilities in designing appropriate technique for a given scenario.
- To implement soft computing based solutions for real-world problems.
- To give students knowledge of non-traditional technologies and fundamentals of artificial neural networks, fuzzy sets, fuzzy logic, genetic algorithms.
- To provide student a hand-on experience on MATLAB to implement various strategies.

Course Outcomes:

After the completion of the course, student will be able to

- Elaborate fuzzy logic and reasoning to handle uncertainty in engineering problems.
- Make use of genetic algorithms to combinatorial optimization problems.
- Distinguish artificial intelligence techniques, including search heuristics, knowledge representation, planning and reasoning.
- Formulate and apply the principles of self-adopting and self organizing neuro fuzzy inference systems.
- Evaluate and compare solutions by various soft computing approaches for a given problem

UNIT I: Fuzzy Set Theory: Introduction to Neuro, Fuzzy and Soft Computing, Fuzzy Sets, Basic function and Terminology, Set-theoretic Operations, Member Function Formulation and Parameterization, Fuzzy Rules and Fuzzy Reasoning, Extension Principle and Fuzzy Relations, Fuzzy If-Then Rules, Fuzzy Reasoning, Fuzzy Inference Systems, Mamdani Fuzzy Models, Sugeno Fuzzy Models, Tsukamoto Fuzzy Models, Input Space Partitioning and Fuzzy Modeling.

UNIT II: Optimization: Derivative based Optimization, Descent Methods, and The Method of Steepest Descent, Classical Newton's Method, Step Size Determination, Derivative-free Optimization, Genetic Algorithms, Simulated Annealing, and Random Search, Downhill Simplex Search.

UNIT III: Artificial Intelligence: Introduction, Knowledge Representation, Reasoning, Issues and Acquisition: Prepositional and Predicate Calculus Rule Based knowledge Representation Symbolic Reasoning Under Uncertainty Basic knowledge Representation Issues Knowledge acquisition, Heuristic Search: Techniques for Heuristic search Heuristic Classification State Space Search: Strategies Implementation of Graph Search based on Recursion Patent-directed Search Production System and Learning.

UNIT IV: Neuro Fuzzy Modeling: Adaptive Neuro-Fuzzy Inference Systems, Architecture Hybrid Learning Algorithm, Learning Methods that Cross-fertilize ANFIS and RBFN Coactive Neuro Fuzzy Modeling, Framework Neuron Functions for Adaptive Networks Neuro Fuzzy Spectrum.

UNIT V: Applications Of Computational Intelligence: Printed Character Recognition, Inverse Kinematics Problems, Automobile Fuel Efficiency Prediction, Soft Computing for Coloripe Prediction.

Text Books:

1. "Neuro-Fuzzy and Soft Computing", J.S.R.Jang, C.T.Sun and E.Mizutani, PHI, 2004, Pearson Education 2004
2. Artificial Intelligence by Saroj Koushik, Cengage Learning
3. "Artificial Intelligence and Intelligent Systems", N.P.Padhy, Oxford University Press, 2006

Reference Books:

1. Artificial Intelligence, Second Edition, Elaine Rich & Kevin Knight, Tata McGraw Hill Publishing Comp., New Delhi, , 2006

2. "Fuzzy Logic with Engineering Applications", Timothy J.Ross, McGraw-Hill, 1997

I Year - II Semester		L	T	P	C
		3	0	0	3
Cloud Computing					

Course Objectives:

- To implement Virtualization
- To implement Task Scheduling algorithms.
- Apply Map-Reduce concept to applications.
- To build Private Cloud.
- Broadly educate to know the impact of engineering on legal and societal issues involved.

Course Outcomes: At the end of the course, student will be able to

- Interpret the key dimensions of the challenge of Cloud Computing.
- Examine the economics, financial, and technological implications for selecting cloud computing for own organization.
- Assessing the financial, technological, and organizational capacity of employer's for actively initiating and installing cloud-based applications.
- Evaluate own organizations' needs for capacity building and training in cloud computing-related IT areas.
- To Illustrate Virtualization for Data-Center Automation.

UNIT I: Introduction: Network centric computing, Network centric content, peer-to –peer systems, cloud computing delivery models and services, Ethical issues, Vulnerabilities, Major challenges for cloud computing. **Parallel and Distributed Systems:** Introduction, architecture, distributed systems, communication protocols, logical clocks, message delivery rules, concurrency, model concurrency with Petri Nets.

UNIT II: Cloud Infrastructure: At Amazon, The Google Perspective, Microsoft Windows Azure, Open Source Software Platforms, Cloud storage diversity, Inter cloud, energy use and ecological impact, responsibility sharing, user experience, Software licensing, **Cloud Computing:** Applications and Paradigms: Challenges for cloud, existing cloud applications and new opportunities, architectural styles, workflows, The Zookeeper, The Map Reduce Program model, HPC on cloud, biological research.

UNIT III: Cloud Resource virtualization: Virtualization, layering and virtualization, virtual machine monitors, virtual machines, virtualization- full and para, performance and security isolation, hardware support for virtualization, Case Study: Xen, vBlades, **Cloud Resource Management and Scheduling**: Policies and Mechanisms, Applications of control theory to task scheduling, Stability of a two-level resource allocation architecture, feedback control based on dynamic thresholds, coordination, resource bundling, scheduling algorithms, fair queuing, start time fair queuing, cloud scheduling subject to deadlines, Scheduling Map Reduce applications, Resource management and dynamic application scaling.

UNIT IV: Storage Systems: Evolution of storage technology, storage models, file systems and database, distributed file systems, general parallel file systems. Google file system. Apache Hadoop, Big Table, Megastore (text book 1), Amazon Simple Storage Service(S3) (Text book 2), **Cloud Security:** Cloud security risks, security – a top concern for cloud users, privacy and privacy impact assessment, trust, OS security, Virtual machine security, Security risks.

UNIT V: Cloud Application Development: Amazon Web Services : EC2 – instances, connecting clients, security rules, launching, usage of S3 in Java, Installing Simple Notification Service on Ubuntu 10.04, Installing Hadoop on Eclipse, Cloud based simulation of a Distributed trust algorithm, Cloud service for adaptive data streaming (Text Book 1), **Google:** Google App Engine, Google Web Toolkit (Text Book 2), **Microsoft:** Azure Services Platform, Windows live, Exchange Online, Share Point Services, Microsoft Dynamics CRM (Text Book 2).

Text Books:

1. Cloud Computing, Theory and Practice, Dan C Marinescu, MK Elsevier
2. Cloud Computing, A Practical Approach, Anthony T Velte, Toby J Velte, Robert Elsenpeter, TMH

Reference book:

1. Mastering Cloud Computing, Foundations and Application Programming, Raj Kumar Buyya, Christen vecctiola, S Tammarai selvi, TMH

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I Year - II Semester		L	T	P	C
		3	0	0	3
Principles of Computer Security					

Course Objectives:

In the course the student will learn

- This course provides an overview of modern cryptographic theories and techniques, mainly focusing on their application into real systems.
- Topics include Database and Cloud Security, Malicious Software, Denial-of-Service Attacks, Software Security, Operating System Security, Wireless Network Security and mobile device security.

Course Outcomes:

After the completion of the course, student will be able to

- Describe the key security requirements of confidentiality, integrity, and availability, types of security threats and attacks and summarize the functional requirements for computer security.
- Explain the basic operation of symmetric block encryption algorithms, use of secure hash functions for message authentication, digital signature mechanism.
- Discuss the issues involved and the approaches for user authentication and explain how access control fits into the broader context that includes authentication, authorization, and audit.
- Explain the basic concept of a denial-of-service attack, nature of flooding attacks, distributed denial-of-service attacks and describe how computer security vulnerabilities are a result of poor programming practices.
- List the steps used to secure the base operating system, specific aspects of securing Unix/Linux systems, Windows systems, and security in virtualized systems and describe the security threats and countermeasures for wireless networks.

Unit I: Introduction: Computer Security Concepts, Threats, Attacks, and Assets, Security Functional Requirements, Fundamental Security Design Principles, Attack Surfaces and Attack Trees, Computer Security Strategy. **Cryptographic Tools:** Confidentiality with Symmetric Encryption, Message Authentication and Hash Functions, Public-Key Encryption, Digital Signatures and Key Management, Random and Pseudorandom Numbers.

Unit II: User Authentication: Electronic User Authentication Principles, Password-Based Authentication, Token-Based Authentication, Biometric Authentication, Remote User Authentication, Security Issues for User Authentication. **Access Control:** Access Control Principles, Subjects, Objects, and Access Rights, Discretionary Access Control, UNIX File Access Control, Role-Based Access Control, Attribute-Based Access Control, Identity, Credential, and Access Management, Trust Frameworks.

Unit III: Database and Cloud Security: The Need For Database Security, Database Management Systems, Relational Databases, Sql Injection Attacks, Database Access Control, Database Encryption, Cloud Computing, Cloud Security Risks And Countermeasures, Data Protection In The Cloud, Cloud Security As A Service. **Malicious Software:** Types of Malicious Software (Malware), Advanced Persistent Threat, Propagation, Infected Content, Viruses, Propagation, Vulnerability Exploit, Worms, Propagation, Social Engineering, Spam E-Mail, Trojans, Payload, System Corruption, Payload, Attack Agent, Zombie, Bots, Payload, Information Theft, Key loggers, Phishing, Spyware, Payload, Stealthing, Backdoors, Root kits, Countermeasures.

Unit IV: Denial-of-Service Attacks: Denial-of-Service Attacks, Flooding Attacks, Distributed Denial-of-Service Attacks, Application-Based Bandwidth Attacks, Reflector and Amplifier Attacks, Defenses Against Denial-of-Service Attacks, Responding to a Denial-of-Service Attack. **Software Security:** Software Security Issues, Handling Program Input, Writing Safe Program Code, Interacting with the

Operating System and Other Programs.

Unit V: Operating System Security: Introduction To Operating System Security, System Security Planning, Operating Systems Hardening, Application Security, Security Maintenance, Linux/Unix Security, Windows Security, Virtualization Security. **Wireless Network Security:** Wireless Security, Mobile Device Security, IEEE 802.11Wireless LAN Overview, IEEE 802.11i Wireless LAN Security.

Text Book:

1. Computer Security: Principles and Practices, 3e, William Stallings, Lawrie Brown, Pearson

Reference book:

1. Network Security Essentials, Principles and Practices, William Stallings, Pearson

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I Year - II Semester		L	T	P	C
		3	0	0	3
High Performance Computing					

Course Objectives:
The objective of the subject is to
- Introduce the basic concepts related to HPC architecture and parallel computing.
- To discuss various computational techniques for studying soft matter systems.
- To apply these concepts to examine complex bimolecular/materials systems that generally require large-scale HPC platform with hybrid CPU-GPU architectures.

Course Outcomes:
After the completion of the course, student will be able to
- Design, formulate, solve and implement high performance versions of standard single threaded algorithms.
- Demonstrate the architectural features in the GPU and MIC hardware accelerators.
- Design programs to extract maximum performance in a multicore, shared memory execution environment processor.
- Analyze Symmetric and Distributed architectures.
- Develop and deploy large scale parallel programs on tightly coupled parallel systems using the message passing paradigm.

UNIT I: Graphics Processing Units: Introduction to Heterogeneous Parallel Computing, GPU architecture, Thread hierarchy, GPU Memory Hierarchy.

UNIT II: GPU Programming: Vector Addition, Matrix Multiplication algorithms. 1D, 2D, and 3D Stencil Operations, Image Processing algorithms – Image Blur, Gray scaling. Histogramming, Convolution, Scan, Reduction techniques.

UNIT III: Many Integrated Cores: Introduction to Many Integrated Cores. MIC, Xeon Phi architecture, Thread hierarchy, Memory Hierarchy, Memory Bandwidth and performance considerations.

UNIT IV: Shared Memory Parallel Programming: Symmetric and Distributed architectures, OpenMP Introduction, Thread creation, Parallel regions. Work sharing, Synchronization.

UNIT V: Message Passing Interface: MPI Introduction, Collective communication, Data grouping for communication.

Text Books:

1. Programming Massively Parallel Processors A Hands-on Approach, 3e, Wen-Mei W Hwu, David B Kirk and Morgan Kaufmann-2019
2. Intel Xeon Phi Coprocessor Architecture and Tools, Rezaur Rahman, Apress Open, 1st edition-2013
3. Using OpenMP, Barbara Chapman, Gabriele Jost, Rudd Vander Pas, MIT Press, 2008

Reference books:

1. "A Parallel Algorithm Synthesis Procedure for High-Performance Computer Architectures" by Dunn Ian N, 2003

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I Year - II Semester		L	T	P	C
		0	0	4	2
Machine Learning with Python Lab					

Course Objectives:
This course will enable students to

- To learn and understand different Data sets in implementing the machine learning algorithms.
- Implement the machine learning concepts and algorithms in any suitable language of choice.

Course Outcomes(COs): At the end of the course, student will be able to

- Implement procedures for the machine learning algorithms
- Design Python programs for various Learning algorithms
- Apply appropriate data sets to the Machine Learning algorithms
- Identify and apply Machine Learning algorithms to solve real world problems

Experiment-1:
Exercises to solve the real-world problems using the following machine learning methods:
a) Linear Regression
b) Logistic Regression.

Experiment-2:
Write a program to Implement Support Vector Machines.

Experiment-3:
Exploratory Data Analysis for Classification using Pandas and Matplotlib.

Experiment-4:
Implement a program for Bias, Variance, and Cross Validation.

Experiment-5:
Write a program to simulate a perception network for pattern classification and function approximation.

Experiment-6:
Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.

Experiment-7:
Build an Artificial Neural Network by implementing the Back propagation algorithm and test the same using appropriate data sets.

Experiment-8:
Write a program to implement the naïve Bayesian classifier for Iris data set. Compute the accuracy of the classifier, considering few test data sets.

Experiment-9:
Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set.

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Experiment-10:
Apply EM algorithm to cluster a Heart Disease Data Set. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program.

Experiment-11:
Write a program to implement k-Nearest Neighbor algorithm to classify the iris data set. Print both correct and wrong predictions.

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I Year - II Semester		L	T	P	C
		0	0	4	2
MEAN Stack Technologies Lab					

Course Objectives:
From the course the student will
- Learn the core concepts of both the frontend and backend programming course.
- Get familiar with the latest web development technologies.
- Learn all about SQL and Mongo databases.
- Learn complete web development process.

Course Outcomes: At the end of the course, student will be able to
- Identify the Basic Concepts of Web & Markup Languages.
- Develop web Applications using Scripting Languages & Frameworks.
- Creating & Running Applications using JSP libraries.
- Creating Our First Controller Working with and Displaying in Angular Js and Nested Forms with ng-form.
- Working with the Files in React JS and Constructing Elements with Data.

Experiment-1:
Develop static pages (using only HTML) of an online Book store. The pages should resemble: www.amazon.com. The website should consist of the following pages. Home page
- Registration and user Login
- User profile page
- Books catalog
- Shopping cart
- Payment by credit card Order Conformation

Experiment-2:
Write an HTML page including any required JavaScript that takes a number from text field in the range of 0 to 999 and shows it in words. It should not accept four and above digits, alphabets and special characters.

Experiment-3:
Develop and demonstrate JavaScript with POP-UP boxes and functions for the following problems:
a) Input: Click on Display Date button using on click ( ) function Output: Display date in the textbox
b) Input: A number n obtained using prompt Output: Factorial of n number using alert
c) Input: A number n obtained using prompt Output: A multiplication table of numbers from 1 to 10 of n using alert
d) Input: A number n obtained using prompt and add another number using confirm Output: Sum of the entire n numbers using alert

Experiment-4:
Create a simple visual bean with a area filled with a color. The shape of the area depends on the property shape. If it is set to true then the shape of the area is Square and it is Circle, if it is false. The color of the area should be changed dynamically for every mouse click.

Experiment-5:
Create an XML document that contains 10 users information. Write a Java Program, which takes User Id as input and returns the user details by taking the user information from XML document using DOM parser or SAX parser.

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Experiment-6:
Develop and demonstrate PHP Script for the following problems:
a) Write a PHP Script to find out the Sum of the Individual Digits.
b) Write a PHP Script to check whether the given number is Palindrome or not

Experiment-7:
Implement the following in CSS
a) Implementation of 'get' and 'post' methods.
b) Implementation in colors, boarder padding.
c) Implementation button frames tables, navigation bars.

Experiment-8:
Implement the web applications with Database using
a) PHP,
b) Servlets and
c) JSP.

Experiment-9:
Write a program to design a simple calculator using
a) JavaScript
b) PHP
c) Servlet and
d) JSP.

Experiment-10:
Create registration and login forms with validations using Jscript query.

Experiment-11:
Jscript to retrieve student information from student database using database connectivity.

Experiment-12:
Implement the following in React JS
a) Using React Js creating constructs data elements.
b) Using React Js implementations DoM.

Experiment-13:
Implement the following in Angular JS
a) Angular Js data binding.
b) Angular JS directives and Events.
c) Using angular Js fetching data from MySQL.

Experiment-14:
Develop and demonstrate Invoking data using Jscript from Mongo DB.

Experiment-15:
Create an Online fee payment form using JSCript and MangoDB.

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I Year - II Semester		L	T	P	C
		2	0	0	2
Mini project with seminar					

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II Year - I Semester		L	T	P	C
		3	0	0	3
Deep Learning					

Course Objectives:
At the end of the course, the students will be expected to:
- Learn deep learning methods for working with sequential data,
- Learn deep recurrent and memory networks,
- Learn deep Turing machines,
- Apply such deep learning mechanisms to various learning problems.
- Know the open issues in deep learning, and have a grasp of the current research directions.

Course Outcomes:
After the completion of the course, student will be able to
- Demonstrate the basic concepts fundamental learning techniques and layers.
- Discuss the Neural Network training, various random models**.**
- Explain different types of deep learning network models.
- Classify the Probabilistic Neural Networks.
- Implement tools on Deep Learning techniques.

UNIT I: Introduction: Various paradigms of learning problems, Perspectives and Issues in deep learning framework, review of fundamental learning techniques. **Feed forward neural network:** Artificial Neural Network, activation function, multi-layer neural network.

UNIT II: Training Neural Network: Risk minimization, loss function, back propagation, regularization, model selection, and optimization.
Conditional Random Fields: Linear chain, partition function, Markov network, Belief propagation, Training CRFs, Hidden Markov Model, Entropy.

UNIT III: Deep Learning: Deep Feed Forward network, regularizations, training deep models, dropouts, Convolution Neural Network, Recurrent Neural Network, and Deep Belief Network.

UNIT IV: Probabilistic Neural Network: Hopfield Net, Boltzmann machine, RBMs, Sigmoid net, Auto encoders.

UNIT V: Applications: Object recognition, sparse coding, computer vision, natural language processing. **Introduction to Deep Learning Tools:** Caffe, Theano, Torch.

Text Books:

1. Goodfellow, I., Bengio,Y., and Courville, A., Deep Learning, MIT Press, 2016..
2. Bishop, C. ,M., Pattern Recognition and Machine Learning, Springer, 2006.

Reference Books:

1. Artificial Neural Networks, Yegnanarayana, B., PHI Learning Pvt. Ltd, 2009.
2. Matrix Computations, Golub, G.,H., and Van Loan,C.,F, JHU Press,2013.
3. Neural Networks: A Classroom Approach, Satish Kumar, Tata McGraw-Hill Education, 2004.

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II Year - I Semester		L	T	P	C
		3	0	0	3
Social Network Analysis					

Course Objectives:

- The learning objective of the course Social Network Analysis is to provide students with essential knowledge of network analysis applicable to real world data, with examples from today's most popular social networks.

Course Outcomes:

- After the completion of the course, student will be able to
- Demonstrate social network analysis and measures.
- Analyze random graph models and navigate social networks data
- Apply the network topology and Visualization tools.
- Analyze the experiment with small world models and clustering models.
- Compare the application driven virtual communities from social network Structure.

UNIT I: Social Network Analysis: Preliminaries and definitions, Erdos Number Project, Centrality measures, Balance and Homophily.

UNIT II: Random graph models: Random graphs and alternative models, Models of network growth, Navigation in social Networks, Cohesive subgroups, Multidimensional Scaling, Structural equivalence, roles and positions.

UNIT III: Network topology and diffusion, Contagion in Networks, Complex contagion, Percolation and information, Navigation in Networks Revisited.

UNIT IV: Small world experiments, small world models, origins of small world, Heavy tails, Small Diameter, Clustering of connectivity, The ErdosRenyi Model, Clustering Models.

UNIT V: Network structure -Important vertices and page rank algorithm, towards rational dynamics in networks, basics of game theory, Coloring and consensus, biased voting, network formation games, network structure and equilibrium, behavioral experiments, Spatial and agent-based models.

Text Books:

1. S. Wasserman and K. Faust. Social Network Analysis: Methods and Applications (Cambridge, Cambridge University Press, 1994)
2. D. Easley and J. Kleinberg, Networks, Crowds and Markets: Reasoning about a highly connected world-2010

Reference Books:

1. Social Network Analysis: Methods and Applications (Structural Analysis in the Social Sciences) by Stanley Wasserman, Katherine Faust, 1994.

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II Year - I Semester		L	T	P	C
		3	0	0	3

Python Programming

Course Objectives:

- To acquire programming skills in core Python.
- To acquire Object Oriented Skills in Python.
- To develop the skill of designing Graphical user Interfaces in Python.
- To develop the ability to write database applications in Python.

Course Outcomes(COs): At the end of the course, student will be able to

- Understand and comprehend the basics of python programming.
- Demonstrate the principles of structured programming and be able to describe, design, implement, and test structured programs using currently accepted methodology.
- Explain the use of the built-in data structures list, sets, tuples and dictionary.
- Make use of functions and its applications.
- Identify real-world applications using oops, files and exception handling provided by python.

UNIT – I:

Introduction: History of Python, Need of Python Programming, Applications Basics of Python Programming Using the REPL(Shell), Running Python Scripts, Variables, Assignment, Keywords, Input-Output, Indentation.

UNIT – II:

Types, Operators and Expressions: Types - Integers, Strings, Booleans; Operators- Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Expressions and order of evaluations Control Flow- if, if-elif-else, for, while, break, continue, pass

UNIT – III:

Data Structures-Lists- Operations, Slicing, Methods, Tuples, Sets, Dictionaries, Sequences, Comprehensions.

UNIT – IV:

Functions - Defining Functions, Calling Functions, Passing Arguments, Keyword Arguments, Default Arguments, Variable-length arguments, Anonymous Functions, Fruitful Functions (Function Returning Values), Scope of the Variables in a Function - Global and Local Variables, **Modules**: Creating modules, import statement, from. Import statement, name spacing, **Python packages**, Introduction to PIP, Installing Packages via PIP, Using Python Packages

UNIT – V:

Object Oriented Programming OOP in Python: Classes, 'self variable', Methods, Constructor Method, Inheritance, Overriding Methods, Data hiding, **Error and Exceptions:** Difference between an error and Exception, Handling Exception, try except block, Raising Exceptions, User defined Exceptions, **Brief Tour of the Standard Library** - Operating System Interface - String Pattern Matching, Mathematics, Internet Access, Dates and Times, Data Compression, Multithreading, GUI Programming, Turtle Graphics, **Testing:** Why testing is required ?, Basic concepts of testing, Unit testing in Python, Writing Test cases, Running Tests.

Text Books:

1. Fundamentals of Python First Programs, Kenneth. A. Lambert, Cengage
2. Introduction to Programming Using Python, Y. Daniel Liang, Pearson

Reference Books:

1. Introduction to Python Programming, Gowrishankar.S, Veena A, CRC Press
2. Think Python, Allen Downey, Green Tea Press
3. Core Python Programming, W. Chun, Pearson

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II Year - I Semester		L	T	P	C
		3	0	0	3

Principles of Cyber Security

Course Objectives:

- To learn threats and risks within context of the cyber security architecture.
- Student should learn and Identify security tools and hardening techniques.
- To learn types of incidents including categories, responses and timelines for response.

Course Outcomes: At the end of the course, student will be able to

- Apply cyber security architecture principles.
- Describe risk management processes and practices.
- Appraise cyber security incidents to apply appropriate response
- Distinguish system and application security threats and vulnerabilities.
- Identify security tools and hardening techniques

UNIT–I: Introduction to Cyber security- Cyber security objectives**,** Cyber security roles**,** Differences between Information Security & Cyber security, **Cyber security Principles**-Confidentiality, integrity, &availability Authentication & non- repudiation.

UNIT–II: Information Security (IS) within Lifecycle Management-Lifecycle management landscape, Security architecture processes, Security architecture tools, Intermediate lifecycle management concepts, **Risks & Vulnerabilities**-Basics of risk management**,** Operational threat environments**,** Classes of attacks.

UNIT–III: Incident Response- Incident categories**,** Incident response Incident recovery, and **Operational security protection**: Digital and data assets, ports and protocols, Protection technologies, Identity and access Management, configuration management.

UNIT–IV: Threat Detection and Evaluation (DE): Monitoring- Vulnerability Management, Security Logs and Alerts, Monitoring Tools and Appliances**. Analysis**- Network traffic Analysis, packet capture and analysis

UNIT–V: Introduction to backdoor System and security-Introduction to metasploit, Backdoor, demilitarized zone(DMZ),Digital Signature, Brief study on Harding of operating system.

Text Books:

1. NASSCOM: Security Analyst Student Hand Book Dec 2015.
2. Information Security Management Principles Updated Edition by David Alexander, Amanda Finch, David Sutton ,Published by BCS, June 2013.

Reference Books:

1. CSX- cyber security fundamentals 2 nd edition, Published by ISACA, Cyber security, Network Security, Data Governance Security.

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II Year - I Semester		L	T	P	C
		3	0	0	3
Internet of Things					

Course Objectives:

- To Understand Smart Objects and IoT Architectures.
- To learn about various IOT-related protocols
- To build simple IoT Systems using Arduino and Raspberry Pi.
- To understand data analytics and cloud in the context of IoT
- To develop IoT infrastructure for popular applications.

Course Outcomes:

After the completion of the course, student will be able to

- Summarize on the term 'internet of things' in different contexts.
- Analyze various protocols for IoT.
- Design a PoC of an IoT system using Rasperry Pi/Arduino
- Apply data analytics and use cloud offerings related to IoT.
- Analyze applications of IoT in real time scenario

UNIT I:

FUNDAMENTALS OF IoT: Evolution of Internet of Things, Enabling Technologies, IoT Architectures,oneM2M, IoT World Forum (IoTWF) and Alternative IoT models, Simplified IoT Architecture and Core IoT Functional Stack, Fog, Edge and Cloud in IoT, Functional blocks of an IoT ecosystem, Sensors, Actuators, Smart Objects and Connecting Smart Objects.

UNIT II:

IoT PROTOCOLS: IT Access Technologies: Physical and MAC layers, topology and Security of IEEE 802.15.4, 802.15.4g, 802.15.4e, 1901.2a, 802.11ah and Lora WAN, Network Layer: IP versions, Constrained Nodes and Constrained Networks, Optimizing IP for IoT: From 6LoWPAN to 6Lo, Routing over Low Power and Lossy Networks, Application Transport Methods: Supervisory Control and Data Acquisition, Application Layer Protocols: CoAP and MQTT.

UNIT III:

DESIGN AND DEVELOPMENT: Design Methodology, Embedded computing logic, Microcontroller, System on Chips, IoT system building blocks, Arduino, Board details, IDE programming, Raspberry Pi, Interfaces and Raspberry Pi with Python Programming.

UNIT IV:

DATA ANALYTICS AND SUPPORTING SERVICES: Structured Vs Unstructured Data and Data in Motion Vs Data in Rest, Role of Machine Learning – No SQL Databases, Hadoop Ecosystem, Apache Kafka, Apache Spark, Edge Streaming Analytics and Network Analytics, Xively Cloud for IoT, Python Web Application

Framework, Django, AWS for IoT, System Management with NETCONF-YANG.

UNIT V:

CASE STUDIES/INDUSTRIAL APPLICATIONS: Cisco IoT system, IBM Watson IoT platform, Manufacturing, Converged Plant wide Ethernet Model (CPwE), Power Utility Industry, Grid Blocks Reference Model, Smart and Connected Cities: Layered architecture, Smart Lighting, Smart Parking Architecture and Smart Traffic Control.

Text Books:

2.IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, Cisco Press, 2017

Reference Books:

6. Internet of Things – A hands-on approach, Arshdeep Bahga, Vijay Madisetti, Universities Press, 2015
7. The Internet of Things – Key applications and Protocols, Olivier Hersent, David Boswarthick, Omar Elloumi and Wiley, 2012 (for Unit 2).
8. "From Machine-to-Machine to the Internet of Things – Introduction to a New Age of Intelligence", Jan Ho¨ ller, Vlasios Tsiatsis, Catherine Mulligan, Stamatis, Karnouskos, Stefan Avesand. David Boyle and Elsevier, 2014.
9. Architecting the Internet of Things, Dieter Uckelmann, Mark Harrison, Michahelles and Florian (Eds), Springer, 2011.
10. Recipes to Begin, Expand, and Enhance Your Projects, 2nd Edition, Michael Margolis, Arduino Cookbook and O'Reilly Media, 2011.

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II Year - I Semester		L	T	P	C
		3	0	0	3
Machine Learning					

Course Objectives:

Machine Learning course will

- Develop an appreciation for what is involved in learning from data.
- Demonstrate a wide variety of learning algorithms.
- Demonstrate how to apply a variety of learning algorithms to data.
- Demonstrate how to perform evaluation of learning algorithms and model selection.

Course Outcomes:

After the completion of the course, student will be able to

- Domain Knowledge for Productive use of Machine Learning and Diversity of Data.
- Demonstrate on Supervised and Computational Learning
- Analyze on Statistics in learning techniques and Logistic Regression
- Illustrate on Support Vector Machines and Perceptron Algorithm
- Design a Multilayer Perceptron Networks and classification of decision tree

UNIT-I: Introduction-Towards Intelligent Machines, Well posed Problems, Example of Applications in diverse fields, Data Representation, Domain Knowledge for Productive use of Machine Learning, Diversity of Data: Structured / Unstructured, Forms of Learning, Machine Learning and Data Mining, Basic Linear Algebra in Machine Learning Techniques.

UNIT-II: Supervised Learning- Rationale and Basics: Learning from Observations, Bias and Why Learning Works: Computational Learning Theory, Occam's Razor Principle and Overfitting Avoidance Heuristic Search in inductive Learning, Estimating Generalization Errors, Metrics for assessing regression, Metris for assessing classification.

UNIT-III: Statistical Learning- Machine Learning and Inferential Statistical Analysis, Descriptive Statistics in learning techniques, Bayesian Reasoning: A probabilistic approach to inference, K-Nearest Neighbor Classifier. Discriminant functions and regression functions, Linear Regression with Least Square Error Criterion, Logistic Regression for Classification Tasks, Fisher's Linear Discriminant and Thresholding for Classification, Minimum Description Length Principle.

UNIT-IV: Support Vector Machines (SVM)- Introduction, Linear Discriminant Functions for Binary Classification, Perceptron Algorithm, Large Margin Classifier for linearly seperable data, Linear Soft Margin Classifier for Overlapping Classes, Kernel Induced Feature Spaces, Nonlinear Classifier, Regression by Support vector Machines.

Learning with Neural Networks: Towards Cognitive Machine, Neuron Models, Network Architectures, Perceptrons, Linear neuron and the Widrow-Hoff Learning Rule, The error correction delta rule.

UNIT -V: Multilayer Perceptron Networks and error back propagation algorithm, Radial Basis Functions Networks. **Decision Tree Learning**: Introduction, Example of classification decision tree, measures of impurity for evaluating splits in decision trees, ID3, C4.5, and CART decision trees, pruning the tree, strengths and weakness of decision tree approach.

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Textbooks:

1. Applied Machine Learning, 1st edition M.Gopal, Mc Graw Hill Education,2018

References:

1. Kevin Murphy, Machine Learning: A Probabilistic Perspective, MIT Press, 2012
2. Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning, Springer 2009 (freely available online)
3. Christopher Bishop, Pattern Recognition and Machine Learning, Springer, 2007.

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KAKINADA – 533 003, Andhra Pradesh, India

II Year - I Semester		L	T	P	C
		3	0	0	3

Digital Forensics

Course Objective:

- Provides an in-depth study of the rapidly changing and fascinating field of computer
- Combines both the technical expertise and the knowledge required to investigate, detect and prevent digital crimes.
- Knowledge on digital forensics legislations, digital crime, forensics processes and procedures, data acquisition and validation, e-discovery tools
- E-evidence collection and preservation, investigating operating systems and file systems, network forensics, art of steganography and mobile device forensics

Course Outcomes: After completion of course, students would be

- Understand relevant legislation and codes of ethics
- Computer forensics and digital detective and various processes, policies and procedures
- E-discovery, guidelines and standards, E-evidence, tools and environment.
- Email and web forensics and network forensics

Syllabus:

UNIT -I: Digital Forensics Science: Forensics science, computer forensics, and digital forensics, **Computer Crime:** Criminalistics as it relates to the investigative process, analysis of cyber-criminalistics area, holistic approach to cyber-forensics.

UNIT -II: Cyber Crime Scene Analysis: Discuss the various court orders etc., methods to search and seizure electronic evidence, retrieved and un-retrieved communications, Discuss the importance of understanding what court documents would be required for a criminal investigation.

UNIT -III: Evidence Management & Presentation: Create and manage shared folders using operating system, importance of the forensic mindset, define the workload of law enforcement, Explain what the normal case would look like, Define who should be notified of a crime, parts of gathering evidence, Define and apply probable cause.

UNIT -IV: Computer Forensics: Prepare a case, Begin an investigation, Understand computer forensics workstations and software, Conduct an investigation, Complete a case, Critique a case,
Network Forensics: open-source security tools for network forensic analysis, requirements for preservation of network data.

UNIT -V: Mobile Forensics: mobile forensics techniques, mobile forensics tools.
Legal Aspects of Digital Forensics: IT Act 2000, amendment of IT Act 2008, Recent trends in mobile forensic technique and methods to search and seizure electronic evidence.

Text Book:

1. John Sammons, 2e, The Basics of Digital Forensics, Elsevier, 2014

Reference Books:

1. Digital Forensics: The Fascinating world of digital evidences, 1st Edition, Nilakshi Jain, Dhananjay R. kalbande, wiley- 2016

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KAKINADA – 533 003, Andhra Pradesh, India

II Year - I Semester		L	T	P	C
		3	0	0	3

Next Generation Databases

Course Objectives:

- To explore the concepts of NoSQL Databases.
- To understand and use columnar and distributed database patterns.
- To learn to use various Data models for a variety of databases.

Course Outcomes: Students will be able to:

- Explore the relationship between Big Data and NoSQL databases
- Work with NoSQL databases to analyze the big data for useful business applications.
- Work with different data models to suit various data representation and storage needs.

Unit-I: Database Revolutions- System Architecture- Relational Database- Database Design Data Storage- Transaction Management- Data warehouse and Data Mining- Information Retrieval.

UnitII: Big Data Revolution- CAP Theorem- Birth of NoSQL- Document Database—XML Databases- JSON Document Databases- Graph Databases.

UnitIII: Column Databases— Data Warehousing Schemes- Columnar Alternative- Sybase IQ- CStore and Vertica- Column Database Architectures- SSD and In-Memory Databases— InMemory Databases- Berkeley Analytics Data Stack and Spark.

UnitIV: Distributed Database Patterns— Distributed Relational Databases- Non-relational Distributed Databases- MongoDB - Sharing and Replication- HBase- CassandraConsistency Models— Types of Consistency- Consistency MongoDB- HBase Consistency- Cassandra Consistency.

UnitV: Data Models and Storage- SQL- NoSQL APIs- Return SQL- Advance Databases— PostgreSQL- Riak- CouchDB- NEO4J- Redis- Future Databases— Revolution RevisitedCounter revolutionaries- Oracle HQ- Other Convergent Databases- Disruptive Database Technologies.

Text Books:

1. "Next Generation Databases",1st Edition, Guy Harrison, Apress, 2015.

References Books:

1. Database System Concepts", Sixth Edition, Abraham Silberschatz, Henry F. Korth, S. Sudarshan, McGrawHill,2010.
2. "Seven Databases in Seven Weeks", Eric Redmond, Jim R Wilson, LLC. 2012.
3. "NoSQL for Mere Mortals", Dan Sullivan, Addison-Wesley, 2015.
4. "NoSQL for Dummies ",Adam Fowler, John Wiley & Sons, 2015.

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IV Semester

L	T	P	C
0	0	32	16

(DISSERTATION) DISSERTATION PHASE – I AND PHASE – II

Syllabus Contents:

The dissertation / project topic should be selected / chosen to ensure the satisfaction of the urgent need to establish a direct link between education, national development and productivity and thus reduce the gap between the world of work and the world of study. The dissertation should have the following

- Relevance to social needs of society
- Relevance to value addition to existing facilities in the institute
- Relevance to industry need
- Problems of national importance
- Research and development in various domain

The student should complete the following:

- Literature survey Problem Definition
- Motivation for study and Objectives
- Preliminary design / feasibility / modular approaches
- Implementation and Verification
- Report and presentation

The dissertation stage II is based on a report prepared by the students on dissertation allotted to them. It may be based on:

- Experimental verification / Proof of concept.
- Design, fabrication, testing of Communication System.
- The viva-voce examination will be based on the above report and work.

Guidelines for Dissertation Phase – I and II at M. Tech. (Electronics):

- As per the AICTE directives, the dissertation is a yearlong activity, to be carried out and evaluated in two phases i.e. Phase – I: July to December and Phase – II: January to June.
- The dissertation may be carried out preferably in-house i.e. department's laboratories and centers OR in industry allotted through department's T & P coordinator.
- After multiple interactions with guide and based on comprehensive literature survey, the student shall identify the domain and define dissertation objectives. The referred literature should preferably include IEEE/IET/IETE/Springer/Science Direct/ACM journals in the areas of Computing and Processing (Hardware and Software), Circuits-Devices and Systems, Communication-Networking and Security, Robotics and Control Systems, Signal Processing and Analysis and any other related domain. In case of Industry sponsored projects, the relevant application notes, while papers, product catalogues should be referred and reported.
- Student is expected to detail out specifications, methodology, resources required, critical issues involved in design and implementation and phase wise work distribution, and submit the proposal within a month from the date of registration.
- Phase – I deliverables: A document report comprising of summary of literature survey, detailed objectives, project specifications, paper and/or computer aided design, proof of concept/functionality, part results, A record of continuous progress.
- Phase – I evaluation: A committee comprising of guides of respective specialization shall assess the progress/performance of the student based on report, presentation and Q &A. In case of unsatisfactory performance, committee may recommend repeating the Phase-I work.

- During phase – II, student is expected to exert on design, development and testing of the proposed work as per the schedule. Accomplished results/contributions/innovations should be published in terms of research papers in reputed journals and reviewed focused conferences OR IP/Patents.
- Phase – II deliverables: A dissertation report as per the specified format, developed system in the form of hardware and/or software, a record of continuous progress.
- Phase – II evaluation: Guide along with appointed external examiner shall assess the progress/performance of the student based on report, presentation and Q &A. In case of unsatisfactory performance, committee may recommend for extension or repeating the work

Course Outcomes:

At the end of this course, students will be able to

1. Ability to synthesize knowledge and skills previously gained and applied to an in-depth study and execution of new technical problem.
2. Capable to select from different methodologies, methods and forms of analysis to produce a suitable research design, and justify their design.
3. Ability to present the findings of their technical solution in a written report.
4. Presenting the work in International/ National conference or reputed journals.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
KAKINADA – 533 003, Andhra Pradesh, India

AUDIT 1 and 2: ENGLISH FOR RESEARCH PAPER WRITING

Course objectives:

Students will be able to:

Understand that how to improve your writing skills and level of readability
Learn about what to write in each section
Understand the skills needed when writing a Title Ensure the good quality of paper at very first-time submission

Syllabus

Units	CONTENTS	Hours
1	Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness	4
2	Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticising, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction	4
3	Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check.	4
4	key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature,	4
5	skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions	4
6	useful phrases, how to ensure paper is as good as it could possibly be the first- time submission	4

Suggested Studies:

1. Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books)
2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press
3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman'sbook .
4. Adrian Wallwork , English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011

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KAKINADA – 533 003, Andhra Pradesh, India

AUDIT 1 and 2: DISASTER MANAGEMENT

Course Objectives: -Students will be able to:

learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.

critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.

develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.

critically understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home country or the countries they work in

Syllabus		
Units	**CONTENTS**	**Hours**
1	**Introduction** Disaster: Definition, Factors And Significance; Difference Between Hazard And Disaster; Natural And Manmade Disasters: Difference, Nature, Types And Magnitude.	4
2	**Repercussions Of Disasters And Hazards**: Economic Damage, Loss Of Human And Animal Life, Destruction Of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, Man- made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts.	4
3	**Disaster Prone Areas In India** Study Of Seismic Zones; Areas Prone To Floods And Droughts, Landslides And Avalanches; Areas Prone To Cyclonic And Coastal Hazards With Special Reference To Tsunami; Post-Disaster Diseases And Epidemics	4
4	**Disaster Preparedness And Management** Preparedness: Monitoring Of Phenomena Triggering A Disaster Or Hazard; Evaluation Of Risk: Application Of Remote Sensing, Data From Meteorological And Other Agencies, Media Reports: Governmental And Community Preparedness.	4
5	**Risk Assessment** Disaster Risk: Concept And Elements, Disaster Risk Reduction, Global And National Disaster Risk Situation. Techniques Of Risk Assessment, Global Co-Operation In Risk Assessment And Warning, People's Participation In Risk Assessment. Strategies for Survival.	4
6	**Disaster Mitigation** Meaning, Concept And Strategies Of Disaster Mitigation, Emerging Trends In Mitigation. Structural Mitigation And Non-Structural Mitigation, Programs Of Disaster Mitigation In India.	4

Suggested Readings:

1. R. Nishith, Singh AK, "Disaster Management in India: Perspectives, issues and strategies "'New Royal book Company.
2. Sahni, PardeepEt.Al. (Eds.)," Disaster Mitigation Experiences And Reflections", Prentice Hall Of India, New Delhi.
3. Goel S. L. , Disaster Administration And Management Text And Case Studies" ,Deep &Deep Publication Pvt. Ltd., New Delhi.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

KAKINADA – 533 003, Andhra Pradesh, India

AUDIT 1 and 2: SANSKRIT FOR TECHNICAL KNOWLEDGE

Course Objectives

1. To get a working knowledge in illustrious Sanskrit, the scientific language in the world
2. Learning of Sanskrit to improve brain functioning
3. Learning of Sanskrit to develop the logic in mathematics, science & other subjects enhancing the memory power
4. The engineering scholars equipped with Sanskrit will be able to explore the huge knowledge from ancient literature

Syllabus

Unit	Content	Hours
1	Alphabets in Sanskrit, Past/Present/Future Tense, Simple Sentences	4
2	Order Introduction of roots Technical information about Sanskrit Literature	4
3	Technical concepts of Engineering-Electrical,	4
4	Technical concepts of Engineering - Mechanical.	4
5	Technical concepts of Engineering - Architecture.	4
6	Technical concepts of Engineering – Mathematics.	4

Suggested reading

1. "Abhyaspustakam" – Dr.Vishwas, Samskrita-Bharti Publication, New Delhi
2. "Teach Yourself Sanskrit" Prathama Deeksha-Vempati Kutumbshastri, Rashtriya Sanskrit Sansthanam, New Delhi Publication
3. "India's Glorious Scientific Tradition" Suresh Soni, Ocean books (P) Ltd., New Delhi.

Course Output

Students will be able to

1. Understanding basic Sanskrit language
2. Ancient Sanskrit literature about science & technology can be understood
3. Being a logical language will help to develop logic in students

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
KAKINADA – 533 003, Andhra Pradesh, India

AUDIT 1 and 2: VALUE EDUCATION

Course Objectives

Students will be able to

1. Understand value of education and self- development
2. Imbibe good values in students
3. Let the should know about the importance of character

Syllabus

Unit	Content	Hours
1	Values and self-development –Social values and individual attitudes. Work ethics, Indian vision of humanism. Moral and non- moral valuation. Standards and principles. Value judgements	4
2	Importance of cultivation of values. Sense of duty. Devotion, Self-reliance. Confidence, Concentration. Truthfulness, Cleanliness. Honesty, Humanity. Power of faith, National Unity. Patriotism.Love for nature ,Discipline	4
3	Personality and Behavior Development - Soul and Scientific attitude. Positive Thinking. Integrity and discipline. Punctuality, Love and Kindness. Avoid fault Thinking.	4
4	Free from anger, Dignity of labour. Universal brotherhood and religious tolerance. True friendship. Happiness Vs suffering, love for truth. Aware of self-destructive habits. Association and Cooperation. Doing best for saving nature	4
5	Character and Competence –Holy books vs Blind faith. Self-management and Good health. Science of reincarnation. Equality, Nonviolence ,Humility, Role of Women.	4
6	All religions and same message. Mind your Mind, Self-control. Honesty, Studying effectively	4

Suggested reading

1 Chakroborty, S.K. “Values and Ethics for organizations Theory and practice”, Oxford University Press, New Delhi

Course outcomes

Students will be able to 1.Knowledge of self-development
2.Learn the importance of Human values 3.Developing the overall personality

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AUDIT 1 and 2: CONSTITUTION OF INDIA

Course Objectives:
Students will be able to:

1. Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
2. To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
3. To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

Syllabus		
Units	**Content**	**Hours**
1	**History of Making of the Indian Constitution:** History Drafting Committee, (Composition & Working)	4
2	**Philosophy of the Indian Constitution:** Preamble Salient Features	4
3	**Contours of Constitutional Rights & Duties:** Fundamental Rights Right to Equality Right to Freedom Right against Exploitation Right to Freedom of Religion Cultural and Educational Rights Right to Constitutional Remedies Directive Principles of State Policy Fundamental Duties.	4
4	**Organs of Governance:** Parliament Composition Qualifications and Disqualifications Powers and Functions Executive President Governor Council of Ministers Judiciary, Appointment and Transfer of Judges, Qualifications Powers and Functions	4
5	**Local Administration:** District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CE of Municipal Corporation. Pachayati raj: Introduction, PRI: ZilaPachayat. Elected officials and their roles, CEO ZilaPachayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy	4
6	**Election Commission:** Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.	4

Suggested reading

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

Course Outcomes:

Students will be able to:

1. Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
2. Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
3. Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
4. Discuss the passage of the Hindu Code Bill of 1956.

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AUDIT 1 and 2: PEDAGOGY STUDIES

Course Objectives:
Students will be able to:

4. Review existing evidence on the review topic to inform programme design and policy making undertaken by the DfID, other agencies and researchers.
5. Identify critical evidence gaps to guide the development.

Syllabus		
Units	**Content**	**Hours**
1	**Introduction and Methodology:** Aims and rationale, Policy background, Conceptual framework and terminology Theories of learning, Curriculum, Teacher education. Conceptual framework, Research questions**.** Overview of methodology and Searching.	4
2	Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. Curriculum, Teacher education.	4
3	Evidence on the effectiveness of pedagogical practices Methodology for the in depth stage: quality assessment of included studies. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?	4
4	Theory of change. Strength and nature of the body of evidence for effective pedagogical practices. Pedagogic theory and pedagogical approaches. Teachers' attitudes and beliefs and Pedagogic strategies.	4
5	Professional development: alignment with classroom practices and follow-up support Peer support Support from the head teacher and the community. Curriculum and assessment Barriers to learning: limited resources and large class sizes	4
6	**Research gaps and future directions** Research design Contexts Pedagogy Teacher education Curriculum and assessment Dissemination and research impact.	4

Suggested reading

1. Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31 (2): 245-261.
2. Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3): 361-379.
3. Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London: DFID.
4. Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 33 (3): 272–282.
5. Alexander RJ (2001) Culture and pedagogy: International comparisons in primary education. Oxford and Boston: Blackwell.
6. Chavan M (2003) Read India: A mass scale, rapid, 'learning to read' campaign.
7. www.pratham.org/images/resource%20working%20paper%202.pdf.

Course Outcomes:

Students will be able to understand:

1. What pedagogical practices are being used by teachers in formal and informal classrooms in developing countries?
2. What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?
3. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?

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AUDIT 1 and 2: STRESS MANAGEMENT BY YOGA

Course Objectives

1. To achieve overall health of body and mind
2. To overcome stress

Syllabus

Unit	Content	Hours
1	Definitions of Eight parts of yog. (Ashtanga)	5
2	Yam and Niyam. Do`s and Don't's in life. Ahinsa, satya, astheya, bramhacharya and aparigraha	5
3	Yam and Niyam. Do`s and Don't's in life. Shaucha, santosh, tapa, swadhyay, ishwarpranidhan	5
4	Asan and Pranayam Various yog poses and their benefits for mind & body	5
5	Regularization of breathing techniques and its effects-Types of pranayam	4

Suggested reading

1. 'Yogic Asanas for Group Tarining-Part-I" : Janardan Swami YogabhyasiMandal, Nagpur
2. "Rajayoga or conquering the Internal Nature" by Swami Vivekananda, Advaita Ashrama (Publication Department), Kolkata

Course Outcomes:

Students will be able to:

1. Develop healthy mind in a healthy body thus improving social health also
2. Improve efficiency

AUDIT 1 and 2: PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS

Course Objectives

1. To learn to achieve the highest goal happily
2. To become a person with stable mind, pleasing personality and determination
3. To awaken wisdom in students

Syllabus

Unit	Content	Hours
1	Neetisatakam-Holistic development of personality Verses- 19,20,21,22 (wisdom) Verses- 29,31,32 (pride & heroism) Verses- 26,28,63,65 (virtue)	4
2	Neetisatakam-Holistic development of personality Verses- 52,53,59 (dont's) Verses- 71,73,75,78 (do's)	4
3	Approach to day to day work and duties. Shrimad Bhagwad Geeta : Chapter 2-Verses 41, 47,48,	4
4	Chapter 3-Verses 13, 21, 27, 35, Chapter 6-Verses 5,13,17, 23, 35, Chapter 18-Verses 45, 46, 48.	4
5	Statements of basic knowledge. Shrimad Bhagwad Geeta: Chapter2-Verses 56, 62, 68 Chapter 12 -Verses 13, 14, 15, 16,17, 18	4
6	Personality of Role model. Shrimad Bhagwad Geeta: Chapter2-Verses 17, Chapter 3-Verses 36,37,42, Chapter 4-Verses 18, 38,39 Chapter18 – Verses 37,38,63	4

Suggested reading

1. "Srimad Bhagavad Gita" by Swami Swarupananda Advaita Ashram (Publication Department), Kolkata
2. Bhartrihari's Three Satakam (Niti-sringar-vairagya) by P.Gopinath, Rashtriya Sanskrit Sansthanam, New Delhi.

Course Outcomes

Students will be able to

1. Study of Shrimad-Bhagwad-Geeta will help the student in developing his personality and achieve the highest goal in life
2. The person who has studied Geeta will lead the nation and mankind to peace and prosperity
3. Study of Neetishatakam will help in developing versatile personality of students

ACADEMIC REGULATIONS

COURSE STRUCTURE & DETAILED SYLLABUS

For

MASTER OF BUSINESS ADMINISTRATION

(Applicable for the batches admitted from 2019-20)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
KAKINADA – 533003, ANDHRA PRADESH, INDIA

I YEAR I SEMESTER							
S.No	**Course Code**	**Courses**	**Marks**	**L**	**T**	**P**	**C**
1	C-101	Management and Organizational Behavior	100	4	0	0	4
2	C-102	Managerial Economics	100	4	0	0	4
3	C-103	Accounting for Managers	100	4	0	0	4
4	C-104	Quantitative Analysis for Business Decisions	100	4	0	0	4
5	C-105	Legal and Business Environment	100	4	0	0	4
6	C-106	Business Communication and Soft skills	100	4	0	0	4
7	C-107 Open Elective	Cross Cultural Management Rural Innovation projects MOOCs : SWAYAM/NPTEL- Related to Management Courses other than listed courses in the syllabus	100	4	0	0	4
8	C-108	Business Communication and Soft skills Lab	50	0	0	2	2
9	C-109	Information Technology – Lab1(Spreadsheet and Tally)	50	0	0	2	2
		Total	**800**	**28**	**0**	**4**	**32**

I YEAR II SEMESTER							
S.No	**Course Code**	**Courses**	**Marks**	**L**	**T**	**P**	**C**
1	C-201	Financial Management	100	4	0	0	4
2	C-202	Human Resource Management	100	4	0	0	4
3	C-203	Marketing Management	100	4	0	0	4
4	C-204	Operations Management	100	4	0	0	4
5	C-205	Business Research Methods	100	4	0	0	4
6	C-206 open elective	Project Management Technology Management Lean Management Database Management System	100	4	0	0	4
7	C-207	IT-lab 2(Programming R)	50	0	0	2	2
		Total	**650**	**24**	**0**	**2**	**26**

II YEAR III SEMESTER							
S.No	**Course Code**	**Courses**	**Marks**	**L**	**T**	**P**	**C**
1	C-301	Strategic Management	100	4	0	0	4
2	C -302	Operations Research	100	4	0	0	4
3	E -301	Elective – 1	100	4	0	0	3
4	E-302	Elective – 2	100	4	0	0	3
5	E-303	Elective – 3	100	4	0	0	3
6	E-304	Elective – 4	100	4	0	0	3
7	C-304	Industrial Project based on Summer Internship	100	4	0	0	4
		Total	**700**	**28**	**0**	**0**	**24**

II YEAR IV SEMESTER							
S.No	**Course Code**	**Courses**	**Marks**	**L**	**T**	**P**	**C**
1	C -401	Supply Chain Management and Analytics	100	4	0	0	4
2	C-402	Innovation and Entrepreneurship	100	4	0	0	4
3	E-401	Elective – 5	100	4	0	0	3
4	E-402	Elective – 6	100	4	0	0	3
5	E-403	Elective – 7	100	4	0	0	3
6	E-404	Elective – 8	100	4	0	0	3
7	C-403	Comprehensive Viva- voce	50	0	0	0	2
		Total Marks / Credits	**650**	**28**	**0**	**0**	**22**
			2800				**104**

*The project work documentation shall be checked with anti plagiarism software (Turnitin). The permissible similarity shall be less than 30%.

*Comprehensive Viva is to verify the student knowledge as a whole from which he was studied during the two year course work.

III SEMESTER
Human Resource Management

S. no	Course Code	SUBJECT TITLE
1	EH-301	Leadership and Change Management
2	EH-302	Performance Evaluation and Compensation Management
3	EH-303	Human Resource Metrics and Analytics
4	EH-304	Human Capital Management
5	EH-305	Manpower Planning, Recruitment, and Selection

IV SEMESTER
Human Resource Management

S. no	Course Code	SUBJECT TITLE
6	EH-401	Labor Welfare and employment laws
7	EH-402	International HRM
8	EH-403	Employee Relations and Engagement
9	EH-404	Human Resources Development
10	EH-405	Strategic HRM

III SEMESTER FINANCE

S. no	Course Code	SUBJECT TITLE
1	EF-301	Investment Analysis and Portfolio Management
2	EF-302	Managing Banks and Financial Institutions
3	EF-303	Financial Markets and Services
4	EF-304	Mergers, Acquisitions and Corporate Restructuring
5	EF-305	Taxation

IV SEMESTER FINANCE

S. no	Course Code	SUBJECT TITLE
6	EF-401	Financial Derivatives
7	EF-402	Global Financial Management
8	EF-403	Financial Risk Management
9	EF-404	Strategic Financial Management
10	EF-405	Behavioral Finance

III SEMESTER - ELECTIVES
MARKETING

S. no	Course Code	SUBJECT TITLE
1	EM-301	Consumer Behavior
2	EM-302	Retail Management
3	EM-303	Customer Relationship Management
4	EM-304	Strategic Marketing Management
5	EM-305	Digital and Social Media Marketing

IV SEMESTER MARKETING

S. no	Course Code	SUBJECT TITLE
6	EM-401	Services Marketing
7	EM-402	Promotional and Distribution Management
8	EM-403	Green Marketing
9	EM-404	Advertising and Brand Management
10	EM-405	Global Marketing Management

III SEMESTER ELECTIVES
SYSTEMS

S. no	Course Code	SUBJECT TITLE
1	ES-301	Data Mining for Business Decisions
2	ES-302	Managing Software Projects
3	ES-303	Web Designing
4	ES-304	Business Analytics
5	ES-305	Managing Digital Innovation and Transformation

IV SEMESTER SYSTEMS

S. no	Course Code	SUBJECT TITLE
6	ES-401	Big Data Analytics
7	ES-402	Enterprise Resource Planning
8	ES-403	Cyber Laws & Security
9	ES-404	Information Systems Audit
10	ES-405	Artificial Intelligence and Machine Learning

OPERATIONS MANAGEMENT
III SEMESTER

S. no	Course Code	SUBJECT TITLE
1	EO-301	Service Operations Management
2	EO-302	Quality Toolkit for Managers
3	EO-303	Pricing and Revenue Management
4	EO-304	Operations Strategy
5	EO-305	Sales and Operations Planning

IV SEMESTER

S. no	Course Code	SUBJECT TITLE
6	EO-401	Behavioral Operations Management
7	EO-402	Theory of Constraints
8	EO-403	Management of Manufacturing Systems
9	EO-404	Sourcing Management
10	EO-405	Supply Chain Analytics

TRAVEL AND TOURISM MANAGEMENT

III SEMESTER

S. no	**Course Code**	**SUBJECT TITLE**
1	ET-301	Travel agency and Tour Operations
2	ET-302	Hospitality Management
3	ET-303	Resort Planning and Destination Management
4	ET-304	Tourism Policy and Planning
5	ET-305	Recreation Management

IV SEMESTER

S. no	Course Code	SUBJECT TITLE
6	ET-401	Travel Media and Journalism
7	ET-402	Event Management
8	ET-403	Front Office Management
9	ET-404	Information Technology and Tourism
10	ET-405	Eco Tourism Practices

HEALTH CARE AND HOSPITAL MANAGEMENT

III SEMESTER

S. no	Course Code	SUBJECT TITLE
1	EHC-301	Hospital organization and Management
2	EHC-302	Health Care Policies and Delivery Systems
3	EHC-303	Health Economics
4	EHC-304	Hospital Functions and Support Services
5	EHC-305	Revenue Cycle Management

IV SEMESTER

S. no	Course Code	SUBJECT TITLE
6	EHC-401	Patient Care & Services Management
7	EHC-402	Managed Health Care and Insurance
8	EHC-403	Health Laws, Ethics and Regulations
9	EHC-404	Hospital Management Information System
10	EHC-405	Health Analytics

ENTREPRENEURSHIP AND SMALL ENTERPRISE MANAGEMENT

III SEMESTER

S. no	Course Code	SUBJECT TITLE
1	EE-301	Indian Models in Entrepreneurship
2	EE-302	Social Entrepreneurship
3	EE-303	Business Plan Preparation for Small Business
4	EE-304	Entrepreneurial Marketing
5	EE-305	Planning, Structuring, and Financing Small Business

IV SEMESTER

S. no	Course Code	SUBJECT TITLE
6	EE-401	Marketing for Small Business
7	EE-402	Finance and Accounting for Small Business
8	EE-403	Technology Appreciation and Intellectual Property Rights
9	EE-404	Innovation Technology Management
10	EE-405	Venture Valuation and Accounting

AGRO-BUSINESS MANAGEMENT

III SEMESTER

S. no	Course Code	SUBJECT TITLE
	EA-301	Agro-Marketing Management
2	EA-302	Agro-Business and Rural Green Market
3	EA-303	Agro-Business Environment
4	EA-304	Agro-Supply Chain Management
5	EA-305	Entrepreneurship for Agriculture

IV SEMESTER

S. no	Course Code	SUBJECT TITLE
6	EA-401	Food Processing Management
7	EA-402	Disaster Management
8	EA-403	Food Retail Management
9	EA-404	Agro- Technology Management
10	EA-405	Organic Food Technology

LOGISTICS AND SUPPLY CHAIN MANAGEMENT
III SEMESTER

S. no	Course Code	SUBJECT TITLE
1	EL-301	Store keeping and Warehousing management
2	EL-302	Transportation and Infrastructure Management for SCM
3	EL-303	Purchasing and Material Management
4	EL-304	Reverse Logistics
5	EL-305	Supply Chain Risk Management

IV SEMESTER

S. no	Course Code	SUBJECT TITLE
6	EL-401	Enterprise Resource Planning
7	EL-402	International Logistics Management
8	EL-403	Lean Supply Chain Management
9	EL-404	Shipping and Maritime law
10	EL-405	Green Supply Chain Management

BUSINESS ANALYTICS

III SEMESTER

S. no	Course Code	SUBJECT TITLE
1	EB-301	Essentials of Business Analytics
2	EB-302	Text, Social Media& Web Analytics
3	EB-303	Predictive Analytics
4	EB-304	Big Data Analytics
5	EB-305	Marketing Analytics

IV SEMESTER

S. no	Course Code	SUBJECT TITLE
6	EB-401	Financial Analytics
7	EB-402	HR Analytics
8	EB-403	Econometrics and Business Forecasting
9	EB-404	Data Warehousing and OLAP
10	EB-405	Data Mining& Machine learning

SYLLABUS

C-101	Management and Organizational Behavior	100	4	0	0	4

Objective:
Objective of the course is to give a basic perspective of Management. This will form foundation to study other functional areas of management and to provide the students with the conceptual framework and the theories underlying Organizational Behaviour.

Unit – I
Definition, Nature, Functions and Importance of Management – Evolution of Management thought – Scientific management, administrative management, Haw throne experiments – systems approach - Levels of Management - Managerial Skills - Planning – Steps in Planning Process – importance and Limitations – Types of Plans - Characteristics of a sound Plan - Management By Objectives (MBO) - Techniques and Processes of Decision Making - Social Responsibilities of Business

Unit-II
Organizing – Principles of organizing – Organization Structure and Design – Types of power - Delegation of Authority and factors affecting delegation – Span of control – Decentralization – Line and staff structure conflicts - Coordination definition and principles - Emerging Trends in Corporate Structure – Formal and Informal Organization- Nature and importance of Controlling, process of Controlling, Requirements of effective control and controlling techniques.

Unit – III
Organizational behavior: Nature and scope – Linkages with other social sciences – Individual roles and organizational goals – perspectives of human behavior - Perception– perceptual process – Learning - Learning Process- Theories - Personality and Individual Differences - Determinants of Personality - Values, Attitudes and Beliefs - Creativity and Creative thinking.

Unit – IV
Motivation and Job Performance – Content and process Theories of Motivation - Leadership - Styles - Approaches – Challenges of leaders in globalized era – Groups – stages formation of groups – Group Dynamics - Collaborative Processes in Work Groups - Johari Window- Transactional Analysis.

Unit – V:
Organizational conflict-causes and consequences-conflict and Negotiation Team Building, Conflict Resolution in Groups and problem solving Techniques – Organizational change - change process - resistance to change - Creating an Ethical Organization.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. Harold Koontz, Heinz Weihrich, A.R.Aryasri, Principles of Management, TMH, 2010.
2. Dilip Kumar Battacharya, Principles of Management, Pearson, 2012.
3. Kumar, Rao, Chhaalill "Introduction to Management Science" Cengage Publications,New Delhi
4. V.S.P.Rao, Management Text and Cases, Excel, Second Edition, 2012.
5. K.Anbuvelan, Principles of Management, University Science Press, 2013.
6. K.Aswathappa " Organisational Behaviour-Text, Cases and Games", Himalaya Publishing House, New Delhi,2008.
7. Steven L Mc Shane, Mary Ann Von Glinow,

Radha R Sharma: “Organisational Behaviour”, TMH Education, New Delhi,2008

C-102	Managerial Economics	100	4	0	0	4

Objective: This subject seeks to equip the students with the analytical tools of Economics and apply the same to rational managerial decision-making. It further seeks to develop economic way of thinking in dealing with practical business problems and challenge.

UNIT-I:
Introduction to Managerial Economics: Nature and Scope- Fundamental Concepts: Incremental reasoning, Concept of Time Perspective, Discounting Principle, Opportunity Cost Principle, Equi -Marginal Concept,-Theory of Firm.

UNIT-II:
Demand Analysis and Forecasting: Concepts of Demand, Supply, Determinants of Demand and Supply, Elasticities of Demand and Supply- Methods of demand forecasting for established and new products.

UNIT-III:
Cost and Production Analysis: Cost: Concept and types, Cost-Output Relationships, Cost Estimation, Reduction and Control- Economies and Diseconomies of Scale- Law of Variable Proportions- Returns to Scale- Isoquants-Cobb- Douglas and CES Production functions.

UNIT-IV:
Theory of Pricing: Price determination under Perfect Competition, Monopoly, Oligopoly and Monopolistic Competitions- Methods of Pricing- Game Theory basics- Dominant Strategy-Nash Equilibrium and Prisoner's Dilemma.

UNIT-V:
Macro Economics and Business: Concept, Nature and Measurement of National Income-Inflation and Deflation: Inflation - Meaning and Kinds, Types, Causes and measurement of inflation Measures to Control Inflation, Deflation- - Philips curve-Stagflation-Theory of Employment- Business cycles: Policies to counter Business Cycles.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. D.M.Mithani, Managerial Economics, Himalaya Publishing House
2. H.Craig Peterson, W.Cris Lewis, Managerial Economics, Pearson, 2005.
3. Gupta G.S., Managerial Economics, TMH, 1988.
4. P.L. Mehta, Managerial Economics, PHI, 2001.
5. K .K Dawett, Modern Economic Theory, Sultan Chand & Sons.
6. D.N. Dwivedi, Managerial Economics, 7th Ed, Vikas Publishing.
7. Rangarajan and Dholkia, Macroeconomics, TMH.

C-103	**Accounting for Managers**	**100**	**4**	**0**	**0**	**4**

Objective:
The objective of this course is to acquaint the students regarding various accounting concepts and its application in managerial decision making.

Unit – I:
Financial Accounting- concept, Importance and scope, accounting principles, accounting cycle, journal ledger, trial balance, Preparation of final accounts with adjustments.

Unit – II:
Analysis and interpretation of financial statements – meaning, importance and techniques, ratio analysis, Fund flow analysis, cash flow analysis (AS - 3).

Unit – III:
Cost accounting–meaning, importance, methods, techniques; classification of costs and cost sheet; Inventory valuation methods- LIFO, FIFO, HIFO and weighted average method, an elementary knowledge of activity based costing.

Unit – IV:
Management accounting – concept, need, importance and scope; budgetary control-meaning, need, objectives, essentials of budgeting, different types of budgets and their preparation.

Unit-V:
Standard costing and variance analysis (materials, labour)-Marginal costing and its application in managerial decision making, Break Even Analysis.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit. References:

1. MAHESWARI AND MAHESWARI" Financial Accounting", Vikas Publishing House, New Delhi, 2013.
2. Pandey, I.M. Management Accounting, Vikas Publishing House, New Delhi.
3. Horngen, Sundem & Stratton, Introduction to Management Accounting, Pearson Education, New Delhi.
4. Hansen & Mowen, Cost Management, Thomson Learning.
5. Mittal, S.N. Management Accounting and Financial management, Shree Mahavir Book Depot, New Delhi.
6. Jain S.P. and Narang K.L. Advanced Cost Accounting, Kalyani Publishers Ludhiana.
7. Khan M.Y. and Jain, P.K. Management Accounting, TMH, N. Delhi.

C-104	Quantitative Analysis for Business Decisions	100	4	0	0	4

Objective:

Students would be able to acquire an understanding of descriptive statistical tools like measures of central tendency & measures of variation and apply these tools to real life situations.

Unit I

Basic Mathematical & Statistical Techniques: Linear, Quadratic, Logarithmic and Exponential Functions- Permutations and Combinations – Matrices - Elementary operations of matrices.

Unit II

Measures of Central Tendency – Measures of Dispersion –Simple Correlation and Regression Analysis Concept of Probability- Probability Rules – Joint and Marginal Probability – Baye's Theorem- Probability Distributions- Binomial, Poisson, Normal and Exponential Probability Distributions.

UNIT III

Introduction to Decision Theory: Steps involved in Decision Making, different environments in which decisions are made, Criteria for Decision Making, Decision making under uncertainty, Decision making under conditions of Risk-Utility as a decision criterion, Decision trees, Graphic displays of the decision making process, Decision making with an active opponent.

Unit-IV

Sampling and Sampling Distributions – Estimation – Point and Interval Estimates of Averages and proportions of small and Large Samples –Concepts of Testing Hypothesis –One Sample Test for Testing Mean and Proportion of Large and Small Samples.

Unit-V

Tests Two Samples –Tests of Difference between Mean and Proportions of Small and Large Samples – Chi- square Test of Independence and Goodness of Fitness- Analysis of Variance.

Relevant cases have to be discussed in each unit and in examination case is compulsory

from any unit. References:

1. N.D.Vohra: "Quantitative Techniques in Management", Tata-McGraw Hill Private Limited, New Delhi, 2011.
2. Gupta S.P: "Statistical Methods", S. Chand and Sons, New Delhi.
3. Anand Sharma: "Quantitative Techniques for Business decision Making", Himalaya Publishers, New Delhi, 2012.
4. D P Apte: "Operation Research and Quantitative Techniques", Excel Publication, New Delhi, 2013.
5. Hamdy, A.Taha: "Operations Research: An Introduction", Prentice-Hall of India, New Delhi 2003.
6. Anderson: "Quantitative Methods for Business", Cengage Learning, New Delhi 2013.
7. Sancheti, Dc & VK Kapoor, "Business Mathematics", S Chand and Sons, New Delhi.

C-105	Legal and Business Environment	100	4	0	0	4

Objective:

To acquaint students with the issues of Indian business environment in which business has to operate, to relate the impact of environment on business in an integrated manner, and to give an exposure to important commercial and industrial laws.

UNIT-I

Introduction: Concept of Business Environment-Definition-Characteristics-Environmental factors, Importance at national and international level – problems and challenges – Environmental Scanning: Importance, Process of scanning- NITI Aayog: It's Role in Economic Development of India- Technological Environment: Features, Its impact on Business, Restraints on Technological Growth.

UNIT-II

Economic and Political Environment: Concept-Definition of Economic Environment-Economic Systems- Relative merits and demerits of each systems-Economic Policies-Monetary-Fiscal- Industrial policies since independence and their significance – regulatory and promotional framework . Structure of Indian Economy-Nature and significance. Economic Planning- Objectives, Merits, Limitations-Concept and Meaning of Political Environment.

UNIT-III

Legal Environment: - Business Law: Meaning, scope and need for Business Law-Source of Business Law- Indian Contract Act 1872: Its Essentials, Breach of Contract and remedies. Intellectual Property Rights. Negotiable Instruments Act 1881.

UNIT-IV

Company Act 2013: Memorandum and Articles of Association-Partnership Act 1932: Duties of Partners- Dissolution of Partnership-Information Technology Act 2000: Digital signature-Cyber Frauds.

UNIT-V

Miscellaneous Acts: Sales of Goods Act 1930-Sale- agreement to Sale – Implied Conditions and Warranties- Consumer Protection Act 1986- Competition Act-Environment (Protection) Act 1986- Foreign Exchange Management Act (FEMA).

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. Francis Cherunillam, Business Environment, Himalaya Publishers.
2.K.Aswathappa, Essentials of Business Environment, Himalaya Publishers.
3.P.K.Dhar, Indian Economy Growing Dimensions, Kalyani Publishers 4.
4.N.D.Kapoor , Mercantile Law, Sultan Chand Publishers.
5.Chaula and Garg, Mercantile Law, Kalyani Publishers

C-106	Business Communication and Soft skills	100	4	0	0	4

Objective:

To acquaint the students with fundamentals of communication, help them honing oral, written and non-verbal communication skills and to transform them as effective communicators.

Unit – I

Purpose and process of communication: Objectives of Communication-Process of Communication- Types of communication; noise, listening skills, Types of listening, essentials of good listening and tips.

LAB: LISTENING AND SPEAKING SKILLS- Conversational skills (formal and informal) – group discussion. Listening to lectures, discussions, talk shows, news programmes, dialogues from TV/radio/Ted talk/Podcast – watching videos on interesting events on YouTube.(Presenting before the class).

Unit – II

Managing Organizational Communication: Formal and Informal Communication- Interpersonal and Intrapersonal communication- Role of Emotion in Interpersonal Communication- Barriers to Interpersonal Communication- Exchange Theory-Gateways for Effective Interpersonal Communication.

LAB: Organizational Communication:

Choosing the organization – goal setting - time management — leadership traits – team work – communicating across teams- designing career and life planning.

Unit – III

Non verbal communication and Body Language: Kinesics, Proxemics, Paralanguage, Haptics, handshakes, appropriate body language and mannerisms for interviews: business etiquettes- across different cultures.

LAB: Understanding Body Language Aspects and presenting oneself to an interviewer, Proper handshakes**.**

Unit – IV

Written communication: mechanics of writing, report writing- business correspondence-business letter format- Meetings and managing meetings- Resume writing-Formats and Skills.

LAB: Writing job applications – cover letter – resume – emails – letters – memos – reports – blogs – writing for publications.

Unit- V

Presentation skills: prerequisites of effective presentation, format of presentation; Assertiveness –strategies of assertive behavior; Communication skills for group discussion and interviews, Interview Techniques.

LAB: Designing presentations and enhancing presentation skills.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. Mallika Nawal: "Business Communication", Cengage Learning, New Delhi, 2012.
2. Edwin A. Gerloff, Jerry C. Wofford, Robert Cummins Organisational Communication: The key stone to managerial effectiveness.
3. Meenakshi Rama: "*Business Communication*", Oxford University Press, NewDelhi
4. C.S.G. Krishnamacharyulu and Dr. Lalitha Ramakrishnan, Business Communication, Himalaya Publishing House, Mumbai

5. Paul Turner: "*Organisational Communication*", JAICO Publishing House, New Delhi.
6. SathyaSwaroopDebasish, Bhagaban Das" "*Business Communication*", PHIPrivate Limited, New Delhi, 2009.
7. R.K.Madhukar: "Business Communication", Vikas Publishing House, New Delhi, 2012.
8. Kelly M Quintanilla, Shawn T.Wahl:"Business and Professional Communication", SAGE,New Delhi, 2012.
9. Sangita Mehta, NeetyKaushish: "Business Communication", University Science Press, New Delhi, 2010.
10. Anjali Ghanekar: "Business Communication Skills", Everest Publishing House, New Delhi,2011

C-107 Open Elective	Cross Cultural Management	100	4	0	0	4

Objective:
The objective of this course is to enhance the ability of class members to interact effectively with people from cultures other than their own, specifically in the context of international business. The course is aimed at significantly improving the ability of practicing managers to be effective global managers.

Unit – I
Introduction – Concept of Culture for a Business Context; Brief wrap up of organizational culture & its dimensions; Cultural Background of business stakeholders [managers, employees, shareholders, suppliers, customers and others] – An Analytical framework.

Unit – II
Culture and Global Management – Global Business Scenario and Role of Culture. Framework for Analysis; Elements & Processes of Communication across Cultures; Communication Strategy for/ of an Indian MNC and Foreign MNC & High-Performance Winning Teams and Cultures; Culture Implications for Team Building.

Unit – III

Cross Culture – Negotiation & Decision Making – Process of Negotiation and Needed Skills & Knowledge Base – Overview with two illustrations from multicultural contexts [India – Europe/ India – US settings, for instance]; International and Global Business Operations- Strategy Formulation & Implementation; Aligning Strategy, Structure & Culture in an organizational Context.

Unit – IV

Global Human Resources Management – Staffing and Training for Global Operations – Expatriate – Developing a Global Management Cadre.. Motivating and Leading; Developing the values and behaviours necessary to build high-performance organization personnel [individuals and teams included] – Retention strategies.

Unit – V

Corporate Culture – The Nature of Organizational Cultures Diagnosing the As is Condition; Designing the Strategy for a Culture Change Building; Successful Implementation of Culture Change Phase; Measurement of ongoing Improvement.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.
References:

1. Cashby Franklin, Revitalize your corporate culture: PHI, Delhi

2. Deresky Helen, International Management: Managing Across Borders and Cultures, PHI, Delhi

3. Esenn Drlarry, Rchildress John, The Secret of a Winning Culture: PHI, Delhi

C-107 Open Elective	**Rural Innovation projects**	**100**	**4**	**0**	**0**	**4**

Objective:
To make the students understand various natural resources and their importance in rural development.

Unit-I
Definition and meaning of Resources, Types of Rural Resources, Natural and Man-made, Characteristics of Resources, Importance of different resources in Rural Development. Rural Governance and Administration in India- Pre & Post independence-Elements of Indian constitution Constitutional amendment to Panchayati Raj system-Development (Department) Administration in Rural India.

Unit-II
Land Resources development experience: Classification of land based on utility, Soils – Structure and importance, Properties of Soil- Physical and Chemical, Soil Conservation-methods and importance. Status of Rural Development in the SAARC countries.

Unit-III
Human Resources Dimensions of Rural Development-Quantitative aspects of rural human resource (Gender & Age wide classification, Density, Issue in rural human resources- Scarcity, lack of skill, attitude, and social status). Food security and public distribution system-Rural Financial Sector –Sources of Rural Credit: Institutional and Non Institutional - Service Delivery System in Rural areas, Rural Infrastructural Sector and Millennium Development Goals Housing in Rural Areas.

Unit-IV
Approaches of Rural Development in India- institutional, technological, area and target group, participatory, individualistic. Rural Development Policies during different plan periods. Strategies of Rural Development – growth oriented strategy, Welfare strategy, Responsive strategy, Holistic strategy, right-based strategy. PURA Model.

Unit-V
Review of Rural Development Programmes in the area of agricultural sector – crop, non-crop, livestock, fishery, forestry. Review of Rural Development Programmes in area of Social Sectors – Health, Sanitation and Education. Project Planning and Management.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. Rural Development: Principles, Policies and Management, Katar Singh, Sage Publications India Pvt. Ltd., 2009.
2. Soil & Water Conservation & Watershed Management Hardcover – 2012, Singh PK Mahnot

C-107 Open Elective	**MOOCs : SWAYAM/NPTEL- Related to Management Courses other than listed courses in the syllabus**	**100**	**4**	**0**	**0**	**4**

NOTE: Students opting for SWAYAM should register for 12 weeks course and need to produce the Pass certificate with minimum 40% (Percentage) for receiving the Academic Credits. The actual percentage mentioned on the certificate will be transferred to the marks memo.

C-108	**Business Communication and Soft skills Lab**	**50**	**0**	**0**	**2**	**2**

(LAB):

Evaluation Process:

i) For practical (LAB) subject the distribution shall be **20 marks** for internal evaluation and **30 marks** for the semester end examinations. There shall be continuous evaluation by the internal subject teacher during the semester for **20** internal marks. Out of the **20 marks internal, 10** marks shall be for day-to-day performance (**5 marks for day-to-day evaluation and 5 marks for Record**) and **10 marks** shall be evaluated by conducting an internal test towards the end of semester.

ii) Semester End examination shall be conducted by the teacher concerned and external examiner for **30 marks. Three QUESTIONS will be given in the external examination from the activities listed in each unit. Each question carries 10 marks. Duration of the examination is 90 minutes.**

Unit: 1

Listening and speaking skills- Conversational skills (formal and informal) – group discussion. Listening to lectures, discussions, talk shows, news programmes, dialogues from TV/radio/Ted talk/Podcast – watching videos on interesting events on YouTube. (Presenting before the class).

Activities for Unit-1:

1) Dos and Don'ts of Group Discussions.
2) Tell me about yourself.
3) Self SWOT Analysis
4) Analysis of Academic Video clip uploaded on the system for the student.
5) News Presentation- Current affairs.

Unit – II

Organizational Communication:

Choosing the organization – goal setting - Time management — leadership traits – Team work – communicating across teams- designing career and life planning.

Activities for Unit-II:

1) Individual goal setting – process / SMART goals.
2) Designing a team activity to be conducted in the class.
3) Preparing a schedule plan for conducting an event (with proper time management).
4) Designing a self career plan.
5) Prepare a time management chart for your daily schedule. (Prioritization)

Unit – III

Non verbal communication and Body Language:

Understanding Body Language Aspects and presenting oneself to an interviewer, Proper handshakes**.**

Activities for Unit-III:

1) Maintaining the body language for interviews.
2) Presenting oneself to an interviewer.
3) Importance of kinesics in an interview.
4) Role plays on cross cultural communication.

Unit – IV

Written communication:

Writing job applications – cover letter – resume – emails – letters – memos – reports – blogs – writing for publications.

Activities for Unit-IV:

1) Preparation of effective Resume.
2) Write dialogues for the following situation: Mr. A calls a Hotel in Shimla to make a reservation for four people.
3) Write dialogues for the following situation: Mr.K gives direction to his friend how to reach the JNTUK University.
4) Write a covering letter for job application in TCS.
5) Write at least 5 E-mail etiquette.

Unit- V

Presentation skills:

Designing presentations and enhancing presentation skills.

Activities for Unit-V:

1) Prepare a PowerPoint presentation on presentation skills.
2) How to make an effective presentation.
3) Prepare and present a PPT on any topic given by the examiner.

References:

1.Mallika Nawal: "Business Communication", Cengage Learning, New Delhi, 2012.
2.Edwin A. Gerloff, Jerry C. Wofford, Robert Cummins Organisational Communication: The key stone to managerial effectiveness.
3.Meenakshi Rama: "*Business Communication*", Oxford University Press, NewDelhi
4. C.S.G. Krishnamacharyulu and Dr. Lalitha Ramakrishnan, Business Communication, Himalaya Publishing House, Mumbai
5. Paul Turner: "*Organisational Communication*", JAICO Publishing House, New Delhi.
6. SathyaSwaroopDebasish, Bhagaban Das" "*Business Communication*", PHIPrivate Limited, New Delhi, 2009.
7. R.K.Madhukar: "Business Communication", Vikas Publishing House, New Delhi, 2012.
8. Kelly M Quintanilla, Shawn T.Wahl:"Business and Professional Communication", SAGE,New Delhi, 2012.
9. Sangita Mehta, NeetyKaushish: "Business Communication", University Science Press, New Delhi, 2010.
10. Anjali Ghanekar: "Business Communication Skills", Everest Publishing House, New Delhi,2011

C-109	**Information Technology – Lab1 (Spreadsheet and Tally)**	**50**	**0**	**0**	**2**	**2**

Lab Evaluation:

i) For practical (LAB) subject the distribution shall be **20 marks** for internal evaluation and **30 marks** for the semester end examinations. There shall be continuous evaluation by the internal subject teacher during the semester for **20** internal marks. Out of the **20 marks internal, 10** marks shall be for day-to-day performance (**5 marks for day-to-day evaluation and 5 marks for Record**) and **10 marks** shall be evaluated by conducting an internal test towards the end of semester.

ii) Semester End examination shall be conducted by the teacher concerned and external examiner for **30 marks. Three QUESTIONS will be given in the external examination from the experiments based on the syllabus. Each question carries 10 marks. Duration of the examination is 90 minutes.**

UNIT- 1

Introducing spreadsheet: Choosing the correct tool; Creating and Saving; Spreadsheet workspace; Managing the workspace; Entering and editing data; Data entry; Selecting cells; Saving time when entering data. Presenting a spreadsheet; Number and date/time format tools; Percentages; Dates and Times; Currency; Text; Performing calculations; Basic arithmetic; Using functions; Replicating formulae; Absolute cell addressing; References between worksheets.

UNIT -II

Ranges and functions: Creating named ranges; Using named ranges; Finding and inserting functions; Excel – Functions: what if, Conditional count, sum and average, Multiple criteria with count, sum and if. Time and date calculations.

UNIT- III

Basic of Accounting: Type of Accounts, Rules of Accounting, Principles of concepts and conventions, double entry system, book keeping Mode of Accounting, Financial Statements, Transaction, Recording Transactions. Getting the functional with Tally, Creation and setting up of company in Tally.

UNIT- IV

Accounting Masters in Tally- Features- Configurations- Setting up Account Heads.

UNIT- V

Inventory in Tally- Stock – groups – Stock Categories - Godowns / Location Units of Measure - Stock Items - Creating Inventor y Masters for National Traders

II SEMESTER

C-201	**Financial Management**	**100**	**4**	**0**	**0**	**4**

Objective:

The Course is designed for the students to understand the Financial Management concepts and to identify, enrich and fulfill the needs of Financial Markets.

UNIT- I

Financial Management: Concept - Nature and Scope - Evolution of financial Management - The new role in the contemporary scenario – Goals and objectives of financial Management - Firm's mission and objectives - Profit maximization Vs. Wealth maximization – Maximization Vs Satisfying - Major decisions of financial manager.

UNIT-II

Financing Decision: Sources of finance - Concept and financial effects of leverage – EBIT – EPS analysis. Cost of Capital: Weighted Average Cost of Capital– Theories of Capital Structure.

UNIT -III

Investment Decision: Concept and Techniques of Time Value of Money – Nature and Significance of Investment Decision – Estimation of Cash flows – Capital Budgeting Process – Techniques of Investment Appraisal – Discounting and Non Discounting Methods.

UNIT-IV

Dividend Decision: Meaning and Significance – Major forms of dividends – Theories of Dividends – Determinants of Dividend – Dividends Policy and Dividend valuation – Bonus Shares –Stock Splits – Dividend policies of Indian Corporate.

UNIT-V

Liquidity Decision: Meaning - Classification and Significance of Working Capital – Components of Working Capital – Factors determining the Working Capital – Estimating Working Capital requirement – Cash Management Models – Accounts Receivables –Credit Policies – Inventory Management.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. I.M. Pandey: "**Financial Management",** Vikas Publishers, New Delhi, 2013.
2. Khan and Jain: Financial Management, Tata McGraw Hill, New Delhi,
3. Prasanna Chandra: "**Financial Management Theory and Practice**", Tata McGrawHill 2011.
4. P.Vijaya Kumar, M.Madana Mohan, G. Syamala Rao: "**Financial Management",** Himalaya Publishing House, New Delhi, 2013.
5. Brigham,E.F: "**Financial Management Theory and Practice**", Cengae Learning, New Delhi, 2013
6. RM Srivastava, Financial Management, Himalaya Publishing house, 4th edition.

C-202	Human Resource Management	100	4	0	0	4

Objective:

To equip the students with basic concepts of Human Resource Management and the various functions of HRM including Industrial Relations in the liberalized, socialism environment.

UNIT -I

HRM: Significance - Definition and Functions – evolution of HRM- Principles - Ethical Aspects of HRM- - HR policies, Strategies to increase firm performance - Role and position of HR department –aligning HR strategy with organizational strategy - HRM – changing , global perspective challenges, environment – cross- cultural problems – emerging trends in HRM.

UNIT -II

Investment perspectives of HRM: HR Planning – Demand and Supply forecasting - Recruitment and Selection- Sources of recruitment - Tests and Interview Techniques - Training and Development – Methods and techniques– Job design , evaluation and Analysis - Management development - HRD concepts.

UNIT -III

Performance Appraisal: Importance – Methods – Traditional and Modern methods – Latest trends in performance appraisal - Career Development and Counseling- Compensation - Concepts and Principles- Influencing Factors- Current Trends in Compensation- Methods of Payments in detail - Incentives rewards compensation mechanisms.

UNIT -IV

Wage and Salary Administration: Concept- Wage Structure- Wage and Salary Policies- Legal Frame Work- Determinants of Payment of Wages- Wage Differentials - Incentive Payment Systems. Welfare management: Nature and concepts – statutory and non-statutory welfare measures.

UNIT -V

Managing Industrial Relations: Trade Unions - Employee Participation Schemes- Collective Bargaining– Grievances and disputes resolution mechanisms – Safety at work – nature and importance – work hazards – safety mechanisms - Managing work place stress.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit. References:

1. K Aswathappa: "Human Resource and Personnel Management", Tata McGraw Hill, New Delhi, 2013.
2. N.Sambasiva Rao and Dr. Nirmal Kumar: "Human Resource Management and Industrial Relations", Himalaya Publishing House, Mumbai.
3. Mathis, Jackson,Tripathy:"Human Resource Management:Asouth-Asin Perspective", Cengage Learning, New Delhi, 2013.
4. Subba Rao P: "Personnel and Human Resource Management-Text and Cases", Himalaya Publications, Mumbai, 2013.
5. MadhurimaLall, Sakina QasimZasidi: "Human Resource Management", Excel Books, New Delhi, 2010.

C-203	Marketing Management	100	4	0	0	4

The Course is designed for the students to understand the Marketing concepts and to identify, enrich and fulfill the needs of customers and markets.

UNIT -I

Introduction to Marketing: Needs - Wants – Demands - Products - Exchange - Transactions - Concept of Market and Marketing and Marketing Mix - Production Concept- Product Concept - Sales and Marketing Concept - Societal Marketing Concept - Green Marketing concept - Indian Marketing Environment.

UNIT -II

Market Segmentation, Targeting and Positioning: Identification of Market Segments - Consumer and Institutional/corporate Clientele - Segmenting Consumer Markets - Segmentation Basis – Evaluation and Selection of Target Markets – Positioning significance - Developing and Communicating a Positioning Strategy.

UNIT -III

Product and Pricing Aspects: Product – Product Mix - Product Life cycle - Obsolescence- Pricing- Objectives of Pricing - Methods of Pricing - Selecting the Final price - Adopting price - Initiating the price cuts - Imitating price increases-Responding to Competitor's price changes.

UNIT -IV

Marketing Communication: Communication Process – Communication Mix – Integrated Marketing Communication - Managing Advertising Sales Promotion - Public relations and Direct Marketing - Sales force
– Determining the Sales Force Size - Sales force Compensation.

UNIT -V

Distribution, Marketing Organization and Control: Channels of Distribution- Intensive, Selective and Exclusive Distribution- Organizing the Marketing Department - Marketing Implementation - Control of Marketing Performance - Annual Plan Control - Profitability Control - Efficiency Control - Strategic Control.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References

1. Phillip Kotler: "**Marketing Management** ", Pearson Publishers, New Delhi, 2013.
2. Rajan Saxena: "**Marketing Management**", Tata McGraw Hill, New Delhi, 2012.
3. V S Ramaswamy & S Namakumari, Marketing Management Global Perspective Indian Context 4th Edition, Mac Millan Publishers 2009.
4. Tapan K Panda: **"Marketing Management**", Excel Books, New Delhi, 201**2**
5. Paul Baines, Chris Fill, Kelly Page Adapted by Sinha K: "**Marketing**", Oxford University Press, Chennai, 2013

C-204	Operations Management	100	4	0	0	4

Objective:

This Course is designed to make student understand the strategic significance of Operation management, to acquaint them with application of discipline to deal with real life business problem.

UNIT-I:

Introduction to Operation Management: Nature & Scope of Operation/ Production Management, Relationship with other functional areas, Recent trend in Operation Management, Manufacturing & Theory of Constraint, Types of Production System, Just in Time (JIT) & lean system.

UNIT -II:

Product Design & Process Selection: Stages in Product Design process, Value Analysis, Facility location & Layout: Types, Characteristics, Advantages and Disadvantages, Work measurement, Job design.

UNIT- III:

Forecasting & Capacity Planning: Methods of Forecasting, Overview of Operation Planning, Aggregate Production Planning, Production strategies, Capacity Requirement Planning, MRP, Scheduling, Supply Chain Management, Purchase Management, Inventory Management.

Unit- IV:

Productivity: Factors, Affecting Productivity – Job Design – Process Flow Charts – Methods Study – Work Measurement – Engineering and Behavioral Approaches.

UNIT -V:

Quality Management: Quality- Definition, Dimension, Cost of Quality, Quality Circles-Continuous improvement (Kaizen), ISO (9000&14000 Series), Statistical Quality Control: Variable & Attribute, Process Control, Control Charts -Acceptance Sampling Operating Characteristic Curve (AQL , LTPD, Alpha & Beta risk), Total Quality Management (TQM).

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit. References:

1. Krajewski & Ritzman (2004). Operation Management -Strategy and Analysis. Prentice Hall of India.
2. Panner Selvem, Production and Operation Management, Prentice Hall of India.
3. Chunnawals, Production & Operation Management Himalaya, Mumbai
4. Charry, S.N (2005). Production and Operation Management- Concepts, Methods Strategy. John Willy& Sons Asia Pvt Limited.
5. K Aswathappa & Sridhar Bhatt, Production & Operations Management, Himalaya, Mumbai.

C-205	Business Research Methods	100	4	0	0	4

Developing the students in Research orientation and to acquaint them with fundamental of research methods.

UNIT -I

Introduction : Nature and Importance of Research, The role of Business Research, Aims of social research, Types of Research- Pure research vs. Applied research, Qualitative research vs. Quantitative research, Exploratory research, Descriptive research and Experimental research, ethical issues in business research- Defining Research Problem, Steps in Research process.

UNIT -II

Data Base: Discussion on primary data and secondary data, tools and techniques of collecting data. Methods of collecting data. Sampling design and sampling procedures. Random vs. Non-random sampling techniques, determination of sample size and an appropriate sampling design. Designing of Questionnaire –Measurement and Scaling – Nominal Scale – Ordinal Scale – Interval Scale – Ratio Scale – Guttmann Scale – Likert Scale – Schematic Differential Scale.

UNIT -III

Survey Research and data analysis: Selection of an appropriate survey research design, the nature of field work and Field work management. Media used to communicate with Respondents, Personal Interviews, Telephone interviews, Self-administered Questionnaires- Editing – Coding – Classification of Data – Tables and Graphic Presentation –Preparation and Presentation of Research Report.

UNIT -IV

Statistical Inference: Formulation of Hypothesis –Tests of Hypothesis - Introduction to Null hypothesis vs. alternative hypothesis, parametric vs. non-parametric tests, procedure for testing of hypothesis, tests of significance for small samples, application, t-test, Chi Square test.

UNIT -V

Multivariate Analysis: Nature of multivariate analysis, classifying multivariate techniques, analysis of dependence, analysis of interdependence. Bi-Variate analysis-tests of differences-t test for comparing two means and z-test for comparing two proportions and ANOVA for complex experimental designs.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References

1. C.R. Kothari: Research Methodology, methods and Techniques New Age International Publisher.
2. Navdeep and Guptha : "**Statistical Techniques & Research Methodology**", Kalyani Publishers

3. Willam G.Zikmund, Adhkari: "***Business Research Methods***",
4. Learning, New Delhi, 2013.
5. A.N. Sadhu, Amarjit singh, Research methodology in social sciences, 7th Edition Himalaya Publications.
6. A Bhujanga rao , Research methodology, Excel Books, 2008.

C-206 Open Elective	Project Management	100	4	0	0	4

The objective of this course is to enable the students to gain basic knowledge about the concept of project, project management, project life-cycle, project appraisal; to acquaint the students about various issues of project management.

Unit -I:

Basics of Project Management –Concept– Project environment – Types of Projects – Project life cycle – Project proposals – Monitoring project progress – Project appraisal and Project selection – Causes of delay in Project commissioning– Remedies to avoid overruns. Identification of Investment opportunities – Sources of new project ideas, preliminary screening of projects – Components for project feasibility studies.

Unit- II:

Market feasibility -Market survey – Categories of Market survey – steps involved in conducting market survey

– Demand forecasting techniques, sales projections.

Unit- III:

Technical and Legal feasibility: Production technology, materials and inputs, plant capacity, site selection, plant layout, Managerial Feasibility Project organization and responsibilities. Legalities – Basic legal provisions. Development of Programme Evaluation & Review Technique (PERT) –Construction of PERT (Project duration and valuation, slack and critical activities, critical path interpretation) – Critical Path Method (CPM)

Unit- IV:

Financial feasibility – Capital Expenditure – Criteria and Investment strategies – Capital Investment Appraisal Techniques (Non DCF and DCF) – Risk analysis – Cost and financial feasibility – Cost of project and means of financing — Estimation of cash flows – Estimation of Capital costs and operating costs; Revenue estimation – Income – Determinants – Forecasting income –Operational feasibility - Breakeven point – Economics of working.

Unit -V:

Project Implementation and Review: Forms of project organization – project planning – project control – human aspects of project management – prerequisites for successful project implementation – project review – performance evaluation – abandonment analysis.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit. References:

1. Prasanna Chandra, “Projects, Planning, Analysis, Selection, Financing, Implementation and Review”, Tata McGraw Hill Company Pvt. Ltd., New Delhi 1998.

2. Gido: Effective Project Management, 2e, Thomson, 2007.
3. Singh M.K, “Project Evaluation and Management”.
4. Vasanth Desai, Project Management, 4th edition, Himalaya Publications 2018.
5. Clifford F. Gray, Erik W. Larson, “Project Management, the Managerial Emphasis”, McGraw Hill, 2000.

C-206 Open Elective	**Technology Management**	**100**	**4**	**0**	**0**	**4**

The course aims at providing an overview of various issues connected with Management of Technology in organizations.

UNIT-I.

Evolution of Technology-Effects of New Technology- Technology Innovation-Invention-Innovation- Diffusion- Revolutionary and Evolutionary Innovation- Product and Process Innovation- Strategic Implications of Technology- Technology - Strategy Alliance- -Convergent and Divergent Cycle- The Balanced Approach.

UNIT-II:

Technology Assessment- Technology Choice- Technological Leadership and Followership- Technology Acquisition- Technological Forecasting- Exploratory, Intuitive, Extrapolation, Growth Curves, Technology Monitoring- Normative: Relevance Tree, Morphological Analysis, Mission Flow Diagram.

UNIT-III:

Diffusion of Technology- Rate of Diffusion; Innovation Time and Innovation Cost-Speed of Diffusion- Technology Indicators- Various Indicators- Organizational Implications of Technology- Relationship between Technical Structure and Organizational Infrastructure- Flexible Manufacturing Management System (FMMS).

UNIT-IV:

Financial Aspects in Technology Management- Improving Traditional Cost - Management System- Barriers to the Evaluation of New Technology- Social Issues in Technology Management- Technological Change and Industrial Relations- Technology Assessment and Environmental Impact Analysis.

UNIT-V:

Human Aspects in Technology Management- Integration of People and Technology-Organizational and Psychological Factors- Organizational Outcome- Technology Transfer-Technology Management Scenario in India.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

Suggested Readings:

1. Sharif Nawaz: Management of Technology Transfer & Development, APCFT, Bangalore, 1983.
2. Rohtagi P K, Rohtagi K and Bowonder B: Technological Forecasting, Tata McGraw Hill, New Delhi.
3. Betz Fredrick: Managing Technology, Prentice Hall, New Jersey.
4. Gaynor: Handbook of Technology Management, McGraw Hill.
5. Tarek Khalil: Management of Technology, McGraw Hill International, 2000.

C-206 Open Elective	**Lean Management**	**100**	**4**	**0**	**0**	**4**

To understand issues and challenges in implementing and development in lean manufacturing techniques from TPS and its contribution for improving organizational performance.

Unit- I

Introduction: Mass production system, Craft Production, Origin of Lean production system , Why Lean production , Lean revolution in Toyota , Systems and systems thinking , Basic image of lean production , Customer focus , Waste Management.

UNIT- II

Just In Time: Why JIT , Basic Principles of JIT, JIT system, Kanban, Six Kanban rules, Expanded role of conveyance, Production leveling, Three types of Pull systems, Value stream mapping. JIDOKA, Development of Jidoka concept, Why Jidoka, Poka, Yoke systems, Inspection systems and zone control – Types and use of Poka-Yoke systems, Implementation of Jidoka

UNIT -III

Kaizen: Six – Sigma philosophy and Methodologies ,QFD, FMEA Robust Design concepts; SPC, QC circles standardized work in lean system , Standards in the lean system, 5S system.

UNIT- IV

Total Productive Maintenance: Why Standardized work, Elements of standardized work, Charts to define standardized work, Kaizen and Standardized work Common layouts.

UNIT- V

Hoshin Planning & Lean Culture: Involvement, Activities supporting involvement, Quality circle activity, Kaizen training, Key factors of PKT success, Hoshin Planning System, Four Phases of Hoshin Planning, Why Lean culture – How lean culture feels.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. Jeffrey Liker, The Toyota Way: Fourteen Management Principles from the World's Greatest Manufacturer, McGraw Hill, 2004.
2. Debashish Sarkar , Lessons in Lean Management,
3. Dale H., Besterfield , Carol, Besterfield, etal, Total Quality Management (TQM) 5e by Pearson 2018.

C-206 Open Elective	**Data Base Management System**	**100**	**4**	**0**	**0**	**4**

The course is to present an introduction to database management systems, with an emphasis on how to organize, maintain and retrieve - efficiently, and effectively - information from a DBMS.

UNIT- I

Introduction to Database Systems: Data - Database Applications - Evolution of Database - Need for Database Management – Data models - Database Architecture - Key Issues and Challenges in Database Systems.

UNIT -II

ER and Relational Models: ER Models – ER to Relational Mapping –Object Relational Mapping - Relational Model Constraints - Keys - Dependencies - Relational Algebra - Normalization - First, Second, Third & Fourth Normal Forms - BCNF – Join Dependencies.

UNIT- III

Data Definition and Querying: Basic DDL - Introduction to SQL - Data Constraints - Advanced SQL - Views

- Triggers - Database Security – Embedded & Dynamic SQL.

UNIT -IV

Transactions and Concurrency: Introduction to Transactions - Transaction Systems - ACID Properties - System & Media Recovery - Need for Concurrency - Locking Protocols – SQL for Concurrency – Log Based Recovery - Two Phase Commit Protocol - Recovery with SQL- Deadlocks & Managing Deadlocks.

UNIT -V

Advanced Topics in Databases: Indexing & Hashing Techniques - Query Processing & Optimization - Sorting & Joins – Database Tuning - Introduction to Special Topics - Spatial & Temporal Databases – Data Mining and Warehousing.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, ―Database System Concepts‖, Sixth Edition, Tata McGraw Hill, 2010.
2. Ramez Elmasri, Shamkant B. Navathe, ―Fundamentals of Database Systems‖, Sixth Edition, Pearson/Addison - Wesley, 2010.
3. C.J. Date, A. Kannan and S. Swamynathan, ―An Introduction to Database Systems‖, Pearson Education, Eighth Edition, 2006.
4. Raghu Ramakrishnan, ―Database Management Systems‖, Fourth Edition, McGraw Hill, 2015.

C-207	IT Lab 2 (Programming R)	50	0	0	2	2

After taking the course, students will be able to

- Use R for statistical programming, computation, graphics, and modeling,
- Write functions and use R in an efficient way,
- Fit some basic types of statistical models
- Use R in their own research,
- Be able to expand their knowledge of R on their own.

SYLLABUS:

UNIT-I:
Introduction, How to run R, R Sessions and Functions, Basic Math, Variables, Data Types, Vectors, Conclusion, Advanced Data Structures, Data Frames, Lists, Matrices, Arrays, Classes**.**

UNIT-II:
R Programming Structures, Control Statements, Loops, - Looping Over Non vector Sets,- If-Else, Arithmetic and Boolean Operators and values, Default Values for Argument, Return Values, Deciding Whether to explicitly call return- Returning Complex Objects, Functions are Objective, No Pointers in R, Recursion, A Quicksort Implementation-Extended Extended Example: A Binary Search Tree.

UNIT-III:
Doing Math and Simulation in R, Math Function, Extended Example Calculating Probability- Cumulative Sums and Products-Minima and Maxima- Calculus, Functions Fir Statistical Distribution, Sorting, Linear Algebra Operation on Vectors and Matrices, Extended Example: Vector cross Product- Extended Example: Finding Stationary Distribution of Markov Chains, Set Operation, Input /out put, Accessing the Keyboard and Monitor, Reading and writer Files,

UNIT-IV:
Graphics, Creating Graphs, The Workhorse of R Base Graphics, the plot() Function – Customizing Graphs, Saving Graphs to Files-

UNIT-V:
Probability Distributions, Normal Distribution- Binomial Distribution- Poisson Distributions Other Distribution, Basic Statistics, Correlation and Covariance, T-Tests,- ANOVA.

References:

1) The Art of R Programming, Norman Matloff, Cengage Learning
2) R for Everyone, Lander, Pearson
3) R Cookbook, PaulTeetor, Oreilly
4) R in Action,Rob Kabacoff, Manning.
5) Garrett Grolemund, Hands on Programming with R, Oreilly

III SEMESTER CORE PAPERS

C- 301. STRATEGIC MANAGEMENT

C-301	STRATEGIC MANAGEMENT	100	4	0	0	4

UNIT-I

Introduction: Concepts in Strategic Management, Strategic Management as a process – Developing a strategic vision, Mission, Objectives, Policies – Factors that shape a company's strategy – Crafting a strategy.

UNIT-II

Environmental Scanning: Industry and Competitive Analysis -Evaluating company resources and competitive capabilities – SWOT Analysis – Strategies and competitive advantages in diversified companies and its evaluation. Tools and techniques- Porter's Five Force Model, BCG Matrix, GE Model,

UNIT-III

Strategy Formulation : Strategy Framework For Analyzing Competition, Porter's Value Chain Analysis, Competitive Advantage of a Firm, Exit and Entry Barriers - Formulation of strategy at corporate, business and functional levels. Types of Strategies

UNIT-IV

Strategy Implementation : Strategy and Structure, Strategy and Leadership, Strategy and culture connection - Operationalising and institutionalizing strategy- Organizational Values and Their Impact on Strategy – Resource Allocation – Planning systems for implementation.

UNIT-V

Strategy Evaluation and control – Establishing strategic controls - Measuring performance – appropriate measures- Role of the strategist – using qualitative and quantitative benchmarking to evaluate performance - strategic information systems – problems in measuring performance – Strategic surveillance -strategic audit

References

1. P.Subba Rao: Business Policy and Strategic Management, Himalaya Publishing House, New Delhi, 2010
2. Kazmi: Strategic Management and Business Policy, Tata McGraw Hill, 2009
3. R.Srinivasn: Strategic Management, PHI Learning, New Delhi, 2009
4. Adrian Haberberg & Alison: Strategic Management, Oxford University Press, New Delhi, 2009

C-302	OPERATIONS RESEARCH	100	4	0	0	4

Unit – I:

Importance-The History of OR-Definition-Features-Scope of Operations Research –Linear Programming: Introduction-Advantages of using LP-Application areas of LP- Formation of mathematical modelling, Graphical method, the Simplex Method; Justification, interpretation of Significance of All Elements In the Simplex Tableau, Artificial variable techniques: Big M method.

UNIT II:

Transportation, Assignment Models: Definition and application of the transportation model, methods for finding initial solution-tests for optimality-variations in transportation problem, the Assignment Model, Travelling Salesman Problem.

Unit – III:

Dynamic Programming – Applications of D.P. (Capital Budgeting, Production Planning, Solving Linear Programming Problem) – Integer Programming – Branch and Bound Method.

Unit – IV :– Game Theory: Introduction – Two Person Zero-Sum Games, Pure Strategies, Games with Saddle Point, Mixed strategies, Rules of Dominance, Solution Methods of Games without Saddle point – Algebraic, matrix and arithmetic methods. Simulation – Simulation Inventory and Waiting Lines.

Unit – V:

P.E.R.T. & C.P.M. and Replacement Model: Drawing networks – identifying critical path – probability of completing the project within given time- project crashing – optimum cost and optimum duration. Replacement models comprising single replacement and group replacement.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. Winston, Operations Research, Cengage, ND
2. Anand Sharma, Operations Research, Himalaya Publishing House, 3. Kalavarthy, S. Operations Research, Vikas Publishers House Pvt Ltd.,
4. Mcleavey & Mojena, Principles of Operations Research for Management, AITBS publishers,
5. V.K.Kapoor, Operation Research Techniques for Management, Sultan Chand & Sons,
6. Richard Bronson & Govindasami Naadimuthu, SCHAUM'S OUTLINE OF THEORY & PROBLEMS OF Operations Research, 2nd Ed., Tata Mc Graw-Hill Edition,
7. JK Sharma Operation Research – Theory and Applications, MacMillan.

IV SEMESTER CORE PAPERS

C-401	**SUPPLY CHAIN MANAGEMENT AND ANALYTICS**	**100**	**4**	**0**	**0**	**4**

UNIT - I

Basics of Supply Chain Management: Introduction to Supply Chain Management – Evolution- Different views of Supply Chain – Supply Chain Strategy – Supply Chain Drivers – Developing Supply Chain Strategy- Strategic fit in Supply Chain. Analytics in Supply Chain Management.

UNIT – II

Supply Chain Analysis - Types of Supply Chains - Advanced Planning - Structure of Advanced - Planning Systems-Strategic Network Planning - Demand Planning - Master Planning - Demand Fulfilment and ATP - Production Planning and Scheduling Purchasing and Material Requirements Planning Distribution and Transport – Planning - Coordination and Integration - Collaborative Planning.

UNIT – III

Set covering and Set Partitioning Problems, Travelling Salesman Algorithms, Advanced Vehicle Routing Problem Heuristics, Scheduling Algorithms-Deficit function Approach and Linking Algorithms.

UNIT- IV

Fuzzy Logic and Techniques-Application in SCM - Recent issues in SCM: Role of computer/ IT in supply chain management, CRM Vs SCM, Benchmarking concept, features and implementation, outsourcing –basic concepts, value addition in SCM – concept of demand chain management.

UNIT- V

Inventory Management in Supply Chain- Network Design in Supply Chain- Alternative Channels of Distribution- Location Decisions in Supply Chain-Implementing Advanced Planning Systems - The Definition of a Supply - Chain Project -The Implementation Process- SCM in a Pharmaceutical – Company Food and Beverages - Computer Assembly Semiconductor – Manufacturing.

Suggested Readings:

1. Mohanty R.P, S.G Deshmuki “Supply Chain Management” Biztantra, New Delhi
2. Sunil Chopra, Peter Meindl, Supply Chain Management ,Pearson Education, India.

C- 402	INNOVATION AND ENTREPRENEURSHIP	100	4	0	0	4

UNIT I

Entrepreneurship: Definition of Entrepreneur, Entrepreneurial motivation and barriers; Internal and external factors; Types of entrepreneurs; Theories of entrepreneurship; Classification of entrepreneurship. Creativity and Innovation: Creative Problems Solving, Creative Thinking, Lateral Thinking, Views of De Bono, Khandwalaand others, Creative Performance in terms of motivation and skills.

UNIT II

Creativity and Entrepreneurial Plan: Idea Generation, Screening and Project Identification, Creative Performance, Feasibility Analysis: Economic, Marketing, Financial and Technical; Project Planning, Evaluation, Monitoring and Control, segmentation, Targeting and positioning of Product, Role of SIDBI in Project Management.

UNIT III

Operation problems: Incubation and Take-off, Problems encountered Structural, Financial and Managerial Problems, Types of Uncertainty. Institutional support for new ventures: Supporting organizations; Incentives and facilities; Financial Institutions and Small-scale Industries, Govt. Policies for SSIs.

UNIT IV

Family and non-family entrepreneurs: Role of Professionals, Professionalism vs. family entrepreneurs, Role of Woman entrepreneur, Sick industries, Reasons for Sickness, Remedies for Sickness, Role of BIFR in revival, Bank Syndications.

Unit V

Introduction to Innovation management, Managing Innovation within Firms, Business strategy & organization Knowledge, New Product Strategy & Managing New Product Development, Role of Technology in Management of innovation, Managing for Intellectual Property Right.

References:

1) Couger, C-Creativity and Innovation (IPP, 1999)
2) Nina Jacob, -Creativity in Organisations (Wheeler, 1998)
3) Jonne&Ceserani-Innovation & Creativity(Crest) 2001.
4) BridgeSetal-Understanding Enterprise: Entrepreneurship and Small Business (Palgrave,2003)
5) Holt-Entrepreneurship: New Venture Creation (Prentice-Hall) 1998.
6) Singh P&Bhanderkar A-Winning the Corporate Olympiad:TheRenaissan cearadigm(Vikas)
7) Dollinger M J-Entrepreneurship (Prentice-Hall, 1999).
8) Tushman, M.L. & Lawrence, P.R. (1997)-Managing Strategic Innovation & Change Oxford .
9) Jones T. (2003)-Innovating at the Edge: How Organizations Evolve and Embed Innovation Capability.Butterwork Heinemann, U. K.
10) Amidon, D. M.(1997)-Innovation Strategy for the Knowledge Economy:The Kanawakening. Butterwork-Heinemann, New Delhi, India.

III SEMESTER
ELECTIVES
(HUMAN RESOURCE MANAGEMENT)

EH-301	**LEADERSHIP AND CHANGE MANAGEMENT**	**100**	**4**	**0**	**0**	**3**

Unit I:

Organisational Leadership: Definition, Components and evaluation of leadership, factors of leadership, Situational Leadership Behaviour: Meaning, Fiedler Contingency Model, Path Goal and Normative Models - Emerging Leadership Behaviour: Transformational, Transactional and Visionary Leadership - Leadership for the new Millennium Organisations - Leadership in Indian Organisations. Leadership Effectiveness: Meaning, Reddins' 3-D Model, Hersey and Blanchard Situational Model, Driving Leadership Effectiveness, Leadership for Organisational Building.

Unit II:

Leadership Motivation, Culture: Motivation Theories for Leadership- Emerging Challenges in Motivating Employees. Motivation, Satisfaction, Performance.Organisational Culture: Meaning, Definitions, Significance, Dimensions, Managing Organisational Culture, Changing organisational Cultural.Leadership Development: Leadership development: Significance – Continuous Learning: Principles of learning to develop effective leadership – Vision and Goals for organisation: significance of goals for leaders – Charting vision and goals of Indian leaders and abroad.

Unit III:

Strategic Leadership: Leader Self management: significance - Developing self esteem and balancing emotions – Interpersonal Leadership Skills: Praise – Criticise – Communicate – Leadership Assertiveness: Circle of influence and circle of concern – Leadership with Edification: Tools of edification – Leadership and creativity: Developing creative thinking – Leadership and Team Building: Principles of team building, individual versus Group versus Teams – Leadership and Integrity: Developing character and values.

UNIT IV:

Basics of Change Management: Meaning, nature and Types of Change – change programmes – change levers – change as transformation – change as turnaround – value based change.

UNIT V:

Mapping change: The role of diagramming in system investigation – A review of basic flow diagramming techniques –systems relationships – systems diagramming and mapping, influence charts, multiple cause diagrams- a multidisciplinary approach -Systems approach to change: systems autonomy and behavior – the intervention strategy model – total project management model (TPMM). Organization Development (OD): Meaning, Nature and scope of OD - Dynamics of planned change – Person-focused and role-focused OD interventions –Planning OD Strategy – OD interventions in Indian Organizations – Challenges to OD Practioners

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

Reference Books:

1. Peter G. Northouse, Leadership, 2010, Sage. Publication.
2. Richard L. Daft "Leadership" Cengage Learning 2005.
3. Uday Kumar Haldar "Leadership and Team Building" Oxford Higher Education 2010
4. Richard L Hughes, Robert C Ginnett, Gordon J Curphy "Leadrship" Tata Mc Graw Hill Education Private Limited 2012.
5. Peter Lornge, Thought leadership Meets Business, 1st edition, 2009, Cambridge.
6. Cummings: "Theory of Organisation Development and Change", Cengage Learning, New Delhi, 2013.
7. Robert A Paton: Change Management, Sage Publications, New Delhi, 2011. 3. NilanjanSengupta: Managing Changing Organisations, PHI Learning, New Delhi, 2009

EH-302	**PERFORMANCE EVALUATION AND COMPENSATFION MANAGEMENT**	**100**	**4**	**0**	**0**	**3**

Unit- I:

Introduction: –Definition –concerns-scope-Historical developments in performance management-Over view of performance management-Process for managing performance-Importance –Linkage of PM to other HR processes-Performance Audit.

Unit- II:

Performance Management Planning: Introduction-Need-Importance-Approaches-The Planning Process—Planning Individual Performance- Strategic Planning –Linkages to strategic planning-Barriers to performance planning-Competency Mapping-steps-Methods.

Unit-III:

Management System: objectives – Functions- Phases of Performance Management System-Competency, Reward and Electronic Performance Management Systems-Performance Monitoring and Counselling: Supervision- Objectives and Principles of Monitoring- Monitoring Process- Periodic reviews- Problem solving- engendering trust-Role efficiency- Coaching-Counselling and Monitoring- Concepts and Skills .

UNIT -IV:

Compensation: concept and definition – objectives and dimensions of compensation program – factors influencing compensation –Role of compensation and Reward in Modern organizations Compensation as a Retention strategy- aligning compensation strategy with business strategy - Managing Compensation: Designing a compensation system – internal and external equity– pay determinants - frame work of compensation policy - influence of pay on employee attitude and behaviour - the new trends in compensation management at national and international level.

UNIT V:

Compensation Structure: Compensation Structure -History and past practices, elements of ,management compensation –Types of compensation system-Performance based and Pay based structures-Designing pay structures-comparison in evaluation of different types of pay structures-Significance of factors affecting-Tax Planning –Concept of Tax planning-Role of tax planning in compensation benefits-Tax efficient compensation package-Fixation of tax liability salary restructuring.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References

1. Prem Chadha: “Performance Management”, Macmillan India, New Delhi, 2008.
2. Michael Armstrong & Angela Baron, “Performance Management”: The New Realities, Jaico Publishing House, New Delhi, 2010.
3. T.V.Rao, “Appraising and Developing Managerial Performance”, Excel Books, 2003.
4. David Wade and Ronad Recardo, “Corporate Performance Management”, Butter Heinemann, New Delhi, 2002.
5. Dewakar Goel: “Performance Appraisal and Compensation Management”, PHI Leaarning, New Delhi, 2009
6. A.M. Sarma “Performance Management Systems” Himalaya Publishing House, New Delhi, 2010.

EH-303	HUMAN RESOURCE METRICS AND ANALYTICS	100	4	0	0	3

Objective of the Course: Objective of the course is to provide knowledge in developing right HR metrics and analytics based on the organizational requirements. This will lay foundation in pruning HR metrics into Analytics for effective management decisions.

Unit 1

HR Metrics Overview--Concepts, Objectives-- Historical evolution of HR metrics.--Explain how and why metrics are used in an organization--Deciding what metrics are important to your business--HR metrics design principles--Approaches for designing HR metrics--The Inside-Out Approach--The Outside-In Approach-- Align HR metrics with business strategy, goals and objectives--Link HR to the strategy map--

Unit II

Creating levels of metrics measures—HR Effeciency measures—HR Effectiveness measures--HR value / impact measures. Building HR functions metrics-- Workforce Planning Metrics--Recruitment Metrics --Training & Development Metrics-- Compensation & Benefits Metrics --Employee relations & Retention Metrics

Unit III

HR Analytics Overview -- What HR Analytics. -- Importance of HR Analytics. -- Translating HR metrics results into actionable business decisions for upper management (Using Excel Application exercises, HR dashboards)-- HR information systems and data sources-- HR Metrics and HR Analytics-- Intuition versus analytical thinking-- HRMS/HRIS and data sources--Analytics frameworks like LAMP-- HCM:21(r) Model.

Unit IV

Diversity Analysis-- Equality, diversity and inclusion, measuring diversity and inclusion, Testing the impact of diversity, Workforce segmentation and search for critical job roles.. Recruitment and Selection Analytics--Evaluating Reliability and validity of selection models, Finding out selection bias.Predicting the performance and turnover. Performance Analysis--Predicting employee performance, Training requirements, evaluating training and development.

UNIT V:

Optimizing selection and promotion decisions. Monitoring impact of Interventions-- Tracking impact interventions-- Evaluating stress levels and value-change-- Formulating evidence based practices and responsible investment-- Evaluation mediation process, moderation and interaction analysis.

References

1. Edwards Martin R, Edwards Kirsten (2016),"Predictive HR Analytics: Mastering the HR Metric",Kogan Page Publishers, ISBN-0749473924
2. Fitz-enz Jac (2010), "The new HR analytics: predicting the economic value of your company's human capital investments", AMACOM, ISBN-13: 978-0-8144-1643-3
3. Fitz-enz Jac, Mattox II John (2014), "Predictive Analytics for Human Resources", Wiley, ISBN- 1118940709
4. Bernard Marr(2018), Data Driven HR:How to use Analytics and metrics to data driven performance,Kindle Edition.
5. John Sullivan(2003)HR Metrics The World Class Way, Kennedy Information ISBN 978-1932079012

EH-304	HUMAN CAPITAL MANAGEMENT	100	4	0	0	3

Unit I:

Economic theories of Human Capital: Nature and Role of Human Capital; The Human Capital Model; Predictions of Human Capital Approach; Socio-economic relevance of labour problems in changing scenario; Evolution of organized labour; Industrialization and Development of Labour Economy; Growth of Labour Market in India in the globalised stetting.

Unit II:

Accounting Aspects of Human Capital – Cost Based Models: Meaning, Basic Premises, Need and Significance of HRA, Advantages and Limitation of HRA; Monetary and Non-Monetary Models; Cost Based Models- Acquisition Cost Method, Replacement Cost Model, Opportunity Cost Method, standard cost method, Current Purchasing Power Method (C.P.P.M.); Comparison of Cost incurred on Human capital and the contributions made by them in the light of productivity and other aspects.

Unit III:

Accounting Aspects of Human Capital – Value Based Models: Value Based Models - Hermanson'sUnpurchased Goodwill Method, Hermanson's Adjusted Discount Future Wages Model, Lev and Schwartz Present Value of Future Earnings Model, Flamholtz's Stochastic Rewards Valuation Model, Jaggi and Lau's Human Resource Valuation Model, Robbinson's Human Asset Multiplier Method, Watson's Return on Effort Employed Method, Brummet, Flamholtz and Pyle's Economic Value Method of Group Valuation, Morse's Net Benefit Method; Recent developments in the field of Human Asset/Capital Accounting.

Unit IV:

Quality of Work Life: Workers' Participation in Management - Worker's Participation in India, shop floor, Plant Level, Board Level- Quality Circles. Workers' education objectives - Rewarding. Employees Engagement and Empowerment-nature-types-drivers-benefits-measurement of Engagement-Empowerment.

Unit V:

Industrial Accidents and safety: meaning and definition of accident-types of industrial accidents-cost and consequences-causes and prevention of accidents- Industrial safety –statutory machineries for industrial safety-safety audit. Social Security: Introduction and types –Social Security in India, Health and Occupational safety programs- work place discipline –work place counselling-meaning –definition –types-advantages-characteristics of an effective counsellor.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References

1. I.L.O., Social & Labour aspects of Economic Development, Geneva
2. Report of the National Commission on Labour
3. Patterson & Schol., Economic Problems of Modern Life. Mc-Graw Hill Book Company.
4. Walter Hageabuch, Social Economics, Cambridge University Press.
5. S. Howard Patterson, Social Aspects of Industry.
6. Millis and Montgonery, Labours Progress and some Basic Labour Problems. Mc -Graw Hill Book Company.
7. Flamholtz, Eric, Human Resource Accounting, Dickenson Publishing Co., Califf.
8. Hermanson, Roger H. Accounting for Human Assets, Occasionals Paper No.14, Graduate School of Business Administration, Michigan State University. 9. Flamholtz, Eric G., Human Resource Accounting: Advances in Concepts, Methods and Applications, Jossey Eass Publishers, San Francisco, London.
10. Likert, Rensis, The Human Organisation: Its Management and Value, McGraw Hill Book Co., New York, N.Y.
11. Ganguli, Prabuddha, Intellectual Property Rights: Unleashing the Knowledge Economy, Tata McGraw-Hill Publishing Co. Ltd., New Delhi.
12. Chakraborty, S.K., Human Asset Accounting: The Indian Context in Topics in Accounting and Finance, Oxford University Press.

EH-305	**MANPOWER PLANNING, RECRUITMENT, AND SELECTION**	**100**	**4**	**0**	**0**	**3**

Unit I

Basics of Human Resource Planning: Macro Level Scenario of Human Resource Planning- Factors affecting HRP -Concepts and Process of Human Resource Planning - Methods and Techniques of Demand Forecasting - Methods and Techniques of Supply Forecasting - Micro Level Planning.

Unit II

Manpower Planning, Human Resource Planning and Business Environment; Defining and Drawing Manpower Systems- Stocks and Flows; Human Resource Distribution Mapping and Identifying Surplus; Downsizing Strategies- Legal and voluntary framework.

Unit III

Analysis, design and evaluation of job: nature of job analysis, process, methods of collecting job data, potential problems with job analysis-job design-contemporary issues-job evaluation – process-methods.

Unit IV

Recruiting and selecting the right talent: recruitment and selection needs-recruitment process-alternative to recruitment-selection process-evaluation-barriers to effective selection-making the selection effective.

Unit V

Training and Development: Overview of training and development systems, organizing training department, training and development policies, linking training and development to company's strategy, Requisites of Effective Training, Training Needs Assessment (TNA) Designing Training and Development Programs Evaluation of Training and Development.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. Prior, John, Handbook of Training and Development, Jaico Publishing House, Bombay.
2. Trvelove, Steve, Handbook of Training and Development, Blackwell Business.
3. Warren, M.W. Training for Results, Massachusetts, Addison-Wesley.
4. Craig, Robert L., Training and Development Handbook, McGraw Hill.
5. Garner, James, Training Interventions in Job Skill Development, Addison-Wesley.
6. Mathis, Jackson,Tripathy:"Human Resource Management:Asouth-Asin Perspective", Cengage Learning, New Delhi, 2013
7. Subba Rao P: "Personnel and Human Resource Management-Text and Cases", Himalaya Publications, Mumbai, 2013.

IV SEMESTER
ELECTIVE PAPERS
Human Resource Management

EH-401	**LABOR WELFARE AND EMPLOYMENT LAWS**	**100**	**4**	**0**	**0**	**3**

UNIT I:
Labour Welfare: Concept, scope and philosophy, principles and approaches of labour welfare, Indian constitution on labour, Agencies of labour welfare and their role. Impact of ILO on labour welfare in India.

UNIT II:
Labour welfare programmes: Statutory and non-statutory, extra mural and intra mural, Central Board of Workers' Education; Workers' Cooperatives- Welfare Centres -Welfare Officers' Role, Status and Function, Signs of poor welfare.

UNIT III:
Labour Legislation: Objectives-Principles-Classification-Evaluation of Labour legislation in India- Factories Act 1948, Definitions - Objectives of Act - Factory Inspectorate: – Measures to be taken by Factories for Health, Safety and Welfare of Workers - Working Hours - Wage and Compensation - Provisions Relating to Hazardous Processes - Annual Leave with Wages - Special Provisions - Obligations by Employer and Employee - Offences and Penalties., Contract Labour (Regulation and Abolition) Act 1970 and A.P.Shops and Establishments Act.

UNIT IV:
Industrial Relations Legislation: Industrial Disputes Act 1947Concept, objectives, Types of Strikes and their Legality – Authorities under the Act and their Duties – Voluntary Reference of Disputes to Arbitration – Types of Strikes and Lock-outs Wages for Strike and Lock-out Period– Change in Conditions of Service. Industrial Employment (standing orders) Act 1946 Certification of Draft Standing Orders – Appeals – Date of Operation of Standing Orders – Posting of Standing Orders – Payment of Subsistence Allowance.

UNIT V:
Trade Unions Act 1926. Definitions - Scope and Significance – Characteristics - Types of Trade Unions - Reasons for Joining Trade Unions - Advantages and Disadvantages of Trade unions- Legislations of Trade Unions- Rights and Privileges. Wage and Social Security Legislation: Payment of wages Act 1936 - Minimum wages Act 1948 - Payment of Bonus Act 1966 -. Payment of Gratuity Act 1972 - Workmen's Compensation Act 1923 - Employees State Insurance Act 1948 - Maternity Benefit Act 1961 and Employees Provident Fund and Miscellaneous Provisions Act 1952.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. Govt. of India (Ministry of Labour, 1969). Report of the Commission on Labour Welfare, New Delhi: Author.
2. Govt. of India (Ministry of Labour, 1983). Report on Royal Commission on Labour in India, New Delhi: Author.
3. Malik, P.L: "Industrial Law", Eastern Book Company. Laknow,1977
4. Moorthy, M.V: "Principles of Labour Welfare", Oxford University Press, New Delhi.
5. Pant, S.C: "Indian Labour Problems", Chaitanya Pub. House. Allahabad.

EH-402	INTERNATIONAL HUMAN RESOURCE MANAGEMENT	100	4	0	0	3

UNIT I

Introduction: A Global HR Perspective in New Economy-Challenges of Globalization - Implications of Managing People and Leveraging Human Resource - Strategic Role of International HRM – Distinction between Domestic and International HRM – HR Challenges at International Level.

UNIT II

Managing International Assignments: Significance -Global HR Planning – Staffing policy – Training and development – performance appraisal –International Labour relations – Industrial democracy - Positioning Expatriate – Repatriate – factors of consideration - Strategies - Legal content of Global HRM- International assignments for Women - Problems.

UNIT III

Cross Culture Management: Importance – Concepts and issues – Understanding Diversity – Managing Diversity Cross- Cultural Theories – Hofstede's Model – Kluchkohn - Strodthbeck Model – Andre- Laurent' Theory – Cultural Issues. considerations - Problems – Skill building methods – Cross Culture Communication and Negotiation – Cross Culture Teams. Talent crunch – Indian MNCs and Challenges.

UNIT IV

Compensation Management: Objectives -Importance – Concepts- Trends - Issues – Methods – Factors of Consideration – Models – incentive methods – Approaches of Compensation in Global Assignments - global compensation implications on Indian systems - Performance Management.

UNIT V

Global Strategic Advantages through HRD: Measures for creating global HRD Climate – Strategic Frame Work of HRD and Challenges - Globalization and Quality of Working Life and Productivity – Challenges in Creation of New Jobs through Globalization- New Corporate Culture.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. Subba Rao P: "International Human Resource Management", Himalaya Publishing House, Hyderabad, 2011
2. NilanjanSen Gupta: "International Human Resource Management Text and cases" Excel Books, New Delhi.
3. Tony Edwards :"International Human Resource Management", Pearson Education, New Delhi, 2012
4. Aswathappa K, Sadhana Dash: "International Human Resource Management, TMH, New Delhi,
5. Monir H Tayeb: "International Human Resource Management", Oxford Universities Press, Hyderabad, 2012.

EH-403	EMPLOYEE RELATIONS AND ENGAGEMENT	100	4	0	0	3

UNIT I :

Industrial Relations Management: Concept-meaning and scope of IR-system frame work-Theoretical perspective- Evaluation –Background of industrial Relations in India- Influencing factors of IR in enterprise and the consequences. Globalization and IR- Recent Trends in Industrial Relations.

UNIT II:

Trade Unions: Introduction-Definition and objectives-growth of Trade Unions in India -Union recognition-Union Problems-Employees Association- Collective Bargaining –Characteristics-Importance-Principles-The process of CB-Participation in the bargaining process-Essential conditions for the success of collective bargaining –Negotiating techniques and skills.

UNIT III:

Employee Grievances: Causes of Grievances – Grievances Redressal Machinery – Discipline in Industry _ Measures for dealing with Indiscipline–Standing Orders- Code Discipline.

UNIT IV:

Industrial Disputes: Meaning, nature and scope of industrial disputes - Cases and Consequences of Industrial Disputes –Prevention and Settlement of industrial disputes in India.

UNIT V :

Employee Engagement : Concept-Definition-Elements- Factors- Levels - Driers of Employee Engagement-Measurement-Strategies- The role of managers in engaging the employees.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References

1. C.S Venkataratnam: “Industrial Relations”, Oxford University Press, New Delhi, 2011
2. Sinha: “Industrial Relations, Trade Unions and Labour Legislation”, Pearson Education, New Delhi, 2013
3. Mamoria: “Dynamics of Industrial Relations”, Himalaya Publishing House, New Delhi, 2010
4. B.D.Singh: “Industrial Relations” Excel Books, New Delhi, 2010
5. Arun Monappa: “Industrial Relations”, TMH, New Delhi. 2012
6. Prof. N.Sambasiva Rao and Dr. Nirmal Kumar: “Human Resource Management and Industrial Relations”, Himalaya Publishing House, Mumbai
7. Ratna Sen: “Industrial Relations”, MacMillon Publishers, New Delhi, 2011

EH-404	HUMAN RESOURCES DEVELOPMENT	100	4	0	0	3

UNIT-I:

Concept of HRD-objectives-Structure-Need-Scope- HRD in selected industrial organisations-significance-HRD functions-Framework-Techniques-Attributes of a HRD manager.

UNIT – II:

HRD Strategies:- An Overview - Strategies - Training and Development - Methods - Evaluation of training programmes. HRD Process Model: Methods of Implantation, Evaluation of HRD programmes. Identification of HRD needs and Design and development of HRD programmes.

UNIT – III:

HRD interventions: Mentoring for employee development: Concepts of Mentoring-Perspectives-Mentoring relationship-Outcomes of Mentoring programmes-Design and implementation of formal-mentoring programmes-Barriers to mentoring-Role of mentoring in development, understanding the role and responsibilities of mentor, mentee-Special issues in Mentoring.

UNIT – IV:

Employee counselling for HRD: Overview of counselling programmes, employee assistance programme, stress management, employee wellness and health promotion. Career Planning, management, and development: Career development stages and activities, role of individual and organization in career planning, Issues in career management.

UNIT-V :

The future of HRD and HRD Ethics: Research, practice and education of HRD for innovation and talent development and management, Role of HRD in developing ethical attitude and behaviour and development, Ethical problems with HRD roles. Applications of HRD: HRD Climate, HRD for managing organizational change, HRD for Workers (blue collar employees), HRD Audit.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. Arun Monappa; Personnel Management;
2. Rudrabasava Raj M.N. : Dynamic Personnel Administration Management of Human Resources;
3. Udai Pareek, Human Resource Development;
4. S. Ravishankar & R.K. Mishra (Ed). : Management of Human Resources in Public Enterprises;
5. Haribson F, Educational Planning and Human Resources Development, International Institute for Education, UNESCO, Paris;
6. Bell DJ, Planning Corporate' Manpower, Longman;
7, Walker James W'. Human Resource Planning, MGH.

EH-405	**STRATEGIC HUMAN RESOURCE MANAGEMENT**	**100**	**4**	**0**	**0**	**3**

UNIT-I

Human Resource Strategy: Introduction to Strategic Human Resource Management - Evaluation objectives and Importance of Human Resources Strategy- Strategic fit – A conceptual framework -Human Resources contribution to strategy - Strategy driven role behaviours and practices – Theoretical Perspectives on SHRM approaches - Linking business strategies to HR strategies.

UNIT-II

Strategic Human Resource Planning: Objectives, benefits, levels of strategic planning -Activities related to strategic HR Planning-Basic overview of various strategic planning models-Strategic HR Planning model-Components of the strategic plan.

UNIT-III

Strategy Implementation: Strategy implementation as a social issue-The role of Human Resource-Work force utilization and employment practices-Resourcing and Retention strategies-Reward and Performance management strategies.

UNIT-IV

Strategic Human Resource Development: Concept of Strategic Planning for HRD Levels in Strategic HRD planning-Training and Development Strategies-HRD effectiveness.

UNIT-V

Human Resource Evaluation: Overview of evaluation - Approaches to evaluation, Evaluation Strategic contributions of Traditional Areas - Evaluating Strategic Contribution of Emerging Areas-HR as a Profit centre and HR outsourcing strategy.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. Charles R. Greer: “Strategic Human Resource Management” - A General Manager Approach - Pearson Education, Asia
2. Fombrum Charles & Tichy: “Strategic Human Resource Management” - John Wiley Sons, 1984
3. Dr. Anjali Ghanekar “Strategic Human Resource Management” Everest Publishing House, Pune 2009
4. Tanuja Agarwala “Strategic Human Resource Management” Oxford University Press, New Delhi 2014 www.universityupdates.in || www.android.universityupdates.in || www.ios.universityupdates.in www.universityupdates.in || www.android.universityupdates.in || www.ios.universityupdates.in University Updates
5. Srinivas R Kandula “Strategic Human Resource Development” PHI Learning PVT Limited, New Delhi 2009
6. Dreher, Dougherty “Human Resource Strategy” Tata Mc Graw Hill Publishing Company Limited, New Delhi 2008

III. SEMESTER ELECTIVES
FINANCE

MBA III SEMESTER

EF-301	**INVESTMENT ANALYSIS AND PORTFOLIO MANAGEMENT**	**100**	**4**	**0**	**0**	**3**

Objective: To enlighten the students with the Concepts and Practical applications of Security Analysis and Portfolio Management

Unit-I: Concept of Investment, Investment Vs Speculation, and Security Investment Vs Non-security Forms of Investment-Investment Environment in India. Investment Process - Sources of Investment Information, Security Markets – Primary and Secondary – Types of securities in Indian Capital Market, Market Indices. Calculation of SENSEX and NIFTY.

Unit-II: Return and Risk – Meaning and Measurement of Security Returns. Meaning and Types of Security Risks: Systematic Vs Non-systematic Risk. Measurement of Total Risk - Intrinsic Value Approach to Valuation of Bonds - Preference Shares and Equity Shares.

Unit-III: Fundamental Analysis – Economy, Industry and Company Analysis, Technical Analysis – Concept and Tools and Techniques Analysis – Technical Analysis Vs Fundamental Analysis - Efficient Market Hypothesis; Concept and Forms of Market Efficiency.

Unit-IV: Elements of Portfolio Management, Portfolio Models – Markowitz Model, Efficient Frontier and Selection of Optimal Portfolio. Sharpe Single Index Model and Capital Asset Pricing Model, Arbitrage Pricing Theory.

Unit-V: Performance Evaluation of Portfolios; Sharpe Model – Jensen's Model for PF Evaluation, Evaluation of Mutual Fund.

Suggested Readings:

1. Fisher DE and Jordon RJ, Security Analysis and Portfolio Management,PHI, New Delhi
2. Ambika Prsasad Dash, Security Analysis and Portfolio Management,IK Int Pub House, New Delhi
3. Hirt and Block, Fundamentals of Investment Management, TataMcGrawHill, New Delhi
4. Reily Frank K, Investment Analysis and Portfolio Management,Cengage, New Delhi
5. Bodie,Kane,Marcus and Mohanty, Investments, TataMcGraw Hill, New Delhi
6. Peter Lynch, One Up on Wall Street, Simon & Schuster Paperbacks, New York
7. Sharppe W, Alexander,GJ., & Baily JV., Investments, TMH, New Delhi

8. Avadhani, VA, SAPM, Himalaya Publishers.
9. Bhalla, VK Investment Management, S.Chand., New Delhi
10. Preeti Singh, Investment Management, Himalaya Publishers.
11. Timothy Vick, How to Pick Stocks like Warren Buffett, TMH, New Delhi

EF-302	**MANAGING BANKS AND FINANCIAL INSTITUTIONS**	**100**	**4**	**0**	**0**	**3**

Unit – I: Financial System in India: Introduction - Evolution of Banking - Phases of development - RBI and the Financial System - Committees on Banking Sector Reforms - Prudential Banking -- RBI Guidelines and directions.

Unit – II: Organization, Structure and Functions of RBI and Commercial Banks: Introduction - Origination, Structure and Functions of RBI and Commercial Banks - Role of RBI and Commercial Banks - Lending and Operation policies - Banks as Intermediaries - NBFCs - Growth of NBFCs - FDI in Banking Sector - Banking Regulations - Law and Practice.

Unit – III: Risk Management in Banks : Introduction - Asset/Liability Management Practices - Credit Risk Management - Credit Risk Models - Country Risk Management - Insurance Regulations and Development Authority (IRDA).

Unit – IV: Financial Institutions and Development Banking : Introduction - Origin, Growth and Lending Policies of Terms lending Institutions - Working of IDBI - IFCI - STCs - SIDBI - LIC - GIC - UTI - Role of Financial Institutions in Capital Market.

Unit – V: New Financial Instruments and Institutions : Private Banks - Old generation and New generation private banks - Foreign Banks - NSE - Depositories - DFHI - New Equity and Debt Instruments - SEBI and RBI guidelines.

Suggested Readings:

1. Koch W Timothy and Scott S Macdonald, "Bank Management" Thomson (South-Western), Bangalore 2005 (Text Book)
2. Khan M Y., "Indian Financial System", Tata Mc Graw Hill, New Delhi, 2004
3. Srivastava, RM ., "Management of Indian Financial Institutions", Himalaya Publishing House, Mumbai, 2005
4. Avadhani V A., "Investments and Securities Markets in India", Himalaya Publishing House, Mumbai, 2004
5. Srinivasan NP and Saravanavel, P., "Development Banking in India and Abroad", Kalyani Publications, Ludhiyana, 2001

EF-303	FINANCIAL MARKETS AND SERVICES	100	4	0	0	3

Objective: To enlighten the students with the Concepts and Practical dynamics of Financial Markets and Financial Services

UNIT – I : Structure of Financial System – role of Financial System in Economic Development – Financial Markets and Financial Instruments – Capital Markets – Money Markets – Primary Market Operations – Role of SEBI – Secondary Market Operations – Regulation – Functions of Stock Exchanges – Listing – Formalities – Financial Services Sector Problems and Reforms.

UNIT – II : Financial Services: Concept, Nature and Scope of Financial Services – Regulatory Frame Work of Financial Services – Growth of Financial Services in India – Merchant Banking – Meaning-Types – Responsibilities of Merchant Bankers – Role of Merchant Bankers in Issue Management – Regulation of Merchant Banking in India. Leasing – types of Leases – Evaluation of Leasing Option Vs. Borrowing.

UNIT – III : Venture Capital – Growth of Venture Capital in India – Financing Pattern under Venture Capital – Legal Aspects and Guidelines for Venture Capital. Factoring, Forfeiting and Bill Discounting – Types of Factoring Arrangements – Factoring in the Indian Context.

UNIT – IV : Credit Rating – Meaning, Functions – Debt Rating System of CRISIL, ICRA and CARE. Mutual Funds – Concept and Objectives, Functions and Portfolio Classification, Organization and Management, Guidelines for Mutual Funds. Working of Public and Private Mutual Funds in India. Debt Securitization – Concept and Application – De-mat Services-need and Operations-role of NSDL and CSDL.

UNIT – V : Microfinance: Over view of Microfinance, Indian Rural financial system, introduction to Microfinance, Microfinance concepts, products, (savings, credit, insurance, pension, equity, leasing, hire-purchase service, Microfinance in kind, Micro-remittances, MicroSecuritization. Microfinance models: Generic models viz. SHG, Grameen, and Co-operative, variants SHG NABARD model, SIDBI model, SGSY model, Grameen Bangladesh model, credit unions. Poverty and Need of Microfinance. Gender issues in Microfinance

Suggested Readings:

1. Bhole & Mahakud, Financial Institutions and Market, TMH, New Delhi
2. V.A.Avadhani, Marketing of Financial Services, Himalayas Publishers, Mumbai
3. DK Murthy, and Venugopal, Indian Financial System, IK Int Pub House
4. Anthony Saunders and MM Cornett, Fin Markets & Institutions,TMH,
5. Edminister R.D., Financial Institution, Markets and Management.
7. Punithavathy Pandian, Financial Markets and Services, Vikas, New Delhi

8. Vasanth Desai, Financial Markets & Financial Services, Himalaya, Mumbai

9. Meir Khan – Financial Institutions and Markets, Oxford Press.

EF-304	MERGERS, ACQUISITIONS AND CORPORATE RESTRUCTURING	100	4	0	0	3

Objective:

Unit – I: Mergers- types of merger– theories of mergers- operating, financial and managerial synergy of mergers – value creation in horizontal, vertical and conglomerate mergers – internal and external change forces contributing to M & A activities- Impact of M & A on stakeholders.

Unit – II: M & A – A strategic perspective- industry life cycle and product life cycle analysis in M&A decision, strategic approaches to M&A- SWOT analysis, BCG matrix. Takeovers, types, takeover strategies, - Takeover defences – financial defensive measures – methods of resistance – anti-takeover amendments – poison pills Legal aspects of Mergers/amalgamations and acquisitions/takeovers- Combination and Competition Act- Competition Commission of India (CCI), The SEBI Substantial Acquisition of Shares and Takeover code

Unit – III: Merger Process: Dynamics of M&A process - identification of targets – negotiation - closing the deal. Five-stage model – Due diligence– Types - due diligence strategy and process - due diligence challenges. Process of merger integration – organizational and human aspects – managerial challenges of M & A.

Unit – IV: Methods of financing mergers – cash offer, share exchange ratio – mergers as a capital budgeting decision Synergies from M&A: Operating and Financial synergy Accounting for amalgamation – amalgamation in the nature of merger and amalgamation in the nature of purchase- pooling of interest method, purchase method – procedure laid down under Indian companies act of 2013.

Unit – V: Corporate restructuring – significance - forms of restructuring – joint ventures – sell off and spin off – divestitures – equity carve out – leveraged buy outs (LBO) – management buy outs – master limited partnership– Limited Liability Partnership (LLP) in India: Nature and 91 incorporation of LLP-De merger- strategic alliance buyback of shares.

Suggested Readings:

1. Value Creation from Mergers and Acquisitions, Sudi Sudarsanam – 1/e, Pearson Education, 2003.
2. Merger Acquisitions & Corporate Restructuring – Chandrashekar Krishna Murthy & Vishwanath. S.R – Sage Publication.
3. Mergers, acquisitions and Corporate Restructuring, NishikantJha, Himalaya Publishing House, 2011.
4. Corporate Restructuring, Bhagaban Das, Debdas Raskhit and Sathya Swaroop Debasish, Himalaya Publishing, 2009.
5. Business Legislation for Management, M.C. Kuchhal and Vivek Kuchhal, 4/e, Vikas Publishing House, 2013.

EF-305	TAXATION	100	4	0	0	3

Objective: To acquaint the students with the theoretical and practical aspects of direct taxes including wealth taxes.

Unit –I: General Principles of Tax – Direct and Indirect Taxes – State Power to Levy Tax – Tax System – Provisions of Income Tax Act 1961 – Finance Act – Basic Concepts.

Unit- II: Income Tax – Deductions, Computation, Payment and Accounting- deductions from Gross Total Income, Rebates and Reliefs and Computation of Taxable Income and Tax Payable, Filing of Income Tax Returns – Provisions, Forms and Due Dates, Notices and Assessments.

Unit III: Tax Planning for Firms, HUFs and AOPs- partnership firm under Income Tax Law, tax deductions available to firms, Provisions relating to interest and remuneration paid to partner, Computation of partnership firms' book profit, Set-off and carry-forward of losses of Firms and taxation of HUFs and Associations of Persons (AOPs).

Unit IV: Corporate Taxation- Computation of taxable income, Carry-forward and set-off of losses for companies, Minimum Alternative Tax (MAT), Set-off and Carry-forward of Amalgamation Losses, Tax Planning for Amalgamation, Merger and Demerger of Companies, Tax Provisions for Venture Capital Funds

Unit V: Tax Audit and Accounting for Income Tax - Tax Audit, Qualities and Qualifications Required in Tax Auditors, Forms, Reports and Returns and Tax Reporting and Disclosure in Financial Statements

Suggested Readings:

1. Dr. V.K. Singhania & Dr. Kapil Singhania, Direct Taxes Law and Practice, Taxman Publications Pvt. Ltd., New Delhi.

2. Bhagavati Prasad, Direct Taxes Law and Practice, Wishwa Prakashan, New Delhi.

3. Dinkar Pagare, Income Tax and Practice, Sultan Chand and Sons, New Delhi.

FINANCE

MBA IV SEMESTER

EF-401	**FINANCIAL DERIVATIES**	**100**	**4**	**0**	**0**	**3**

Objective: To enlighten the students with the concepts and practical applications of derivatives in the security markets.

Unit - I: Introduction to Financial Derivatives – Meaning and Need – Growth of Financial Derivatives in India – Derivative Markets – Participants- Functions – Types of Derivatives – Forwards – Futures – Options-Swaps – The Regulatory Framework of Derivatives Trading in India.

Unit - II: Features of Futures –Differences Between Forwards and Futures – Financial Futures – Trading – Currency Futures – Interest Rate Futures – Pricing of Future Contracts- Value at Risk (VaR)-Hedging Strategies – Hedging with Stock Index Futures – Types of Members and Margining System in India – Futures Trading on BSE & NSE.

Unit - III: Options Market – Meaning & Need – Options Vs Futures -Types of Options Contracts – Call Options – Put Options- Trading Strategies Involving Options – Basic Option Positions – Margins – Options on Stock Indices – Option Markets in India on NSE and BSE.

Unit - IV: Option Pricing – Intrinsic Value and Time Value- Pricing at Expiration – Factors Affecting Options pricing- Put-Call Parity Pricing Relationship- Pricing Models - Introduction to Binominal Option Pricing Model – Black Scholes Option Pricing Model.

Unit – V: Swaps – Meaning – Overview – The Structure of Swaps – Interest Rate Swaps – Currency Swaps – Commodity Swaps – Swap Variant – Swap Dealer Role –Equity Swaps – Economic Functions of Swap Transactions - FRAs and Swaps.

Suggested Readings:

1. Hull C. John, “Options, Futures and Other Derivatives”, Pearson Educations Publishers,
2. David Thomas. W & Dubofsky Miller. Jr., Derivatives valuation and Risk Management, Oxford University, Indian Edition.
3. ND Vohra & BR Baghi, Futures and Options, Tata McGraw-Hill Publishing Company Ltd.
4. Red Head: Financial Derivatives: An Introduction to Futures, Forward, Options” Prentice Hall of India.
5. David A. Dubofsky, Thomas W. Miller, Jr.: Derivatives: Valuation and Risk Management, Oxford University Press.
6. Sunil K.Parameswaran, “Futures Markets: Theory and Practice” Tata-McGraw-Hill Publishing Company Ltd.
7. D.C. Patwari, Financial Futures and Options, Jaico Publishing House.
8. T.V. Somanathan, Derivatives, Tata McGraw-Hill Publishing Company Ltd.
9. NSE Manual of Indian Futures & Options & www. Sebi.com
10. S.C. Gupta, Financial Derivatives: Theory, Concepts and Problems, Prentice Hall of India.

EF-402	GLOBAL FINANCIAL MANAGEMENT	100	4	0	0	3

Objective: to enlighten the students with the Concepts and Practical applications of Gobal Financial Management.

Unit I : International Monetary and Financial System: Evolution; Breton Woods Conference and Other Exchange Rate Regimes; European Monetary System, South East Asia Crisis and Current Trends.

Unit II : Foreign Exchange Risk: Transaction Exposure; Accounting Exposure and Operating Exposure – Management of Exposures – Internal Techniques, Management of Risk in Foreign Exchange Markets: Forex Derivatives – Swaps, futures and Options and Forward Contracts.

Unit III : Features of Different International Markets: Euro Loans, CPs, Floating Rate Instruments, Loan Syndication, Euro Deposits, International Bonds, Euro Bonds and Process of Issue of GDRs and ADRs.

Unit IV : Foreign Investment Decisions : Corporate Strategy and Foreign Direct Investment; Multinational Capital Budgeting; International Acquisition and Valuation, Adjusting for Risk in Foreign Investment.

Unit V: International Accounting and Reporting; Foreign Currency Transactions, Multinational Transfer Pricing and Performance Measurement; Consolidated Financial Reporting.

Suggested Readings:

1. Buckley Adrin, Multinational Finance, 3rd Edition, Engle Wood Cliffs, Prentice Hall of India.
2. S.P.Srinivasan, B.Janakiram, International Financial Management, Wiley India, New Delhi.
3. Clark, International Financial Management, Cengage, ND
4. V.Sharan, International Financial Management, 3rd Edition, Prentice Hall of India.
5. A.K.Seth, International Financial Management, Galgothia Publishing Company.
6. P.G.Apte, International Financial Management, Tata McGrw Hill, 3rd Edition.
7. Bhalla, V.K., International Financial Management, 2nd Edition, New Delhi, Anmol, 2001.
8. V.A.Avadhani, International Financial Management, Himalaya Publishing House.
9. Bhalla, V.K., Managing International Investment and Finance, New Delhi, Anmol, 1997.

EF-403	FINANCIAL RISK MANAGEMENT	100	4	0	0	3

Objective: To equip the students with adequate knowledge and Skill to understand and manage the risk and uncertainties to which financial institutions are exposed to.

Unit – I: Introduction The concept of Risk, Nature, Need and scope of risk. Source, measurement, identification and evaluation of Risk. Types of risk–Product market risk and capital market risk. Possible Risk events, Risk Indicators, Risk Management Process–pre-requisites and fundamentals. Misconceptions of Risk. An integrated approach to Corporate Risk Management. Risk management approaches and methods. A comprehensive view of Risk in Financial Institutions. Risk reporting process–internal and external.

Unit – II: Measurement and Management of Risk: Value at risk (VaR): The concept, computation, stresses testing, back testing. Cash flow at risk (CaR): VaR and CaR to make investment decisions. Managing risk when risk is measured by VaR or CaR Non-Insurance methods of Risk Management-Risk Avoidance, Loss Control, Risk Retention and Risk Transfer. Asset-Liability Management (ALM): evolution & concept, RBI guidelines. Capital Adequacy. Management of interest rate risk, liquidity risk, credit risk and exchange rate risk.

Unit – III: Techniques and Tools of Risk Management: Forward contracts and Futures contracts The concept of Derivatives and types of Derivatives. The role of Derivative securities to manage risk and to exploit opportunities to enhance returns. Individuals, speculators, hedgers, arbitrageurs and other participants in Derivatives Market. Forward contracts: Definition, features and pay-off profile of Forward contract. Valuation of forward contracts. Forward Contracts to manage Commodity price risk, Interest rate risk and exchange rate risk. Limitations of Forward contract. Futures contracts: Definition. Clearing house, margin requirements, marking to the market. Basis and convergence of future price to spot price. Valuation of Futures contract. Differences between forward contracts and futures contracts. Risk management with Futures contracts–the hedge ratio and the portfolio approach to a risk–minimizing hedge.

Unit – IV: Techniques and Tools of Risk Management: SWAPS Definition, types of swaps. Interest rate swaps, Currency swaps. Interest rate Swaps: Mechanics of Interest rate swaps .Using Interest rate Swaps to lower borrowing costs, hedge against risk of rising and falling interest rates. Valuation of interest rate Swaps. Pricing of Interest rate swaps at origination and valuing of Interest rate swaps after origination. Currency Swaps: Types of Currency Swaps. Valuation of currency swaps. Using Currency Swaps to lower borrowing costs in foreign country, to hedge against risk of a decline in Revenue, to hedge against risk of an increase in Cost, to hedge against risk of a decline in the value of an asset, to hedge against risk of a rise in the value of a liability. Pricing of currency swap at origination and valuing of currency swap after origination.

Unit – V: Techniques and Tools of Risk Management: Options Definition of an option. Types of options: call option, put option, American option and European option. Options in the money, at the money and out of the money. Option premium, intrinsic value and time value of options. Pricing of call and put options at expiration and before expiration. Options on stock indices and currencies. The Binominal option pricing model (BOPM): assumptions - single and two period models. The Black & Scholes option pricing model (BSOPM): assumptions.

Suggested Readings:

1. Dun and Bradstreet, "Financial Risk Management", 2007, TMH, Delhi.
2. Paul Hopkins, Kogan Page, "Fundamentals of Risk Management", 2010, Institute of Risk Management.

3. Ravi Kumar, “Asset Liability Management”, Vision Books Pvt. Ltd.

4. David. A. Dubofsky & Thomas. W. Miller, Jr., “Derivatives Valuation and Risk Management”, 2003, Oxford University Press.

5. Jean-Philippe Bouchaud and Mark Potters, “Theory of Financial Risk and Derivative Pricing”, 2009, 2nd Ed. Cambridge press

6. John C. Hull & Sankarshan Basu, “Options, Futures and Other Derivatives”, 7th Ed, Pearson Education.

7. “Theory and Practice of Treasury and Risk Management in Banks”, Indian Institute of Banking and Finance, March 2006, Taxmann

8. Peter S. Rose & Sylvia C. Hudgins, “Bank Management & Financial Services”, 7th Ed, Tata McGraw-Hill

9. Rene. M. Stulz, “Risk Management & Derivatives”, 2003, Thomson Southwestern.

10. Jayanth Rama Varma, “Derivatives and Risk Management”, TMH.

EF-404	STRATEGIC FINANCIAL MANAGEMENT	100	4	0	0	3

Objective: To enlighten the students with the Concepts and Practical applications of Strategic Financial Management., with particular reference to the financial strategy and value of the enterprise.

Unit-1: Financial Goals and Strategy – Shareholder Value Creation (SCV): Market Value Added (MVA) – Market-to-Book Value (M/BV) – Economic Value Added (EVA) – Managerial Implications of Shareholder Value Creation.

Unit-II: Financial Strategy for Capital Structure: Leverage Effect and Shareholders' Risk – Capital Structure Planning and Policy – Financial Options and Value of the Firm – Dividend Policy and Value of the Firm.

Unit-III: Investment Strategy – Techniques of Investment Appraisal Under Risk and Uncertainty – Risk Adjusted Net Present Value – Risk Adjusted Internal Rate of Return – Capital Rationing – Decision Tree Approach for Investment Decisions – Evaluation of Lease Vs Borrowing Decision.

Unit-IV: Merger Strategy – Theories of Mergers – Horizontal and Conglomerate Mergers – Merger Procedure – Valuation of Firm – Financial Impact of Merger – Merge and Dilution Effect on Earnings Per Share – Merger and Dilution Effect on Business Control.

Unit-V: Takeover Strategy – Types of Takeovers – Negotiated and Hostile Bids – Takeover Procedure – Takeover Defenses – Takeover Regulations of SEBI – Distress Restructuring Strategy – Sell offs – Spin Offs – Leveraged Buyouts.

Suggested Readings:

1. Van Horn, JC, Financial Management and Policy, Prentice Hall,New Delhi
2. PG Godbole, Mergers, Acquisitions and Corporate Restructuring, Vikas, New Delhi
3. Weaver, Strategic Corporate Finance, Cengage, ND
4. Weston JF, Chung KS & Heag SE., Mergers, Restructuring & Corporate Control, Prentice Hall.
5. GP Jakarthiya, Strategic Financial Management, Vikas, New Delhi
6. Coopers & Lybrand, Strategic Financial: Risk Management, Universities Press (India) Ltd.
7. Robicheck, A, and Myers, S., Optimal Financing Decisions, Prentice Hall Inc.
8. James T.Gleason, RiskL The New Management Imperative in Finance, A Jaico Book.

EF-405	BEHAVIOURAL FINANCE	100	4	0	0	3

Objective: To help students appreciate the limitations of 'rational' models of investment decision making; To introduce students to an alternate framework for understanding price discovery in the markets; and to help students identify persistent or systematic behavioral factors that influence investment behavior

Unit – I Introduction to Behavioral finance – Nature, scope, objectives and application; Investment Decision Cycle: Judgment under Uncertainty :Cognitive information perception - Peculiarities (biases) of quantitative and numerical information perception - Weber law - Subjective probability – Representativeness – Anchoring - Asymmetric perception of gains and losses framing and other behavioral effects - Exponential discounting - Human economic behavior - Discount factors for short and long horizons - Experimental measurement of the discount factor - Hyperbolic discounting.

Unit – II: Utility/ Preference Functions: Expected Utility Theory [EUT] and Rational Thought: Decision making under risk and uncertainty - Expected utility as a basis for decision-making – Theories based on Expected Utility Concept – Decisionmaking in historical prospective - Allais and Elsberg's Paradoxes - Rationality from an economics and evolutionary prospective – Herbert Simon and bounded rationality- Investor rationality and market efficiency - Empirical data that questions market efficiency.

Unit –III: Behavioral Factors and Financial Markets: The Efficient Markets Hypothesis – Fundamental Information and Financial Markets - Information available for Market Participants and Market Efficiency -Market Predictability –The Concept of limits of Arbitrage Model - Asset management and behavioral factors - Active Portfolio Management: return statistics and sources of systematic underperformance. - Fundamental information and technical analysis – the case for psychological influence.

Unit – IV: Behavioral Corporate Finance: Behavioral factors and Corporate Decisions on Capital Structure and Dividend Policy - Capital Structure dependence on Market Timing - Mergers and Acquisitions. Systematic approach to using behavioral factors in corporate decisionmaking. External Factors and Investor Behavior: Mechanisms of the External Factor influence on risk perception and attitudes - Connection to human psychophysiology and emotional regulation Active portfolio management – the source of the systematic underperformance.

Unit – V: Emotions and Decision – Making: Experimental measurement of risk-related - Measuring Risk - Emotional mechanisms in modulating risk-taking attitude - Neurophysiology of risktaking. Personality traits and risk attitudes in different domains.

Suggested Readings:

1. Behavioral Finance: Psychology, Decision-Making, and Markets", by Ackert and Deaves.¬ The Psychology of Investing by John R.
2. Understanding Behavioral Finance by Ackert¬ Nofsinger, Pearson Prentice Hall, (4th Edition)
3. What Investors Really Want - Learn the lessons of behavioral Finance, Meir Statman,¬ McGraw-Hill
4. Handbook of Behavioral Finance – Brian R. Bruce
5. Behavioral finance - Wiley Finance - Joachim Goldberg, Rüdiger von Nitzsch
6. Plous, Scott, 1993, The Psychology of Judgment and Decision Making, Ch 10-15
7. Shleifer, Andrei, 2000, Are Financial Markets Efficient?, Chapter 1 in Inefficient
8. Markets, Oxford University Press. Ackert, L., and R. Deaves, 2010, Behavioral Finance: Psychology, Decision-Making and
9. Markets, South-Western Cengage Learning, Mason, Ohio. Nofsinger, J. R., 2001, Investment Madness, Prentice Hall.
10. Mitchell, O. S., and S. P. Utkus, eds., 2004. Pension Design and Structure: New Lessons
11. from Behavioral Finance (Oxford University Press, New York, New York). Shleifer, Andrei (2000): Ineffcient Markets: An Introduction to Behavioral

12. Finance,Oxford University Press, Oxford. Montier, James (2002): Behavioural Finance, John Wiley & Sons, New York.
13. Plous, S. (1993). The psychology of judgment and decision-making NY: McGrawHill.

EM-301	CONSUMER BEHAVIOR	100	4	0	0	3

Course Objective

To make the students to understand what consumer behaviour is and the different types of Consumers and the relationship between consumer behavior and customer value, satisfaction, trust and retention

Unit – I

Introduction to Consumer Behaviour: Consumer Behaviour – Definition, Consumer and Customers, Buyers and Users, Organisations as Buyers, Development of Marketing Concept, Consumer Behaviour and its Applications in Marketing, Consumer Behaviour and Marketing Communications: Introduction, Marketing Communication Flow, Communications Process, Interpersonal Communication, Persuasive Communications,

Unit – II

Marketing Segmentation and Positioning: Introduction, Requirements for Effective Segmentation, Bases for Segmentation, Product Positioning: An Introduction, Positioning Strategy, Positioning Approaches, Positioning Errors

Consumer Motivation: Introduction, Needs and Goals, motivational Conflict, Defense Mechanisms, Motive Arousal, Motivational Theories, Maslow's hierarchy of needs

Unit – III

Situational Influence on Consumer's Decision and the Decision Models: Introduction, Nature of Situational Influence, Situational Variables, Types of Consumer Decisions, Nicosia Model of Consumer Decision-making (Conflict Model), Howard-Sheth Model (also called Machine Model), Engel, Blackwell, Miniard Model (also called Open System)

Unit – IV

Consumer Personality: Introduction, Self-concept, personality Theories, Brand Personality, emotions Consumer Perception: Introduction, Sensation (Exposure to Stimuli), Perceptual Selection, Perceptual Organisation, Factors that Distort Individual Perception, Price Perceptions, Perceived Product and Service Quality, Consumer Risk Perceptions

Unit – V

Consumer Decision-making Process – Problem Recognition, Information Search and Evaluation of Alternatives: Introduction, Problem Recognition, Information Search, Evaluation of Alternatives. Outlet Selection, Purchase and Post Purchase Behaviour, Introduction, Outlet Selection and Purchase, Post Purchase Behaviour

Suggested References:

1. Ramneek Kapoor, Nnamdi O Madichie: "Consumer Behaviour Text and Cases", TMH, New Delhi, 2012.

2. Ramanuj Majumdar: "Consumer Behavior insight from Indian Market", PHI Learning, New Delhi, 2011.

3. M.S.Raju: "Consumer Behavior Concepts, applications and Cases", Vikas Publishing House, New Delhi, 2013.

EM-302	RETAIL MANAGEMENT	100	4	0	0	3

Course Objective:

Objective of retail management is creating and developing services and products that meet the specific needs of customers and offering these products at competitive, reasonable prices that will still yield profits.

Unit – I

Introduction to Retailing: Introduction, Meaning of Retailing, Economic Significance of Retailing, Retailing Management Decision Process, Product Retailing vs. Service Retailing, Retailing Marketing Environment: Elements in a Retail Marketing Environment, Environmental Issues, , Indian vs. Global Scenario

Unit – II

The Retail Marketing Segmentation: Introduction, Importance of Market, Segmentation in Retail, Targeted Marketing Efforts, Criteria for Effective Segmentation, Dimensions of Segmentation, Positioning Decisions , Limitations of Market Segmentation
Store Location and Layout: Introduction, Types of Retail Stores Location, Factors Affecting Retail Location Decisions, Country/Region Analysis, Trade Area Analysis, Site Evaluation, Site Selection, Location Based Retail Strategies

Unit – III

Store Location and Layout: Introduction, Target Market and Retail Format, Gauging Growth Opportunities, Building a Sustainable Competitive Advantage, the Strategic Retail Planning Process, Differentiation Strategies, Positioning Decisions,

Retail Pricing- Introduction, Establishing Pricing Policies, Factors Influencing Pricing, Pricing Strategies, Psychological pricing, Mark-up and Mark-down Pricing

Unit – IV

Customer Relationship Management in Retailing-Introduction, Benefits of Relationship Marketing, Management of Relationship, Principles of CRM, Customer Relationship Management Strategies, Components of CRM, Customer Service in Retailing, CRM and Loyalty Program

Understanding Integrated Marketing Communication, - Integrated marketing process, Tools of IMC, Upcoming tools of IMC, Factors influencing the Increased use of sales promotion

Unit – V

International Retailing- Introduction, Stages in Retail Global Evolution, Reasons for Going Global, Benefits of Going Global, Other Opportunities and Benefits of Going Global, Market Entry Methods

Suggested References:

1. Sheikh and Kaneez Fatima, “Retail Management”, Himalaya Publishing House, Mumbai, 2012
2. A.J. Lamba:”The Art of Retailing”, Tata McGraw Hill Education Pvt. Ltd. N. Delhi.2011
3. Sivakumar, A, “Retail Marketing”, Excel Books, New Delhi, 2007

4. Swapna Pradhan, “Retail management”, Tata McGraw Hill Education Pvt. Ltd. New Delhi, 2012

EM-303	**CUSTOMER RELATIONSHIP MANAGEMENT**	**100**	**4**	**0**	**0**	**3**

Course Objective

- To provide a conceptual understanding of CRM, its processes, and structure.

Unit – I
Customer Relationship Management Fundamentals: Definition and Significance of Customer Relationship Marketing, Theoretical perspectives of relationship, Evolution of Relationship marketing, Stages of relationship, Issues of relationship, Purpose of relationship marketing, Approach towards marketing: A paradigm shift, Historical Perspectives, CRM Definitions, Emergence of CRM practice, CRM cycle, Significance of CRM, CRM Strategy, Customer Life Time Value, Relationship Life Cycle.

Unit – II
Building Customer Relationship Management: Requisites for Effective Customer acquisition, Customer Knowledge Management for Effective CRM, Customer Retention Process, Strategies to Prevent Defection and Recover Lapsed Customers , CRM Implementation: CRM framework for Implementation, Implementing CRM process, Integration of CRM with ERP System, Barriers to effective CRM Gartner’s Competency model of CRM.

Unit – III
Functional Components of CRM: Database Management: Database Construction, Data Warehousing, architecture, Data Mining. Characteristics, Data Mining tools and techniques, Meaning, Significance, Advantages, Call Center, Multimedia Contact Center, Important CRM software’s

Unit – IV
Sales Force Automations (SFA): Definition and need of Sales Force Automation, barriers to successful Sales Force Automation functionality, technological aspect of Sales Force Automation, data synchronization, flexibility and performance, reporting tools, Impact of CRM on Marketing Channels: Meaning, how does the traditional distrib tion channel structure, support customer relationship, emerging channel trends that impact CRM

Unit – V
Trends and Issues in CRM: CRM in e- business (B2B & B2C), Measuring the Effectiveness of CRM, Factors Influencing the future of CRM. E-CRM in Business, CRM: A changing Perspective, Features of e-CRM, Advantages of e-CRM,

Recommended Books
Text Books:

1. Alok Kumar, Chabbi Sinha & Rakesh Kumar, Customer Relationship Management: Concepts & Application Biztantra, Delhi, 2007

2. H Peeru Mohamed, A Sagadevan, Customer Relationship Management- A Step-by-Step Approach, Vikas Publishing House Pvt. Ltd., Delhi, 2008

Suggested Readings:

1. Jill Dyche: The CRM Handbook: A Business Guide to Customer Relationship Management, Pearson Education, 2002.

2. Ed Peelen, Customer Relationship Management,, Pearson Education,2005.
3. Barnes James G: Secrets of Customer Relationship Management, McGraw Hill, 2001.

EM-304	STRATEGIC MARKETING MANAGEMENT	100	4	0	0	3

Course Objective:

To understand the various components of Business environment and to device strategies to face global competition.

Unit – I
Introduction to Strategic Marketing Management: Strategic marketing process. Concept of strategic marketing. Levels of Strategies-Corporate, Business and Operational level.
Strategy Formulation – Vision, Mission, Objectives and Goals of business and their relationship with Strategic Marketing Management. Considerations for formulation of marketing strategies for all components of Product, Price, Promotion and Distribution.

Unit – II
Corporate restructuring and strategy evaluation: Introduction to corporate restructuring, need for corporate restructuring and its forms. Evaluation of strategic alternatives, types of strategic alternatives like portfolio analysis and its techniques.
Model as basic foundation of Strategic Marketing - McKinsey's 7s framework for analyzing and improving organizational effectiveness.

Unit – III
Marketing Strategy Implementation – Integration of Marketing Strategies and their application to different business sectors – FMCG, Industrial, & Services. Constraints in marketing strategy implementation.

Unit – IV
Marketing Strategy Evaluation: Marketing Audits & their scope – Measurement of Marketing Performance and its feedback to next year's Marketing strategy formulation. Economic losses due to disasters-Issues and Strategies for preventing disasters and preparedness measures.

Unit – V
Recent trends in strategic marketing management - Eco-friendly strategies. Growing need of public private partnership. Corporate Social Responsibility (CSR), strategies of linking CSR with profit and sustainability.

Recommended Books

Text Books:

1. Thompson/Strickland, Strategic Management : Concepts and Cases, McGrawHill Companies; 11th edition
2. David Hunger and Thomas L. Wheelen "Strategic Management" AddisonWesley; 6 Sub edition.

Suggested Reading

1. William F. Glueck, Business Policy and Strategic Management, McGraw-Hill
2. Azhar Kazmi, Strategic Management and Business Policy, Third Edition
3. John A. Pearce & R.B. Robinson, Strategic Management - Strategy Formulation and Implementation, AIBT Publishers & Distributors, New Delhi, 13th Ed. 2001.

EM-305	**DIGITAL AND SOCIAL MEDIA MARKETING**	**100**	**4**	**0**	**0**	**3**

Course Objective:

Digital marketing channels that can helps the students to understand the increased business visibility and brand awareness. Moreover, having a professional presence on social media helps them to reach a broader target audience to secure more leads and convert them into loyal customers.

Unit – I

Understanding Digital Marketing: Concept, Components of Digital Marketing, Need and Scope of Digital Marketing, Benefits of Digital Marketing, Digital Marketing Platforms and Strategies, Comparison of Marketing and Digital Marketing, Digital Marketing Trends.

Unit – II

Channels of Digital Marketing: Digital Marketing, Website Marketing, Search Engine Marketing, Online Advertising, Email Marketing, Blog Marketing, Social Media Marketing, Audio, Video and Interactive Marketing, Online Public Relations, Mobile Marketing, Migrating from Traditional Channels to Digital Channels. Marketing in the Digital Era Segmentation – Importance of Audience Segmentation, How different segments use Digital Media – Organizational Characteristics, Purchasing Characteristics, Using Digital Media to Reach, Acquisition and Retention of new customers, Digital Media for Customer Loyalty.

Unit – III

Digital Marketing Plan: Need of a Digital Marketing Plan, Elements of a Digital Marketing Plan – Marketing Plan, Executive Summary, Mission, Situational Analysis, Opportunities and Issues, Goals and Objectives, Marketing Strategy, Action Plan, Budget, Writing the Marketing Plan and Implementing the Plan.

Unit – IV

Search Engine Marketing and Online Advertising Importance of SEM, understanding Web Search – keywords, HTML tags, Inbound Links, Online Advertising vs. Traditional Advertising, Payment Methods of Online Advertising – CPM (Cost-per-Thousand) and CPC (Cost per-click), Display Ads - choosing a Display Ad Format, Landing Page and its importance.

Unit – V

Social Media Marketing: Understanding Social Media, Social Networking with Facebook, LinkedIn, Blogging as a social medium, Microblogging with Twitter, Social Sharing with YouTube, Social Media for Customer Reach, Acquisition and Retention. Measurement of Digital Media: Analyzing Digital Media Performance, Analyzing Website Performance, Analyzing Advertising Performance.

MBA - Regular (IV Sem)
Marketing – Electives

EM-401	SERVICES MARKETING	100	4	0	0	3

Objectives:

- To explain why there is a need for special services marketing discipline; the challenges for services marketing; and how to deal with them.

- To acquaint the students with elements of services marketing mix, ways to manage the service delivery process and strategies to effectively implement Services marketing.

Unit – I

Introduction to Services Marketing: Understanding Services, Differences in Goods versus Services, Emerging Service Environment, Classification of Services. Service Market Segmentation, Targeting & Positioning: Process of market segmentation, customer loyalty Segmentation, Targeting and Positioning service value addition to the service product, planning and branding service products, new service development.

Unit – II

Pricing strategies for services: Service pricing, establishing monetary pricing objectives foundations of pricing objectives, pricing and demand, putting service pricing strategies into practice.

Service promotion: The role of marketing communication. Implication for communication strategies, setting communication objectives, marketing communication mix.

Unit – III

Implementing Services Marketing: Improving Service Quality and Productivity, SERVQUAL, Service Failures and Recovery Strategies. Customer Relationship Marketing:

Relationship Marketing, the nature of service consumption understanding customer needs and expectations, Strategic responses to the intangibility of service performances.

Unit – IV

Managing Service Delivery Process: Managing Physical Evidence of Services, Designing and Managing Service Processes, Managing People for Service Advantage.

Unit – V

Marketing of Services in Sectors: Financial Services, Health Service, Hospitality Services including travel, hotels and tourism, Professional Service, Public Utility Services, Educational Services.

Recommended Books

Text Books:

1. Valarie A. Zeithaml & Mary Jo Bitner - Services Marketing: Integrating Customer Focus Across The Firm, Third Edition, 2004; Tata McGraw-Hill Publishing Company Ltd, 2008.
2. Christopher H. Lovelock, Jochen Wirtz, Jayanta Chatterjee, Services Marketing: People, Technology, Strategy (A South Asian Perspective) Fifth Edition 2011; Pearson Education

Suggested Readings:

1. Cengiz Haksever, Barry Render, Roberta S. Russel, and Robert G. Murdic: Service Management and Operations (Second Edition); Pearson Education (Singapore) Pte., Ltd., 2003.
2. Kenneth E. Clow & David L. Kurtz: Services Marketing, Biztantra Publication, 2003.
3. Nimit Chowdhary & Monika Chowdhary, Textbook of Marketing of ServicesThe

Indian Experience, Macmillan India Ltd., 2005

EM-402	**PROMOTIONAL & DISTRIBUTION MANAGEMENT**	**100**	**4**	**0**	**0**	**3**

Course Objective:
To provide an understanding about the relevance of marketing communication, promotion activities and management of distribution networks.

Unit – I
Marketing Communications: The nature of marketing communications. The integration of marketing communication. Integrated marketing communication planning process. Model of marketing communications decision process. Establishing objectives and budgeting for the promotional programme.

Unit – II
Developing Integrated Marketing Communications: Creative strategy development. Process of execution of creative strategy: Appeals, execution styles and creative tactics. Media planning & Strategy: Developing Media Plans & Strategies and Implementation with IMC perspective.

Unit – III
Personal Selling: Role of personal selling in IMC programme. Integration of personal selling with other promotional tools. Personal selling process and approaches. Evaluating, motivating and controlling sales force effort.

Unit – IV
Sales Promotion and Support media: Sales Promotion - objectives, consumer and trade oriented sales promotion. Developing and operating sales promotion for consumers & trade: Sales promotion tools: off - shelf offers, price promotions, premium promotions, prize promotions. Coordinating Sales promotions and advertisement. Support media – Elements of Support media and their role. Direct marketing, the internet & Interactive Marketing, publicity and public relations. Monitoring, evaluating & controlling promotion programme.

Unit – V

Distribution Management: Role and functions of channels of distribution. Distribution Systems. Distribution cost, control and customer service. Channel design, and selection of channels, selecting suitable channel partners. Motivation and control of channel members. Distribution of Services, market logistics & supply chain management.

Suggested Readings:

1. Shimp "Advertising and Promotion", 2007, Cengage Learning.
2. George E Belch, Micheal A Belch & Keyoor Purani "Advertising and Promotion", 2010, Tata McGraw Hills, 7th Ed.
3. Shah & D'souza "Advertising & Promotion", 2010, Tata McGraw Hills.

EM-403	GREEN MARKETING	100	4	0	0	3

Course Objectives:

To make the student understand the concept of Green Marketing and Green Products

Unit – I

Green Marketing and Green Product : Introduction to green marketing-strategic green planning-environment and consumption- Green Product- Green Behavior- Five shades of green consumers Segmenting consumers- Green consumer's motives-Buying strategies -Green Business Opportunities- Designing green products-eco-design to eco- innovation-Fundamentals of green marketing-Establishing Credibility-Green distribution and Packaging Contemporary Government polices and subsidies that aids green product development

Unit – II

Green Marketing Concepts: Green Spinning – Green Selling – Green Harvesting – Enviropreneur Marketing - Compliance Marketing – Green Washing – Climate Performance Leadership Index

Unit – III

Purchase Decision: Meaning of Purchase decision – Factors affecting Purchase decision - Steps in the decision making process - Five stages of consumer buying decision process - Models of buyer decision-making

Unit – IV

Environmental consciousness: Introduction of Environment - Importance of environmentalism - Environmental movement - Benefits of green environment to the society - E-waste exchange - Extended Producer Responsibility Plan - Guidelines for Collection and Storage of E-Waste - Guidelines for Transportation of E-Waste - Guidelines for Environmentally Sound Recycling of E-Waste

Unit – V

Green Marketing Initiatives: Green Firms – HCL's Green Management Policy – IBM's Green Solutions – IndusInd Bank's Solar Powered ATMs – ITCs Paperkraft – Maruti's Green Supply Chain – ONCGs Mokshada Green Crematorium – Reva's Electric Car – Samsung's Eco-friendly handsets- Wipro Infotech's Eco-friendly computer peripherals

Text Books And Reference Books:

1. Green Marketing and Environmental Responsibility in Modern Corporations, Esakki and Thangasamy, IGI Global, 2017

2. Green Marketing Management, Robert Dahlstrom, Cengage Learning, 2010.

Essential Reading / Recommended Reading

1. Green Marketing: Challenges and Opportunities for the New Marketing Age, Jacquelyn A. Ottman, NTC Business Books, 1993

2. The New Rules of Green Marketing, Jacquelyn A. Ottman,Berrett-Koehler Publishers, 2011.

EM-404	ADVERTISING AND BRAND MANAGEMENT	100	4	0	0	3

Course Objective:

Expose the students to the dynamism of advertising and brand management and equip them to be able to manage the advertising and branding activities in the business scenario.

Unit – I

Advertising: Its importance and nature; Communication model; Persuasion Process –perception, learning and attitude change; Major advertising decisions and influencing factors;
Determining advertising Objectives and budget.

Unit – II

Developing Advertising Campaign: Determining advertising message and copy - Headline, body copy, logo, illustration and layout; Creative styles and advertising appeals; Media planning – media selection and scheduling Advertising through Internet.

Unit – III

Organisation and Evaluation of Advertising Efforts: In-house arrangements; Using advertising agencies – selection, compensation and appraisal of advertising agency; Evaluating Advertising Effectiveness. Importance of branding; Basic Branding concepts –
Brand personality, brand image, brand identify, brand equity and brand loyalty; Product vs. Corporate branding: Major branding decisions.

Unit – IV

Identifying and selecting brand name Building brand personality, image and identity; Brand positioning and re-launch; Brand extension; Brand portfolio; communication for branding Enhancing brand image through sponsorship and even management.

Unit – V

Managing Brand Equity and Loyalty: Brand Building in Different Sectors - Customers, industrial, retail and service brands. Building brands through Internet. Developing International Brands: Pre-requisites and process; Country-of-origin effects and global branding; Building Indian brands for global markets.

Suggested Readings:

1. S.H.H Kazmi and SatishK.Batra : Advertising and sales promotion, Excel books
   Cowley. D: Understanding Brands, ,Kogan Page Ltd

2. George E.Belch& Michael A. Balch : Advertising and Promotion, TMH

3. Aaker, Myers &Batra : Advertising Management , Prentice Hall.

4. Wells,Moriarity&Burnett : Advertising Principles & practices , Prentice Hall.

EM-405	GLOBAL MARKETING MANAGEMENT	100	4	0	0	3

Course Objective:

To enhance the concepts among the students about free trade at global level and attempt to bring all the countries together for the purpose of trading.

To increase the conception of globalization by integrating the economies of different countries, enabling them to understanding the world peace by building trade relations among different nations.

Unit – I

Global Marketing: Scope and Significance of Global Marketing, The importance of global / international marketing, Differences between international and domestic marketing International environment, International Social & culture Environment, the political legal environment and regulatory environment of international marketing. Technological Environment.

Unit – II

Global Market Entry Strategies: Indirect Exporting, Domestic Purchasing, Direct Exporting, Foreign Manufacturing Strategies without Direct Investment, Foreign Manufacturing Strategies with Direct Investment. Entry Strategies of Indian Firms.

Unit – III

Global product management: International product positioning, Product saturation Levels in global Market, International product life cycle, Geographic Expansion–Strategic Alternatives. New products in Intentional Marketing, Product and culture, brands in International Market.

Unit – IV

International Marketing Channels: channels –Distribution Structures, Distribution Patterns, Factors effecting Choice of Channels, the Challenges in Managing an international Distribution Strategy Selecting Foreign Country Market intermediaries. The management of physical distribution of goods, Advertising and Branding, Grey Market goods.

Unit – V

Export Marketing: Introduction to Export Marketing, Export Policy Decisions of a firm, EXIM policy of India. Export costing and pricing, Export procedures and export documentation. Export assistance and incentives in India.

Suggested Readings :

1. Varshney and Bhattacharya:International Marketing management.
2. Philip Kotler:Marketing Management
3. John Fayerwearther:International Marketing
4..David Carson: International Marketing

III SEMESTER ELECTIVES
SYSTEMS

ES-301	**Data Mining for Business Decisions**	**100**	**4**	**0**	**0**	**3**

Course Objective: A student will be able to apply Data mining techniques for quicker and better decisions. Whenever there is a need for data mining helps.

Unit I:

Introduction to Data Mining: Introduction-- Scope of Data Mining-- What is Data Mining-- How does Data Mining Works-- Predictive Modeling-- Data Mining and Data Warehousing-- Architecture for Data Mining: Profitable Applications-- Data Mining Tools:

Unit II:

Business Intelligence: Introduction, Business Intelligence-- Business Intelligence tools-- Business Intelligence Infrastructure-- Business Intelligence Applications-- BI versus Data Warehouse--BI versus Data Mining-- Future of BI. Data Preprocessing: Introduction-- Data Preprocessing Overview-- Data Cleaning-- Data Integration and Transformation-- Data Reduction-- Discretization and Concept Hierarchy Generation.

Unit III:

Data Mining Techniques An Overview: Introduction-- Data Mining-- Data Mining Versus Database Management System-- Data Mining Techniques- Association rules—Classification—Regression—Clustering-- Neural networks. Clustering—Introduction—Clustering-- Cluster Analysis-- Clustering Methods- K means-- Hierarchical clustering-- Agglomerative clustering-- Divisive clustering-- clustering and segmentation software-- evaluating clusters.

Unit IV:

Web Mining—Introduction—Terminologies-- Categories of Web Mining – Web Content Mining-- Web Structure Mining-- Web Usage Mining-- Applications of Web Mining and Agent based and Data base approaches-- Web mining Software.

Unit V:

Applications of Data mining: Introduction-- Business Applications Using Data Mining-Risk management and targeted marketing-- Customer profiles and feature construction-- Medical applications (diabetic screening)-- Scientific Applications using Data Mining-- Other Applications.

References:

1.Introduction to data mining by Tan, Steinbach & Kumar.
2. Data Mining: Concepts and Techniques, Third Edition by Han, Kamber & Pei.
3. Data Mining and Analysis Fundamental Concepts and Algorithms by Zaki & Meira.
4. **Data Mining: The Textbook** by Aggarwal.
5. Data Mining for Business Intelligence by Galit Shmueli,Nitin R.Patel,PeterC.Bruce

ES-302	Managing Software Projects	100	4	0	0	3

OBJECTIVES:

- To study how to plan and manage projects at each stage of the software development life cycle (SDLC)
- To train software project managers and other individuals involved in software project planning and tracking and oversight in the implementation of the software project management process.
- To understand successful software projects that support organization's strategic goals

UNIT -I: Introduction

Project, Management, Software Project Management activities, Challenges in software projects, Stakeholders, Objectives & goals

Project Planning: Step-wise planning, Project Scope, Project Products & deliverables, Project activities, Effort estimation, Infrastructure

UNIT -II: Project Approach

Lifecycle models, Choosing Technology, Prototyping

Iterative & incremental Process Framework: Lifecycle phases, Process Artifacts, Process workflows (Book 2)

UNIT -III: Effort estimation & activity Planning

Estimation techniques, Function Point analysis, SLOC, COCOMO, Use case-based estimation , Activity Identification Approaches, Network planning models, Critical path analysis

UNIT -IV: Risk Management

Risk categories, Identification, Assessment, Planning and management, PERT technique, Monte Carlo approach

UNIT -V: Project Monitoring & Control, Resource Allocation

Creating a framework for monitoring & control, Progress monitoring, Cost monitoring, Earned value Analysis, Defects Tracking, Issues Tracking, Status reports, Types of Resources, Identifying resource requirements, Resource scheduling, Planning Quality, Defining Quality - ISO 9016, Quality Measures, Quantitative Quality Management Planning, Product Quality & Process Quality Metrics, Statistical Process Control Capability Maturity Model

OUTCOMES:

- To match organizational needs to the most effective software development model
- To understand the basic concepts and issues of software project management
- To effectively Planning the software projects
- To implement the project plans through managing people, communications and change
- To select and employ mechanisms for tracking the software projects
- To conduct activities necessary to successfully complete and close the Software projects
- To develop the skills for tracking and controlling software deliverables
- To create project plans that address real-world management challenges

TEXT BOOKS:

1. Software Project Management, Bob Hughes & Mike Cotterell, TATA Mcgraw-Hill
2. Software Project Management, Walker Royce: Pearson Education, 2005.
3. Software Project Management in practice, Pankaj Jalote, Pearson.

ES-303	WEB DESINING	100	4	0	0	3

UNIT-I:
Web Fundamentals – Introduction To The Web, History of the Web, Protocols Governing the Web, Creating Websites for Individuals and the Corporate World, Web Applications, Writing Web Projects, Identification of Objects, Target User, Web Team, Planning and Process Development, Web Architecture, Major Issues in the Web Solutions Development, Web Servers (Apache Web Server), Web Browsers, Internet Standards, TCP/IP Protocol Suite, IP Addresses, MIME, Cyber Laws.

UNIT-II:
Hyper Text Transfer Protocol (HTTP): Introduction - Web Server and Clients, Resources, URL and its Anatomy – Examples, Message Format, Persistent and Non-Persistent Connections, Web Caching, Proxy. Java Network Programming- Java and the Net, Java Networking Classes and Interfaces, Looking up Internet Address, Client/Server Programs, Socket Programming, E-mail Client.(lab sessions to be conducted)

UNIT-III:
Hyper Text Markup Language (HTML): Introduction, Structure, Text, Lists, Links, Images, Tables, Forms, Frames, Images, and Meta Tags. (lab sessions to be conducted)

UNIT-IV:
Cascading Style Sheets (CSS) Introduction, Advantages, Color, Text, Boxes, Lists, Tables and Forms, Layout, Images, HTML5 Layout. (Lab Sessions to be conducted)

UNIT-V:
JavaScript Introduction, Variables, Literals, Operators, Control Structure, Conditional Statements, Arrays, Functions, Objects, JavaScript and HTML DOM, Advanced JavaScript and HTML Forms (Lab sessions to be conducted).

(Lab Sessions to be conducted wherever it is required)
Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References :
Uttam K Roy: "Web Technologies" — Oxford University Press, 2010.
Jon Duckett: "HTML & CSS: Design and Build Websites" – John Wiley & Sons, 2014.

ES-304	BUSINESS ANALYTICS	100	4	0	0	3

Course Objective: The course is designed to gain an understanding of how managers use business analytics to formulate and solve business problems and to support managerial decision making. The course familiarizes the students with the processes needed to develop, report, and analyze business data.

Unit I

Introduction to Business Analytics: Evolution of Business analytics, scope, Data for Business Analytics, Models in Business Analytics, problem solving with business analytics- Types of data, Integrating Analytics with business, Business Analytics for Competitive Advantage, Descriptive, Predictive, and Prescriptive Analytics, Dashboards Business Analytics Process Cycle.

Unit II

Analytics on Spreadsheets: Basic Excel, Excel Formulas, Excel Functions, Data Queries. Descriptive Analytics: Descriptive Statistical measures - Populations and samples, Statistical notations, Measures of Location, Measures of Dispersion, and Measures of Association. Statistical Inference: Hypothesis testing, one-Sample Test, Two-Sample Test, Two tailed Hypothesis for mean, ANOVA. Predictive Analytics: Simple Linear regression, Multiple Linear regression, Residual Analysis, Building regression models, Regression with categorical Independant variables – CASE STUDIES.

Unit III

Machine Learning, Supervised Learning and Unsupervised Learning, Clustering & Segmentation, Affinity/ Association Analysis, Data Reduction, Visual Analytics and Data Visualization Prescriptive Analytics: Building Linear Optimization models, Implementing Linear Optimization models on spreadsheets, Solving Linear Optimization models- CASE STUDIES.

Unit IV

Marketing Analytics, Models and metrics- Market Insight – Market data sources, sizing, PESTLE trend analysis, and porter five forces analysis - Market basket Analysis, Text Analytics, Spreadsheet Modelling - Sales Analytics: E Commerce sales mode, sales metrics, profitability metrics and support metrics.

Unit V

Introduction to Big Data, Master Data Management. Data Mining on what kind of data, What kinds of patterns can be mined, Which technologies are used, Which kinds of applications are targeted, Major issues in Data Mining. Getting to know your Data: Data Objects and Attribute Types, Basic Statistical Descriptions of Data, Data Visualization, Measuring data Similarity and Dissimilarity.

References:

1. Analytics at Work by Thomas H. Davenport, Jeanne G.Harris and Robert Morison, Harvard Business Press, 2010.
2. Getting Started with Business Analytics: Insightful Decision – Making by David Hardoon, Galit Shmueli, Chapman & Hall/CRC, 2013.
3. Business Intelligence: A Managerial Approach by Efraim Turban, Ramesh Sharda, Dursun Delen and Daid King, Pearson Publication, 2012.
4. Business Intelligence Making Decision through Data Analytics, Jerzy Surma, Business Expert Press, 2011.
5. Successful Business Intelligence: Secrets to Making BI a Killer App by Cindi Howson, Tata McGraw Hill Edition 2012.
6. R for Everyone: Advanced Analytics and Graphics, Jared Lander, Addison Wesley.

ES-305	Managing Digital Innovation and Transformation	100	4	0	0	3

Course Objectives

- To understand digital transformations and information in the globalization world
- To explore social media transformation in the business world
- To develop on building digital capabilities
- To understand the challenges on using digital platform for business
- To learn digital transformations in the space of cloud computing

UNIT -I : Introduction to Digital Transformations: The five domains of digital transformations — customer, competition, data, innovation, and value, 1-farness customer networks, turn data into assets, adapt value proposition

UNIT-II : Classification of Digital Transformations: Business Model, product development, data, processes, knowledge, self—service, and organizational culture; Social Media Transformation: understand requirements, document goals, objective and social media tactics, establish potential future state operating model, gap analysis and recommendations.

UNIT-III : Building digital capabilities: challenges ongoing digital, handling employee during digital transformations, developing companywide strategy; Digital transformations in the space of cloud computing: prepare and drive digital transformations.

UNIT –IV: Re-Organisation in Order to Bridge the Gap to Digital Customers - Digitalization of Professional Services: Value Creation in Virtual Law Firms - Digital Transformation Supporting Public Service Innovation: Business Model Challenges and Sustainable - Development Opportunities

UNIT – V

Areas of IT management and its challenges, IT services, IT organisation - Enterprise Innovation and the Digital Transformation - Industry, development trends, business competitiveness due to Technology - Using Technology as Innovation, Integration and Interconnection of business - IT strategy, IT governance, IT sourcing and controlling

References:

- Herbert, Lindsay; Digital Transformation: Build your organization's Future for the Innovation Age, Bloomsbury Publication, 2017
- Venkatraman, V; The Digital Matrix: New rules for business transformation through technology; Lifetree Media Ltd, 2017
- Velte, A. T; Velte, T. J; and Elsenpeter, R; Cloud Computing: A Practical Approach, Mcgraw Hill Education (India) Private Limited,2017 (23rd reprint)
- Rogers, David, The Digital Transformation Playbook — Rethink your Business for the Digital Age (Columbia Business School Publishing),2016.
- Westerman, G; Bonnet, D; and McAfee, A; Leading Digital: Turning Technology into Business Transformation; Harvard Business Review Press, 2014.
- Srinivasan. J, and Suresh. J, Cloud Computing: A Practical Approach for learning and implementation, Pearson Publication, 2014

IV SEMESTER ELECTIVES
SYSTEMS

ES-401	BIG DATA ANALYTICS	100	4	0	0	3

COURSE OBJECTIVES : Understand the Big Data Platform and its Use cases • Provide an overview of Apache Hadoop • Provide HDFS Concepts and Interfacing with HDFS • Understand Map Reduce Jobs • Provide hands on Hodoop Eco System • Apply analytics on Structured, Unstructured Data. • Exposure to Data Analytics with R.

Unit I

Introduction to Big Data: Big Data-definition, Characteristics of Big Data (Volume, Variety,Velocity, Veracity, Validity), Importance of Big Data , Patterns for Big Data Development, Data in the Warehouse and Data in Hadoop [Zikopoulos] - Introduction to Hadoop**:** Hadoop- definition, Understanding distributed systems and Hadoop,Comparing SQL databases and Hadoop, Understanding MapReduce, Counting words with Hadoop—running your first program, History of Hadoop, Starting Hadoop - The building blocks of Hadoop, NameNode, DataNode, Secondary NameNode, JobTracker and Task Tracker.

Unir II

HDFS: Components of Hadoop -Working with files in HDFS, Anatomy of a MapReduceprogram, Reading and writing the Hadoop Distributed File system -The Design of HDFS, HDFS Concepts, The Command-Line Interface, Hadoop Filesystem, The Java Interface, Data Flow, Parallel Copying with distcp, Hadoop Archives. Hadoop I/O: Compression—Serialization-- Avro and File-Based Data structures.

Unit III

MapReduce Programming: Writing basic Map Reduce programs - Getting the patent data set,constructing the basic template of a Map Reduce program, Counting things, Adapting for Hadoop's API changes, Streaming in Hadoop. MapReduce Advanced Programming: Advanced MapReduce - Chaining Map Reduce jobs,joining data from different sources.

Unit IV

Hadoop Eco System --User Defined Functions-- Data Processing operators. Hive : Hive Shell-- Hive Services-- Hive Metastore-- Comparison with Traditional Databases—HiveQL-- Tables, Querying Data and User Defined Functions. Hbase : HBasics—Concepts—Clients—Example-- Hbase Versus RDBMS. Big SQL : Introduction

Unit V

Graph Representation in MapReduce: Modeling data and solving problems with graphs,Shortest Path Algorithm, Friends-of-Friends Algorithm, PageRank Algorithm, BloomFilters. Data Analytics with R Machine Learning : Introduction, Supervised Learning, Unsupervised Learning, Collaborative Filtering. Big Data Analytics with BigR.

References

1. Tom White " Hadoop: The Definitive Guide" Third Edit on, O'reily Media, 2012.
2. Seema Acharya, Subhasini Chellappan, "Big Data Analytics" Wiley 2015.
3. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.
4. Jay Liebowitz, "Big Data and Business Analytics" Auerbach Publications, CRC press (2013)
5. Tom Plunkett, Mark Hornick, "Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R Enterprise and Oracle R Connector for Hadoop", McGraw-Hill/Osborne Media (2013), Oracle press.
6. Anand Rajaraman and Jef rey David Ulman, "Mining of Massive Datasets", Cambridge University Press, 2012.
7. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley & sons, 2012.
8. Glen J. Myat, "Making Sense of Data", John Wiley & Sons, 2007
9. Pete Warden, "Big Data Glossary", O'Reily, 2011.
10. Michael Mineli, Michele Chambers, Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley Publications, 2013.

11. ArvindSathi, “BigDataAnalytics: Disruptive Technologies for Changing the Game”, MC Press, 2012
12. Paul Zikopoulos ,Dirk DeRoos , Krishnan Parasuraman , Thomas Deutsch , James Giles , David Corigan , "Harness the Power of Big Data The IBM Big Data Platform ", Tata McGraw Hill Publications, 2012.

ES-402	ENTERPRISE RESOURCE PLANNING	100	4	0	0	3

Course Objectives:

COB 1: To help in understanding basic concepts in ERP.
COB 2: To help in understanding the importance of ERP.
COB 3: To help in analyzing the effects of ERP on business.

Course Outcomes:
At the end of this course students will be able to:

CO 1: Describe the meaning of ERP.
CO 2: Explain the importance of ERP Implementation.
CO 3: Distinguish Pre ERP implementation and post ERP implementation.
CO 4: Compare ERP System Options and Selection Methods.
CO 5: Research on ERP present and future.

UNIT- I:
Introduction to ERP: Overview of ERP – Introduction and Evaluation –advanced ERP-SCM and CRM systems and related technologies – ERP life cycle ERP implementation Life cycle- SDLC and ERP life cycle.

UNIT-II:
ERP Implementation: reasons for ERP failure. pre – implementation Tasks – Implementation methodologies – Process definition - Dealing with employee resistance Training and Education – Project management and monitoring Success and failure factors of an ERP implementation.

UNIT-III:
Post ERP implementation: Change Management – post implementation review, support, maintenance and security of ERP. Different business modules of an ERP package. ERP market place and market place dynamics.

UNIT-IV:
ERP System Options and Selection Methods: Optimal Means of Developing an ERP, Measurement of Project Impact, IT Selection and Project Approval, ERP proposal Evaluation, Project Evaluation Techniques, Testing.

UNIT--V:
ERP present and future: Turbo charge the ERP system- EAI – ERP. Internet and WWW- Future Directions and trends in ERP – Future Directions in ERP: New Markets, New Technologies, Faster Implementation Methodologies, New Business Segments, Trends in Security.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

References:

1. Singla: “Enterprise Resource Planning”, Cengage Learning, New Delhi, 2013.
2. Alexleon: “Enterprise Resource Planning”, TMH, New Delhi, 2011.
3. Mahadeo Jaiswal, Ganesh Vanapalli: “Enterprise Resource Planning”, MacMillon, New Delhi, 2013.
4. N.Venkateswaran: “Enterprise Resource Planning”, SCITECH Publiscation, New Delhi, 2009.
5. S.Kesharwani, SBodduluri, M Ashok Kumar: “Enterprise Resource Planning”, Paramount Publishing House, New Delhi, 2012.

ES-403	CYBER LAWS & SECURITY	100	4	0	0	3

Course Objectives:

COB 1: To help in understanding basic concepts in cyber security.
COB 2: To help in understanding the importance of Secure System Planning and Administration
COB 3: To help in analysing the effects of Secure System Planning and administration.

Course Outcomes:
At the end of this course students will be able to:

CO 1: Describe the meaning and concepts of cyber security.
CO 2: Explain the importance of Secure System Planning and administration.
CO 3: Distinguish Information security policies and procedures in organizations.
CO 4: Compare and contrast the practical applications of Information security systems.
CO 5: Research on Organizational and Human Security.

UNIT-I:
Introduction to Computer Security: Definition, Threats to security, Government requirements, Information Protection and Access Controls, Computer security efforts, Standards, Computer Security mandates and legislation, Privacy considerations, International security activity.

UNIT-II:
Secure System Planning and administration: Introduction to the orange book, Security policy requirements, accountability, assurance and documentation requirements, Network Security, The Red book and Government network evaluations.

UNIT-III:
Information security policies and procedures: Corporate policies- Tier 1, Tier 2 and Tier3 policies - process management-planning and preparation-developing policies-asset classification policy-developing standards.

UNIT-IV:
Information security: fundamentals-Employee responsibilities- information classification Information handling- Tools of information security- Information processing-secure program administration.

UNIT-V:
Organizational and Human Security: Adoption of Information Security Management Standards, Human Factors in Security- Role of information security professionals.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

Reference Books:

1. Debby Russell and Sr. G.T Gangemi, "Computer Security Basics (Paperback)", 2nd Edition, O' Reilly Media, 2006.
2. Thomas R. Peltier, "Information Security policies and procedures: A Practitioner's Reference", 2nd Edition Prentice Hall, 2004.
3. Kenneth J. Knapp, "Cyber Security and Global Information Assurance: Threat Analysis and Response Solutions", IGI Global, 2009.
4. Thomas R Peltier, Justin Peltier and John blackley, "Information

Security Fundamentals", 2nd Edition, Prentice Hall, 1996.
5. Jonathan Rosenoer, "Cyber law: the Law of the Internet", Springer-verlag, 1997.

ES-404	INFORMATION SYSTEMS AUDIT	100	4	0	0	3

Course Objectives:

COB 1: To help in understanding basic concepts in Information Systems Audit.
COB 2: To help in understanding the importance of Information and systems audit.
COB 3: To help in analyzing the effects of Information Systems and Audit.

Course Outcomes:
At the end of this course students will be able to:

CO 1: Describe the meaning and concepts of Information System Auditing.
CO 2: Explain the importance of Management Control Framework.
CO 3: Distinguish Management Control Framework required for establishing effective controls.
CO 4: Compare and contrast Evidence Evaluation systems.
CO 5: Research corporate governance issues in Indian context.

UNIT-I:
Overview of Information System Auditing: Effect of Computers on Internal Controls, Effects of Computers on Auditing, Foundations of information Systems Auditing, Conducting an Information Systems Audit.

UNIT-II:
The Management Control Framework-I: Introduction, Evaluation the Planning Function, Leading Function and Controlling Function, Systems Development - Management Controls, Approaches to Auditing Systems Development , Normative Models of the Systems Development Process, Evaluating the Major phases in the Systems Development Process, Programming Management Controls, Data Resource Management Controls.

UNIT-III:
The Management Control Framework-II: Security Management Controls, Operations Management Controls Quality Assurance Management Controls- Case Studies.

UNIT-IV:
Evidence Collection: Audit Software, Code Review, Test Data, and Code Comparison, Concurrent Auditing techniques, Interviews, Questionnaires, and Control Flowcharts. Performance Management tools- Case Studies.

UNIT-V:
Evidence Evaluation: Evaluating Asset Safeguarding and Data Integrity, Evaluating System Effectiveness, Evaluating System Efficiency. Information Systems Audit and Management: Managing the Information Systems Audit Function,

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

Reference Books:
1. Ron Weber: "Information Systems Control and Audit", Pearson Education, 2013.
2. D P Dube: Information System Audit and Assurance, TMH, New Delhi, 2008.

ES- 405	ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING	100	4	0	0	3

UNIT I

What is Artificial Intelligence (AI)---Definitions, The Foundations of AI, The History of AI, Agents and Environments, The Concept of Rationality, The Nature of Environments, The Structure of Agents, Problem Solving Agents, Example Problems, Searching for Solutions, Uninformed Search Strategies: Breadth First, Depth First, Depth Limited; Informed Search Strategies: Greedy Best First, A*Algorithms

UNIT II

Convolution Neural Networks -- Image classification -- Text classification -- Image classification and hyper-parameter tuning -- Emerging NN architectures -- Recurrent Neural Networks -- Building recurrent Neural Networks-- Long Short-Term Memory -- Time Series Forecasting. - Deep Learning -- Auto-encoders and unsupervised learning -- Stacked auto-encoders and semi-supervised learning-- Regularization - Dropout and Batch normalization.

UNIT III

Foundations for Machine Learning(ML)-- ML Techniques overview -- Validation Techniques (Cross-Validations)-- Feature Reduction/Dimensionality reduction -- Principal components analysis (Eigen values, Eigen vectors, Orthogonality). - Clustering -- Distance measures -- Different clustering methods (Distance, Density, Hierarchical) -- Iterative distance-based clustering-- Dealing with continuous,--categorical values in K-Means--Constructing a hierarchical cluster-- K-Medoids-- k-Mode and density-based clustering -- Measures of quality of clustering

UNIT IV

Classification Naïve Bayes Classifier -- Model Assumptions--Probability eestimation -- Required data processing -- M-estimates-- Feature selection--Mutual information --Classifier K-Nearest Neighbors -- Computational geometry-- Voronoi Diagrams-- Delaunay Triangulations -- K-Nearest Neighbor algorithm-- Wilson editing and triangulations -- Aspects to consider while designing K-Nearest Neighbor Support Vector Machines --Linear learning machines and Kernel space--Making Kernels and working in feature space-- SVM for classification and regression problems. Decision Trees -- ID4--C4.5-- CART ---Ensembles methods -- Bagging & boosting and its impact on bias and variance -- C5.0 boosting -- Random forest -- Gradient Boosting Machines and XGBoost.

UNIT V

Association Rule mining-- The applications of Association Rule Mining: Market Basket-- Recommendation Engines, etc.-- A mathematical model for association analysis-- Large item sets-- Association Rules -- Apriori-- Constructs large item sets with mini sup by iterations-- Interestingness of discovered association rules-- Application examples-- Association analysis vs. classification -- FP-trees. - Machine Learning Applications across Industries---Healthcare—Retail--Financial Services—Manufacturing—Hospitality--Cloud Based ML Offerings--Top 10 AI Startups---Flashcards (Tips, Tricks, Definitions)

References:

1. Artificial Intelligence: A Modern Approach. Stuart Russell, Peter Norvig, Pearson Education 2nd Edition.
2. Expert Systems : Principles and Programming. Joseph C Giarratano, Gary D Riley Thomson Publication, 4th Edition.

1. Elaine Rich and Kevin Knight: Artificial Intelligence , Tata McGraw Hill.
2. Dan W.Patterson, Introduction to Artificial Intelligence and Expert Systems, PrenticeHall of India.
3. David W Rolston: Principles of Artificial Intelligence and Expert System Development, McGraw Hill

EO- 301	SERVICE OPERATIONS MANAGEMENT	100	4	0	0	3

UNIT-I:
Introduction – Goods Vs. Services – Definition of Services – Nature and characteristics of services – Classification of services – Services in Manufacturing Sector – The service-process matrix – Service Strategy – Competitive Service Strategies – Strategic Service Vision Globalization of Services: Service Management in the International Arena.

UNIT-II:
Service Strategy and Competitiveness: Positioning and Marketing of Services -Technology and Its Impact on Services and Their Management - Design and Development of Services and Service Delivery Systems. Service Design: Introduction – New service design and development – Design elements – Service system design and delivery process: Classification of Service Processes, Process Structure – Technology in Services – Product/Service Life Cycle on Performance Objectives.

UNIT III
Service Quality: Defining Service Quality – Measuring Service Quality: SERVQUAL – Quality Service by Design – Service process control – Quality philosophy and performance excellence – Total Quality Management (TQM) tools: Seven Quality Control (QC) tools

UNIT-IV
Service Facility: Service Facility Design – Service facility layout: Types, Process Analysis – Facility Location: Decision, Classification, Techniques - Human Resource Development for Services. - Locating Facilities and Designing their Layout. - Service Quality and Continuous Improvement.

UNIT-V:
Managing Demand And Capacity: Managing Demand and Supply in Services- Forecasting Demand – Forecasting methods: Subjective or qualitative, Quantitative – Service Capacity: Factors, Elements Strategies – Service Inventory Management - Service Productivity and Measurement of Performance. - Management of Public and Private Non-profit Service Organizations.- Forecasting for Services.

Text books:

1. B. Fitzsimmons, James A., and Mona J. Fitzsimmons, Service Management: Operations, Strategy, and Information Technology, 6th Ed., Irwin/McGraw-Hill, 2008.

References:

2. **Cengiz Haksever, Barry Render, Roberta S. Russell & Robert G. Murdick,** Service Management and Operations, Pearson – Prentice Hall.
3. C. Haksever, Render B., Russel S. R. and Murdick R. G., Service Management and Operations, 2nd Ed., Prentice Hall, 2007.
4. 2. Robert Johnston, Graham Clark. Service Operations Management: Improving Service Delivery, Prentice Hall, 2012.

EO- 302	QUALITY TOOLKIT FOR MANAGERS	100	4	0	0	3

UNIT I

Introduction: Evolution of Quality – Quality Definition and Contributions by Deming, Juran, Crosby, Feiganbaum, Ishikawa and Taguchi – Definition of quality management – Quality management Framework – Barriers or Obstacles for implementation of quality management – Cost of Quality

UNIT II

Quality Management Systems: Introduction – Benefits of ISO Registration – ISO 9000 series of Standards – ISO 9001 Requirements – Implementation – Documentation – Writing the Documents – Quality Auditing

UNIT III

Statistical Process Control: Introduction – Pareto Analysis – Cause and Effect Diagram – Checklist or Checksheet – Process Flow Chart – His gram – Scatter Diagram – Statistical Fundamentals such as Mean and Standard deviation – Chance and Assignable Causes – Control Charts for Variables – Process Capability Analysis such as C_p and C_{pk}– Control Charts for Attributes.

UNIT IV

Tools And Techniques: Plan-Do-Check-Act (PDCA) Cycle – Quality Circles – Seven Management tools – Benchmarking – Quality Function Deployment (QFD) – Failure Mode and Effect Analysis (FMEA) – Taguchi Method

UNIT V

SIX SIGMA: Evolution – TQM vs. Six Sigma – What is Six Sigma – Six Sigma methodologies Such as DMAIC, DFSS – Six Sigma Belts.

TEXT BOOKS

1. Besterfiled, et al., Total Quality Management, Pearson Education Asia, 3rd Edition, 2006.
2. Suganthi, L. and Samuel, A., Total Quality Management, Prentice Hall (India) Pvt. Ltd.

REFERENCE BOOKS

1. Evans, J.R. and Lindsay, W. M., The Management and Control of Quality, 6th Edition, South-Western (Thomson Learning), 2005.
2. Oakland, J.S., TQM – Text with Cases, Butterworth – Heinemann Ltd., Oxford, 3rd Edition, 2006.

EO- 303	Pricing and Revenue Management	100	4	0	0	3

UNIT I

Pricing and Revenue management: introduction, objectives, scope of pricing and revenue management – Role of Revenue Management – multiple customers management in revenue management.

UNIT II

Pricing and Revenue management in Perishable management: concept of perishable goods – pricing methods of perishable goods - identify the cost- competition and consumer components of pricing – pricing as a component of the marketing mix -

UNIT III

Revenue management in the seasonal demand: concept – objectives- methods of demand forecasting for seasonal demand – price determination under seasonal demand - management of seasonal demand flections and measures to control demand and price fluctuations.

UNIT IV

Pricing and revenue management in service industry: concept of services – type of services – objectives- role and functions of services industry – Technical matching of demand and supply – pricing strategies in hotels, flights, overseas shipping, rental cars and transportation providers - customer value based pricing - the psychological foundations of pricing - value and use of pricing in a broader sense – Dynamic pricing.

UNIT V

Revenue management for bulk and spot customers: concept of bulk customers – role of bulk customers in business promotion – pricing management and pricing strategies for bulk customers – demand and supply – pricing in long and short term contracts – pricing in bulk contracts – spot market pricing.

Reference:

1. David Walters. Operations Strategy, Palgrave Macmillan Publisher, 2015.
2. JA Van Mieghem and Gad Allon. Operations Strategy: Practices and Principles, Dynamic Ideas LLC 2nd edition, 2015.
3. Kotlar, Philip, Marketing Management, Prentice Hall, New Delhi.
4. McCarthy, E.J., Basic Marketing: A managerial approach, Irwin, New York.

EO- 304	OPERATIONS STRATEGY	100	4	0	0	3

UNIT I

Introduction – Strategy: Definition, Levels – Operations and Strategy – Operations Management Vs. Operations Strategy – Four perspectives on Operations Strategy – Decision areas: Structural and Infrastructural – The Process of Operations Strategy

UNIT II

Performance objectives: Introduction – Quality: Hard, Soft – Speed: Time – Dependability: Time – Flexibility: Type –Internal and external benefits – The Operations Strategy Matrix – Performance Objectives and Competitive Factors – Product/Service Life Cycle on Performance Objectives.

UNIT III

New approaches: Total Quality Management (TQM): Fit into Operations Strategy – Lean Manufacturing: Fit into Operations Strategy – Business Process Reengineering (BPR): Fit into Operations Strategy – Six Sigma: Fit into Operations Strategy.

UNIT IV

Decision areas – I: Capacity Strategy: Levels of capacity decision, Factors influencing the overall level of capacity, Location of capacity – Purchasing and Supply Strategy: Supply Networks, Do (Make) or Buy? the vertical integration decision.

UNIT V

Decision areas – II Process Technology Strategy: Classification, Three dimensions of process technology – Improvement Strategy: Breakthrough Improvement and Continuous Improvement, The Importance – Performance Matrix.

TEXT BOOKS:

1. Nigel Slack, Michael Lewis, Mohita Gangwar Sharma. Operations Strategy, Pearson Education Limited, England, 5th edition, 2018.

REFERENCE BOOKS:

1. David Walters. Operations Strategy, Palgrave Macmillan Publisher, 2015.
2. JA Van Mieghem and Gad Allon. Operations Strategy: Practices and Principles, Dynamic Ideas LLC 2nd edition, 2015.

EO- 305	SALES AND OPERATIONS PLANNING	100	4	0	0	3

Unit- I

Sales Management and Organisation: Objectives and sales management , sales executive as a coordinator , sales management and control , sales organisation - it's purpose , setting up a sales organisation , types of sales organisation – sales and operational planning: Introduction to Sales and operations planning - Purpose of sales and operations plans - Decision context - Sales and operations planning as a process - Overview of decision support tools

Unit -II

Personal Selling: Objectives and theories of personal selling , analysing market potential, sales potential and sales forecasting method & evaluation , determining sales related marketing policies - product policies, distribution policies & pricing policies .

Unit- III

Planning and control systems for manufacturers - Materials requirement planning - Drum – buffer – Rope system – Scheduling - Scheduling service and manufacturing processes - Scheduling customer demand - Scheduling employees - Operations scheduling. Sales Operations: Sales budget , sales territories , sales Quata's , control of sales , sales meeting and sales contest, organising display , showroom and exihibitions.

Unit- IV

Salesmanship: Sales manager- Qualities and functions , types of salesman , prospecting , pre-approach & approach , selling sequence , psychology of customers. Capacity Planning – Measurement of Capacity: KPIs (Efficiency and Utilization) – Aggregate Production Planning (APP): Model, Techniques – Multi Attribute Decision Making (MADM) – Analytic Hierarchy Process

Unit-V

Sales force Management: Recruitment & selection, training , formulation & conduction of sales training programme, motivation of sales personnel , compensation of sales personnel , evaluation and supervision of sales personnel .

Reference:

1. Robert Penn Burrows, Lora Cecere, Gregory P. Hackett, The Market-Driven Supply Chain: A Revolutionary Model for Sales and Operations Planning in the New On-Demand Economy, AMACOM Div American Mgmt Assn, 2011.
2. Still , Cundiff & Govani Sales management & Cases
3. McMurry & Arnold How to build a dynamic Sales Organisation
4. Pradhan , Jakate & Mali Elements of Salesmanship and Publicity
5. Anderson R Professional Sales Management
6. F.L. Lobo Successful Selling

EO- 401	BEHAVIORAL OPERATIONS MANAGEMENT	100	4	0	0	3

UNIT I

Behavioural Operations Management – Definition – The study of Behavioural Operations – History and the Contemporary Knowledge Base – Virtuous Cycles of Experimental Learning

UNIT II

Production and Service Contexts – I: Synch and Swim: Managing and Mismanaging Process Constraints and Variability – Process and Perception: Kristen's Cookie Company from a Behavioral Point of View

UNIT III

Production and Service Contexts – II:The Wait or Buy Game: How to Game the System That's Designed to Game You Back – Sharing the Load: Group Behavior and Insights into Simulating Real-World Dynamics.

UNIT IV

Supply Chains: Sharing the Risk: Understanding Risk – Sharing Contracts from the Supplier's Perspective – Supply Chain Negotiator: A Game of Gains, Losses, and Equity.

UNIT V

Integrative/Enabling Technology: Dynamic Pricing in Revenue Management – Intertemporal choices in Project based organisations – Impulsiveness and Emotions – Behaviour Assessment Test on Conflict Management – Kicking the mean Habit – A chain of hands.

TEXT BOOKS:

1. Elliot Bendoly, Wout van Wezel, and Daniel G. Bachrach, The Handbook of Behavioral Operations Management, Oxford University Press, 2015.
2. Christoph H. Loch, Yaozhong Wu, Behavioral Operations Management, Now Publishers Inc, 2007.

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EO- 402	THEORY OF CONSTRAINTS	100	4	0	0	3

Unit I. Introduction to Theory of Constraints

Unit II. TOC Thinking Tools: Current Reality Tree and Core Conflicts -- Conflict Clouds -- Negative Branch Reservations -- Prerequisite Tree -- Categories of Legitimate Reservation -- Layers of Resistance

Unit III. TOC applications in Production/Operations -- Concepts of Drum—Buffer-- Rope -- Simplified Drum Buffer Rope -- Drum Buffer Rope -- Use of Simulator to explain DBR

Unit IV. TOC applications in Distribution -- Replenishment Model

Unit V. TOC applications in Finance and Measurements -- Throughput Accounting

Unit VI TOC applications in Project management -- Critical Chain

References

1.Theory of Constraints by Eliyahu M Goldratt
2.Theory of Constraints Handbook by John G Schleler

EO- 403	MANAGEMENT OF MANUFACTURING SYSTEMS	100	4	0	0	3

UNIT I

Management of Manufacturing Systems: An Overview – Manufacturing Systems: Type – Challenges – Evolution of Manufacturing Systems – Nine laws in Manufacturing – Various methodologies.

UNIT II

Cellular Manufacturing Systems: Principle – Group Technology (GT) – Cellular Manufacturing Systems – Layout – Cell Design: formation, operator allocation, sequencing and scheduling – Part Classification and Coding – Production flow analysis.

UNIT III

Just-in-time: Evolution of Just-In-Time – Principle – Seven wastes – Just-In-Time (JIT) – Kanban or Pull System – CONWIP – Tools and Techniques.

UNIT IV

Synchronous manufacturing: Synchronous Manufacturing or Theory of Constraints – Principle – Definition of Goal by Goldratt – Role of a constraint – Types of resources: bottlenecks and capacity constrained resource – Drum Buffer Rope System.

UNIT V

Flexible Manufacturing Systems (FMS): Concept of Flexible Manufacturing System (MS) – Flexibility – Types: Single machine cell, Flexible manufacturing cell, Flexible manufacturing system – Components – Applications – Benefits – Implementation issues.

TEXT BOOKS:

1. Mikell P. Groover, Automation, Production Systems and Computer-Integrated Manufacturing, Pearson Education; Fourth edition, 2016.
2. Richard J. Schonberger, World Class Manufacturing, Free Press Publication, 2008.
3. Feld, W. M., Lean Manufacturing Tools, Techniques and How Use Them, St. Lucie Press, Florida, 2000.

REFERENCE BOOKS:

1. Richard J. Schonberger, World Class Manufacturing: The Next Decade: Building Power, Strength, and Value, Free Press Publication, 2013.
2. R.P.Mohanty & S.G.Deshmukh, Advanced operations management, Pearson education (Singapore) P.Ltd

EO- 404	SOURCING MANAGEMENT	100	4	0	0	3

UNIT I

Introduction of Sourcing – Sourcing management: Concept, Functions, Application – Supplier Evaluation and Selection (Concepts): Supplier Rating – Rating criteria – Factors.

UNIT II

Global sourcing: Introduction to Global Sourcing – Trends in Global Sourcing – Global Sourcing – Negotiation – Performance Measurement and Evaluation (Concepts and Metalcraft Case)

UNIT III

Supply Chain: The Role of Sourcing – Components – Key Process – Outsource: Various Mechanism – Third-party logistics (3PL): Service.

UNIT IV

Analytical tools: Analytical Tools in Sourcing (Total Cost of Ownership (Wire Harness case), Pricing Analyses - (Plastic Shield case)) – Analytical Tools in Sourcing (Foreign Exchange Currency Management, Learning Curve, Quantity Discount Models) – Integrative Pacific Systems Case (Supplier Scorecard, Sourcing Risk, Supplier Financial Analysis).

UNIT V

Risks & Trends: Sourcing Risk Management (Concepts) – Electronic Sourcing – Sustainability and Sourcing (Green Sourcing; Walmart-China Case)

TEXT BOOKS:

1. Sunil Chopra and Peter Meindi, Supply Chain Management – Strategy Planning and Operation, Pearson Education, Third Indian Reprint, 2004.
2. Monczka et al., Purchasing and Supply Chain Management, Thomson Learning, Second edition, Second Reprint, 2002.

REFERENCE BOOKS:

1. Lee J. krajewski and Larry P.Ritzman, 2007, Operations Management strategy and analysis, 9th Edition, Pearson Eduction / Prenctice Hall of India, 2007.
2. Altekar Rahul V, Supply Chain Management – Concept and cases, Prentice Hall India, 2005.
3. Olivier Bruel, Strategic Sourcing Management: Structural and Operational Decision-making Kogan Page; 1 edition, 2016.

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EO- 405	SUPPLY CHAIN ANALYTICS	100	4	0	0	3

UNIT I

Introduction – Overview on Supply Chain, Analytics and Supply Chain Analytics – Dashboards with relevant KPIs for Supply Chain – Optimization – Classification of optimization problems – Optimization for Analytics – Operations Research Techniques for Analytics.

UNIT II

Location and Layout: Plant/Warehousing Decisions – Location Methods – Location Models – Network Models – Layout Methods – Line Balancing: KPIs (Cycle time, Idle time) – Inventory Management

UNIT III

Total Quality Management: Introduction – Statistical Quality Control (SQC) – Statistical Process Control (SPC) – Pareto Analysis – Histogram – Scatter Diagram – Control Charts – Process Capability Analysis: KPIs (C_p and Cpk)

UNIT IV

Planning & Multi Attribute Decision Making: Capacity Planning – Measurement of Capacity: KPIs (Efficiency and Utilization) – Aggregate Production Planning (APP): Model, Techniques – Multi Attribute Decision Making (MADM) – Analytic Hierarchy Process.

UNIT V

Simulation & DOE: Introduction to simulation – Type: Discrete and Continuous simulation – Simulation models – Steps in Simulation study – Simulation for Analytics – Experimental Designs (Taguchi, RSD, Mixture Design).

TEXT BOOKS:

1. James R. Evans., Business Analytics – Methods, Models and Decisions, Pearson Publications, 1st Edition, 2012.
2. G.V.Shenoy,U.K.Srivastava,S.C.Sharma, Operations Research for Management, New Age International,Revised 2nd Ed, 2005.

REFERENCE BOOKS:

3. Gerad Feigin, Supply Chain planning and analytics – The right product in the right place at the right time, Business Expert Press, 2011
4. Peter Bolstorff, Robert G. Rosenbaum, Supply Chain Excellence: A Handbook for Dramatic Improvement Using the SCOR Model, AMACOM Div American Mgmt Assn, 2007
5. Robert Penn Burrows, Lora Cecere, Gregory P. Hackett, The Market-Driven Supply Chain: A Revolutionary Model for Sales and Operations Planning in the New On-Demand Economy, AMACOM Div American Mgmt Assn, 2011

TRAVEL AND TOURISM MANAGEMENT
III SEMESTER

ET-301	**Travel Agency and Tour Operations**	**100**	**4**	**0**	**0**	**3**

Objective: To understand the significance of travel agency and tour operation business, the current trends and practices in the tourism and travel trade sector and to develop adequate knowledge and skills applicable to travel industry.

UNIT-I Travel Trade: Historical Perspectives: Emergence of Thomas Cook- Cox and Kings- American Express Company, Types of Tour & Types of Tour Operators: Full Service AgencyCommercial Agency-Implant Agency-Group / Incentive Agency, Wholesale and Retail Travel Agency Business: Linkages and Integration with the Principal Service Providers, Changing Scenario of Travel Trade.

UNIT-II Travel Agency and Tour Operation Business: Functions of Travel Agency - Setting Up A Full-Fledged Travel Agency - Sources of Income of A Travel Agency - Diversification of Business - Travel Insurance, Forex- Cargo- MICE – Documentation, Recognition: IATA Accreditation - Recognition from Government.

UNIT-III Itinerary Planning & Development: Tour Itinerary: Types of Itinerary - Resources and Steps for Itinerary Planning - Do's and Don'ts of Itinerary Preparation, Tour Formulation and Designing Process :FITs & Group Tour Planning and Components - Special Interest Tours (SITs).

UNIT-IV Tour Packaging & Costing: Tour Packaging: Classifications of Tour Packages - Components of Package Tours, Concept of Costing: Types of Costs - Components of Tour Cost - Preparation of Cost Sheet, Tour Pricing: Calculation of Tour Price - Pricing Strategies - Tour Packages of Thomas Cook, SOTC, MakeMyTrip and Cox & Kings.

UNIT-V Travel trade Organizations: Objectives, Activities and Functions of UFTAA, PATA, TAAI, IATO, ASTA, ATOI, ADTOI, IAAI, TAFI.

Suggested Readings:

1. Bhatia, A.K. (2013). The Business of Travel Agency and Tour Operations Management. New Delhi: Sterling Publishers (P) Ltd.
2. Goeldner, R., & Ritchie, B. (2010). Tourism, Principles, Practices and Philosophies. London: John Wiley & Sons.
3. Negi, J. (2005). Travel Agency Operations: Concepts and Principles. New Delhi: Kanishka.
4. Negi, K.S. (2011). Travel Agency Management. New Delhi: Wisdom Press.
5. Roday, S., Biwal, A., & Joshi, V. (2009). Tourism Operations and Management. New Delhi: Oxford University Press.
6. Swain, S.K. & Mishra, J.M. (2011). Tourism Principles and Practices. New Delhi: OUP.

ET-302	HOSPITALITY MANAGEMENT	100	4	0	0	3

Objective: To study the flow of activities and functions in today's Hotel operation, familiarize with Hotel and resort management and to establish the importance of various departments and its role in the Hospitality Industry.

UNIT-I Introduction to Hospitality Industry: Distinctive Characteristics: Inflexibility Intangibility-, Perishability - Fixed Location- Relatively Large Financial Investment etc.; Concepts of "Atithi Devo Bhavah"; Hotel and Lodging facilities; Types of Hotels; Classification of Hotels, Chain Operations, Alternative Accommodation; E- Hospitality; Ethical and Regulatory Aspects in a Hotel, International Hotel Regulations, Fiscal and Non-Fiscal Incentives Offered to Hotel Industry in India.

UNIT- II Front Office : Duties and Responsibilities: Reservation & Registration- Meal Plans Room Assignments- Check-in- Departure- Handling Guest Mail- Message Handling- Guest Paging Methods of Payment; Guest Services: Type of Hotel Guests- Types of Meal Plans Wake-up call.

UNIT- III Housekeeping: Hierarchy, Duties & Responsibilities of Housekeeping Staff; Important Functions of Housekeeping Management; Types of Accommodation; Activities in Accommodation Management: Room Service- Room supplies- Types of Room- Types of Bedding and Other Related Types of Service; Liaison with Other Departments.

UNIT- IV Food & Beverage : Hierarchy, Duties & Responsibilities of Staff; Food Production Organization: Kitchen-Buffets-Beverages Operation &Functions; Outlets of F & B; Types of Restaurant Menu; Catering Services: Food Service for the Airlines- BanquetteCorporate- MICE-Retail Food Market- Business/Industrial Food Service- Healthcare Food Service- Club Food Services; Trends in Lodging and Food Services.

UNIT-V Evaluating Hotel Performance: Methods of Measuring Hotel Performance: Occupancy Ratio- Average Daily Rate: Average Room Rate Per Guest- Rev PAR- Market Share Index-Evaluation of Hotel by Guest; Yield Management: Elements of Yield Management, Measuring Yield in the Hotel Industry, Benefits of Yield Management, Challenges or Problems in Yield Management.

Suggested Readings:

1. Negi, J. (2014). Professional Hotel Management. New Delhi: S. Chand.
2. Raghubalan, G., & Smritee, R. (2015). Hotel Housekeeping operations and Management. New Delhi: Oxford University Press.
3. Negi, J. (1984) .Hotels for Tourism Development: Economic Planning & Financial Management. New Delhi: S. Chand.
4. Tewari, J.R. (2016). Hotel front office operations and Management. New Delhi: Oxford publication. 5. Wood, R.C. (2013). Key Concepts of Hospitality Management. London: SAGE Publications, London.

ET-303	**RESORT PLANNING AND DESTINATION MANAGEMENT**	**100**	**4**	**0**	**0**	**3**

Objective: To study the flow of activities and functions in today's Resort operation and to familiarize with Destination Management.

Unit – l: Resort: Concept, Evaluation. Scope, Trends and development - Roles of Resorts in Tourism and Hospitality, Nature of Demand of Resort - Deferent Types of Resorts- Product, Functional specifications - Strategy and organizational structures.

Unit – II: Resort Planning: Location, Feasibility analysis, Architecture, Macro & Micro business environment. The five phases of Resort planning and development - Economic analysis of Resort operation and Forecasting.

Unit – III: Impact analysis of Resorts: Social Impact, the economic impact, physical and environmental.

Unit – IV: Development of destination - Principles of destination development - Concerns for destination planning - Stages in destination designing and management.

Unit – V: Cultural tourism product: designing, development, issues and considerations - Religious tourism product: designing, development, issues and considerations - Heritage tourism product: designing, development, issues and considerations.

Suggested Readings:

1. Gee Chuck Y., Resort Development and Management
2. Stipnauk, David M. and Roffman, Harold, Facilities Management
3. Lawson , Hotels and Resorts: Planning, Design and Refurbishment

ET-304	TOURISM POLICY AND PLANNING	100	4	0	0	3

Objective: To comprehend the conceptual dimensions and policies of tourism industry and to understand the dynamics of tourism businesses and its impacts.

Unit – I: Concept, need, objective, institutional framework and the principal lines of public tourism policy- Role of govt. public and private sector in formulation of tourism policy - Roles of international, national, state and local tourism organizations in carrying out tourism policies.

Unit – II: Goal of national administration and tourism policy - Policy making bodies and its process at national levels - Outline of L.K.Jha Committee (Ad-hoc Committee) - 1963, National Tourism Policy -1982, National Committee Report-1998, National Action Plan on Tourism - 1992.

Unit – III: National Tourism Policy-2002 - Opportunities for investments in hotel sector & Tourism related organizations - Incentives and concessions extended for tourism projects and resources of funding.

Unit – IV: Background, Approach and Process, Techniques of Plan Formulation - Planning for Tourism Destinations-Objectives, methods, steps and factors influencing planning -Destination life cycle concept.

Unit – V: Tourism planning at international, national, regional, state and local, the traditional, approach and PASLOP method of tourism planning - Important feature of five year tourism plans in India - Elements Agents, Processes and typologies of tourism development.

Suggested Readings:

1. Bezbarua M.P, Indian Tourism Beyond The Millenium
2. Burkart & Medlik, Tourism; Past, Present and Future
3. Gee, Chuck Y, James C. Makens , Dexter J. L. & Choy, The Travel Industry
4. Murphy, Peter H, Tourism: A Community Approach

ET-305	RECREATION MANAGEMENT	100	4	0	0	3

Objective: To understand the dynamics of recreation products and their significance for tourism industry.

Unit – I Evolution of Transport Systems, Importance of Transport in Tourism, Major transport systems – rail, road, water transport.

Unit - II Air transport and its evolution, present policies and regulations pertaining to airlines, limitations of weights and capacities.Function of ICAO, DGCA, IATA, AAI. Evolution of Civil Aviation in India.

Unit – III Surface Transport System, Approved Transit Transport, Document connected with Road Transport, RTO, Recreational Vehicles, Road Taxies Fitness Certificates. Major Highways across India and abroad.

Unit – IV Rail Transport System, Major Railway System of world, Amtrak, Eurail, Brit Rail, Indian Railways. Past, Present, Future Tourist Trains, viz Palace on wheels, Royal Orient, Himalayan Queen. Facilities offered by Indian Railways. International Luxury trains : The Orient Express , Trans Siberian railway.

Unit – V Water Transport System, Historical Past, Cruise ship, River Canal boats. Future prospects and growth of Water Transport in India.

Suggested Readings:

1.Transport for tourism: Stephen Page
2.Tourism system : Mill, R.C. and Morrison

TRAVEL AND TOURISM MANAEMENT
MBA IV SEMSESTER

ET-401	**TRAVEL MEDIA AND JOURNALISM**	**100**	**4**	**0**	**0**	**3**

Objective: To provide basic understanding about Travel Journalism and its role in tourism promotion, practical know-how on travel writing and the dynamics of making travelogues and to expose the students to the nitty-gritty's of travel blogging and E-documentation of tourism destinations.

UNIT-I Introduction to Travel Writing: Articles and Short Pieces of Travel Writing, Magazines, Travel Newsletters, Short Pieces for Books – Travel journalism and the Internet - Researching and Approaching Markets -Travel Books : Guide Books, Accommodation Guides, Business Travel Guides, Coffee Table Books, Autobiographical Tales, Anthologies-FAM Tour & Press trips.

UNIT-II Electronic Media and Documentation of Destinations: Methodical approaches in the coverage of travel and transport, events, hospitality and special-interest tourism resources - Nature of media coverage: webcast and telecast –Travel Blogs- Script writing for travel programs - Identifying points for visual support - Conducting interviews - Virtual tourism Preparation of travel footage.

UNIT -III Researching Topics: Sources of Information - Research on the Internet - Researching on the spot - Organizing research material-The importance of specializing.

UNIT-IV Developing Ideas for Travel Articles: Journey Pieces, Activity Pieces, Special Interest Pieces, Side-trips, Reviews - Ideas from own travel experiences - Ideas from other sources.

UNIT-V How to portray the experiences: Using the Senses- Practical Tips; Choosing the Right Words, Verbs, Adjectives and Phrases, And Usages- Illustrations - The Practicality of Taking Photographs, Non-Photographic Illustrations.

Suggested Readings:

1. Arvaham, E. & Ketter, E. (2008), Media Strategies for Marketing Places in Crisis, UK: Elsevier.
2. Brunt. P (1997), Market Research in Travel and Tourism, UK: Butterworth and Heinemann.
3. Bryan Pirolli. (2016). Travel Journalism. London: Taylor and Francis.
4. Clark, R.M., Wood, R.C.(1998), Researching and Writing Dissertations in Hospitality and Tourism, UK.
5. Greenman, J. F. (2012). Introduction of Travel Journalism. New York: Peter Lag.
6. Macdonald, J. (2000). Travel Writing, London: Robert Hale.
7. Neilson, C. (2001), Tourism and the Media: Tourist Decision Making, Information and Communication, Melbourne: Hospitality Press.
8. Neilson, C. (2001). Tourism and the Media: Tourist Decision Making, Information and Communication, Melbourne: Hospitality Press.
9. Reijnders, S. (2016). Places of the Imagination Media, Tourism, Culture. London: Routledge.

ET-402	EVENT MANAGEMENT	100	4	0	0	3

Objective: To enrich the level of knowledge about management of different types events and different aspects, functions of events and To help the students understand different aspects and functions of events; and to provide sufficient opportunities to use knowledge and skill in event business.

UNIT – I Event Business: Types of Events - Size of Events - Five C's of Event Management - Trends of Event Business - Scope of Event Business - Roles and Functions of Event Manager - Attributes of Technical Staff - Preparation of Operation Manual - Developing Record Keeping Systems.

UNIT – II Selection of Event Site: Layouts and Designs - Site Map or Plan-Audiovisual - Lighting and Sound - Special Effects and Video - Event Technology, Event Laws & Regulations - Permissions Required for Holding An Event: Police Permissions - Traffic Police, Ambulance, Fire Brigade and Municipal Corporation- Indian Performing Rights Society (IPRS) - Performing License - Entertainment Tax - Permissions for Open Ground Events - License for Serving Liquor - Waste Management & Green Certification.

UNIT – III Planning and Scheduling Events: Managing Events - Corporate Events - Trade Shows and Exhibitions - Events in Educational Institutions - Budgeting of MICE - Use of Budget Preparation - Estimating Fixed and Variable Costs - Cash Flow - Sponsorship and Subsides -Ethical Behavioral Practices in MICE industry.

UNIT – IV Bidding for Events: Events Theme- Color, Decor, Focal Points, Fabrics, Furnishing, Lighting, Audio visual - Event Logistics: Security, Transport, Parking, Accommodation, Special Needs and Disabled Requirements.

UNIT – V Logistics: Procedures - Performance Standards - Event Networks and Supply Chain - Handling Vendors and Service Contractors - Negotiating With Vendors and Service Contractors.

Suggested Readings:

1. Fenich, G.G. (2014). Production and Logistics in Meeting, Expositions, Events and Conventions. Edinburgh: Pearson.
2. Robincon, P., Wale, D., & Dickson, G. (2010). Events Management 'Ed'. London: CABI.
3. Editorial Data Group USA (2018). Exhibition & Conference Organizers United States: Market Sales in the United States Kindle Edition.
4. Johnson, N. (2014). Event Planning Tips: The Straight Scoop on How to Run a Successful Event (Event Planning, Event Planning Book, Event Planning Business). MCJ Publishing. Kindle Edition.
5. Mittal, S. (2017). Event Management: Ultimate Guide to Successful Meetings, Corporate Events, Conferences, Management & Marketing for Successful Events: Become an event planning pro & create a successful event series. Alex Genadinik Publication. Kindle Edition.

ET-403	FRONT OFFICE MANAGEMENT	100	4	0	0	3

Objective: To study the flow of activities and functions in today's Hotel operation, familiarize with Hotel and resort management; and to establish the importance of front office in various hotels.

Unit – I: Introduction to Hotel and Lodging facilities; Types of Hotels; Classification of Hotels, Chain Operations, Alternative Accommodation; E- Hospitality; Ethical and Regulatory Aspects in a Hotel, International Hotel Regulations, Fiscal and Non-Fiscal Incentives Offered to Hotel Industry in India

Unit – II: Front Office Organization: Basic Layout and Design, Departmental Organizational Structure. Front Office Personnel: Departmental Hierarchy. Attitude and Attributes and Salesmanship. Job Descriptions and Job Specifications of Front Office Personnel.

Unit – III: Front Office Operations: The Front Desk- Equipments in use. The Guest Room- Types and Status Terminology. Key Controls. Tariff plans. Types of rates.

Unit – IV: Reservations: Need for reservations, definitions, importance of reservations. Types of reservations. Sources and modes of reservations. Individual and group bookings. Booking instruments - Booking diary, Conventional charts, A & D register etc. The Reservation Cycle. Hotel Reservation Systems, CRS, Inter-sell agencies, Internet applications.

Unit – V: Franchise and management contracts. Indian Chain of Hotels. Target Markets. Alternate Lodging facilities.

Suggested Readings:

1. Negi, J. (2014). Professional Hotel Management. New Delhi: S. Chand.
2. Raghubalan, G., & Smritee, R. (2015). Hotel Housekeeping operations and Management. New Delhi: Oxford University Press.
3. Negi, J. (1984) .Hotels for Tourism Development: Economic Planning & Financial Management. New Delhi: S. Chand.
4. Tewari, J.R. (2016). Hotel front office operations and Management. New Delhi: Oxford publication.
5. Wood, R.C. (2013). Key Concepts of Hospitality Management. London: SAGE Publications, London.

ET-404	**INFORMATION TECHNOLOGY AND TOURISM**	**100**	**4**	**0**	**0**	**3**

Objective: To familiarize with information technology and tourism business concept and acquaint with E-commerce and E-business and its strategies

Unit – l: Understanding the Hardware: Bit and related measuring terms, I/O and storage devices; components of desktop; buying a computer Lab; demonstrate on open computer and explain its components.

Unit – Il: Operating systems: Basic functions and types of an operating systems; comparative illustrations from popular operating systems.

Unit – Ill: Communication and Protocols; working knowledge of Internet protocols; application of electronic communication tools in business; collaborative tools.

Unit – IV: Understanding database basic terminology; types of databases Lab; creating and relating tables in a microdatabase; basic queries for data analysis; import / export of data in different formats; link with other products like word processors, database, spreadsheets etc.

Unit – V: Electronic commerce-Overview-Business to Government, Business to consumers, Business to business, consumers to consumers, online Stock trading & Market Features, Capabilities and Limitations.

Suggested Readings:

1. Laudon, K.C & Laudon, Jane P.management Information System
2. Kishore, Swapna and Naik Rajesh, SQL for Professional
3. Anderson, Virginia, Access 2002-the complete reference.

ET-405	ECO TOURISM PRACTICES	100	4	0	0	3

Objective: To comprehend the theories and practices of ecotourism and understand the problems of sustainable development, ecotourism and identify solutions.

UNIT-I Fundamentals of Ecology: Ecotourism-Evolution, Principles, Trends and Functions of Ecotourism- Environmentalism, sustainable development-Pollution-Ecological Foot Prints.

UNIT-II Tourism & Ecology: Mass Tourism Vs Ecotourism-Typology of Eco-tourists-Ecotourism Activities & Impacts-Quebec Declaration 2002 - Kyoto Protocol 1997- Ecotourism and globalization.

UNIT-III Ecotourism Policies, Planning: Carrying Capacity - Alternative Tourism-Responsible Ecotourism- Community Participation - Types of Participation - Ecotourism Projects - Case Studies on Periyar National Park, Thenmala Eco-Project, Similipal Ecotourism Project - Nandadevi Biosphere Reserve - Gulf of Mannar - Kruger National Park, South Africa.

UNIT -IV Sustainable Development- Evolution - Principles, Major Dimensions of Sustainability- 10 R's-Stockholm Conference 1972 - Brundtland Commission – The Rio Declaration 1992 - World Conference on Sustainable Tourism 1995 - WSSD 2002, The Cape Town Declarations.

UNIT-V Global Warming & Climate Change: Eco-friendly Practices - Role of International Ecotourism Society - UNWTO, WWF, UNDP - Department of Forest and Environment - Government of India- ATREE- EQUATIONS.

Suggested Readings:

1. Ballantyne, R. and Packer, J. (2013). International Handbook on Ecotourism. United Kingdom: Edward Elgar Publishing Ltd.
2. Fennel, D. A. (2002), Ecotourism Policy and Planning. USA: CABI Publishing.
3. Fennell, D.A. (2008). Ecotourism Third Edition. New York: Routledge Publication.
4. Goodwin, H. (2011). Taking Responsibility for Tourism. Woodeaton: Goodfellow Publishers Limited.
5. Honey. (2008). Ecotourism and Sustainable Development: Who Owns Paradise? 2nd Edition. Washington, DC: Island Press.
6. Strange, T., and Bayley, A. (2008). Sustainable Development. Linking Economy, Society, Environment. Paris: OECD.
7. Tiwari, S.K., & Upadhyay, R.K. (2017). Conservation of Degraded Wetland System of Keoladeo National Park, Bharatpur, India. Ecological Complexity, pp74- 89.
8. Weaver, D. (2001). The Encyclopedia of Ecotourism. London: CABI Publication.

HEALTH CARE AND HOSPITAL MANAGEMENT

MBA III SEMESTER

EHC-301	**HOSPITAL ORGANIZATION AND MANAGEMENT**	**100**	**4**	**0**	**0**	**3**

Objective: To familiarize the students with the basic concepts and principles of management, organization and leadership on hospitals.

Unit-1: Role of a professional manager in a Hospital: concept of management – evolution of management thought – significance of hospital management – role and importance of hospital management – Responsibilities of an Hospital Manager – The transition factors of hospital management.

Unit-II: Managerial function in a hospital: Management process, managerial skills, levels of management, application of managerial functions in hospital. Decision making models in hospital – steps in decision making – techniques and process of decision making – overcoming barriers to effective decision making.

Unit-III: Behavioural concepts and theories: cognitive process, perception and its stages, creativity and problem solving. Process of motivation – Theories of motivation – Motivating medical and paramedical professionals. Leadership styles and influence process – features and importance of leadership – Leadership styles – Successful VS Effective leader.

Unit-IV: Organization structure and planning process: Introduction – nature and structure of the hospital organization – formal and informal organizations – factors influencing the choice of structure – Line and Staff relationship – Desigining structure for a service organization. Strategic and operational planning – Planning practices in Indian hospitals. Controlling – process of control and methods of control.

Unit-V: Organizational climate and social responsibility: Meaning, need, significance of organizational climate – distinction between culture and climate. Need, nature and causes of organizational change – management of change in hospitals. Social responsibilities of hospital management – objectives – responsibilities of hospital manager.

Suggested Readings:

1. Koontz & Weirich, Essentials of Management, Tata McGraw Hill Publishing Company, New Delhi.

2. Stoner, Freeman & Gilbert, Management, PHI, 6th Edition.

3. Robbins.S.P., Fundamentals of Management, Pearson, 2003.

4. Robbins.S. Organisational Behaviour, X edn., Prentice-Hall, India.

5. Umasekaran, Organisational Behaviour.

6. VSP Rao, V Hari Krishna – Management: Text and Cases, Excel Books, I Edition, 2004

EHC-302	HEALTH CARE POLICIES AND DELIVERY SYSTEM	100	4	0	0	3

Objective: To understand the importance of health care policies and to be acquainted with the disaster and safety, delivery system.

UNIT I Introduction – Theoretical frame work – Environment – Internal and External – Environmental scanning – Economic Environment – Competitive Environment – natural Environment – Politico Legal Environment – socio Cultural Environment- International and Technological Environment.

UNIT II A Conceptual Approach to Understanding the Health Care Systems – Evolution – Institutional Settings – Out Patient services – Medical Services – surgical Services – Operating Department – Pediatric services – Dental services – Psychiatric services – casualty & Emergency services – Hospital Laboratory services – Anesthesia services – Obstetric and Gynecology services – Neuro – Surgery service – Neurology services.

UNIT III Overview of Health care sector in India – Primary care – Secondary care – Tertiary care – Rural Medical care – urban medical care – curative care – preventive care – General & special Hospitals – Understanding the hospital management – Role of medical, Nursing staff, Paramedical and Supporting Staff – Health Policy – Population Policy – Drug Policy – Medical Education Policy.

UNIT IV Health Care Regulation – WHO, International Health Regulations,IMA, MCI, State Medical Council Bodies, Health universities and Teaching Hospitals and other Health care Delivery Systems.

UNIT V Epidemiology – Aims – Principles – Descriptive, Analytical and Experimental Epidemology – Methods – Uses.

Suggested Readings:

1. A & Lee, K., Economics of Health, OUP, Oxford, 1983.
2. Liz Haggard, Sarah Hosking, Healing the Hospital Environment: Design, Maintenance, and Management of Healthcare Premises
3. Park JE, Park K., Textbook of preventive and social medicine, 20th edition, Banarsidas Bhanot Publishers. 2009

4. S.L GOEL, Healthcare Management and Administration, Deep & Deep publications Pvt.Ltd., New Delhi.

EHC-303	**HEALTH ECONOMICS**	**100**	**4**	**0**	**0**	**3**

Objective: It is intended to provide an in-depth knowledge about the sources of funds and its effective utilization to achieve a better quality of health care services within a reasonable cost.

Unit I: Introduction of Economics Nature of Economics Analysis - – functioning of Economic systems – Circular flow and interdependence of Economic activity – Basic Economic concepts – scarcity – Opportunity cost – Discounting principle – Concept of marginal Utility – Demand – Supply and Elasticity – Relevance of Economics to health and medical care.

Unit II: Demand Analysis and Production Function Utility analysis – Nature of Demand and determinants – law of demand – Elasticity of Demand – Supply Curves – Cost Concepts and Cost Analysis. Production function – production with one variable input. Law of variable proportion: production with two variable inputs: production isoquant: isocost lines. Estimating production functions: cost concepts and break even analysis.

Unit III: Health Determinants Unique Nature of Health – Health as a Consumer and investment Good – Valuation of Health – Externalities in Health care – Economic Evaluation in Healthcare.

Unit IV: Market Analysis Market Configuration – price determination under different marker conditions- nature and Characteristics of Health care markets – Demand for supply of health care services – Market failure and Government intervention and control.

Unit V: Health care Finances and Trends Health care indicators – Health policies -Health care expenditure – Financing of Health care, Allocations under 5 year plans – National Rural Health Machine (NRHM) – Human Development indices. .Public Health in India: Public health challenges, cost concern, consumer empowerment, fostering experimentation in the health sector. New delivery and financing models, policy reform and entrepreneurial ventures, innovation in health delivery organization.

Suggested Readings:

1. Dwivedi D.N, Micro Economic Theory, Vikas publications, New Delhi 1996
2. James Henderson , Health Economics and policy – South Western College publishing
3. Paul S, Reading in Economics, Tata McGraw Hill
4. Rexford E Santerre , Health Economics Dryden Publishers, Florida (USA) 2000
5. Mills.A.& Lee, k., Economics of Health, OUP Oxford, 1983
6. UNDP, Human Development report, OUP, Newyork
7. Peter Zweible , Health Economics, Oxford university Press, Oxford
8. V Raman Kutty, A Premier of Health Systems Economics, Allies Publication Ltd. New Delhi.
9. H.S.Rout&P.K.Panda, Health Economics in india, New Century Publications, New Delhi

EHC-304	HOSPITAL FUNCTIONS AND SUPPORT SERVICES	100	4	0	0	3

Objective: To get familiarised with support service systems and to get acquainted with hazards and its management in hospital environment.

UNIT I Nutrition and Dietary services – Pharmacy services – Medical Records services.

UNIT II Facilities Engineering – Maintenance of Civil Assets – Electrical supply and Water supply – Medical gas pipeline – Plumbing and Sanitation – Air conditioning system – Hot water and Steam supply – Communication Systems –Biomedical engineering departments in modern hospitals.

UNIT III Laundry services – House keeping services – CSSD-Energy conservation methods – AMC.

UNIT IV Ambulance services – Mortuary services – Hospital security services.

UNIT V Disaster management – Fire hazards – Engineering Hazards – Radiological hazards.- Outsourcing of Support services –Waste disposal and management.

Suggested Readings:

G.D.Kunders, Hospital and Facilities Planning and Design
Jacob Kline, Hand book of Bio-Medical Engineering
Webster J.G and Albert M. Coo, Clinical Engineering Principles and Practices
Antony Kelly, Maintenance Planning and Control

EHC-305	REVENUE CYCLE MANAGEMENT	100	4	0	0	3

Objective: to manage the administrative and clinical functions associated with claims processing, payment, and revenue generation. The process encompasses the identification, management, and collection of patient service revenue.

UNIT I Meaning and scope of patient care services – significance of patient care – role of administration in patient care – classification of Hospital – Role and functions of Administrator in hospitals.

UNIT II Front office services – outpatient services – inpatient services – Accident and Emergency services – Billing services – other services

UNIT III Lab services – Radiology and Imaging services – Rehabilitation services – Blood bank services – Telemedicine

UNIT IV Operation theatre – Intensive care units – Hospital acquired infections – Sterilization – Nursing services – Ward Management

UNIT V Concept of quality – Quality control – Quality assurance – ISO 9000 standards – Total Quality Management – Accreditation – NABL – JCAHQ – Quality manual – Medical tourism

Suggested Readings:

Management process in Health care - S.Srinivasan

Hospital Department Profiles - Gold Berry A.J

HEALTH CARE AND HOSPITAL MANAGEMENT
MBA IV SEMESTER

EHC-401	**PATIENT CARE AND SERVICES MANAGEMENT**	**100**	**4**	**0**	**0**	**3**

Objective: To understand the importance of patient care management and acquainted with the disaster, safety and Security Management in Hospitals.

UNIT I Patient centric management - Concept of patient care, Patient-centric management, Organization of hospital departments, Roles of departments/managers in enhancing care, Patient counseling & Practical examples of patient centric management in hospitals-Patient safety and patient risk management.

UNIT II Quality in patient care management-Defining quality, Systems approach towards quality, Towards a quality framework, Key theories and concepts, Models for quality improvement & Variations in practice

UNIT III Patient classification systems and the role of casemix-Why do we need to classify patients, Types of patient classification systems, ICD 9 (CM, PM), Casemix classification systems, DRG, HBG, ARDRG, Casemix innovations and Patient empowering classification systems.

UNIT IV Medical ethics & auditory procedures-Ethical principles, Civic rights, Consumer Protection Act, Patient complaints powers & procedures of the district forum, State and National commission, Patient appeals, Autopsy, Tort liability, Vicarious liability, Medical negligence, Central & state laws, Use of investigational drugs, Introduction/need & procedures for medical audit, Audit administration & Regulating committees-Confidentiality and professional secrecy, ethics of trust and ethics of rights – autonomy and informed consent, under trading of patient rights – universal accessibility – equity and social justice, human dignity

UNIT V Disaster preparedness-Policies & procedures for general safety, fire safety procedure for evacuation, disaster plan and crisis management . Policies & procedures for maintaining medical records, e-records, legal aspects of medical records, its safety, preservation and storage.

Suggested Readings: Goel S L & Kumar R. HOSPITAL CORE SERVICES: HOSPITAL ADMINISTRATION OF THE 21ST CENTURY 2004 ed., Deep Deep Publications Pvt Ltd: New Delhi

Gupta S & Kant S. Hospital & Health Care Administration: Appraisal and Referral Treatise 1998 ed., Jaypee, New Delhi

EHC-402	**MANAGED HEALTH CARE AND INSURANCE**	**100**	**4**	**0**	**0**	**3**

Objective: The student is expected to understand the nuances of insurance and in particular the health insurance.

Unit I Introduction – Economics of life and health insurance – importance, socio political realities insurance terminology.

Unit II Health policy vis-à-vis health insurance policies – Indian scenario - Different products – Demand and Scope – Limitations.

Unit III Administration of health insurance schemes like CGHS and ESI and Social security measures. TPAs, Governing mechanisms including IRDA.

Unit IV Health insurance Taxation. Standardization and grading of hospital services, Role of vigilance and real time information about the services.

Unit V Health insurance providers – Government and private – micro insurance, the role and responsibilities of provider – insurer – Patient and the Regulatory Agencies.

Suggested Readings:

Gupta, P.K, Insurance and Risk Management, Himalaya Publishing house,2004

EHC-403	HEALTH LAWS, ETHICS AND REGULATIONS	100	4	0	0	3

Objective: To get acquainted with the legal provision and issues related to health care, to familiarise with the medical terminologies and to understand the ethical issues in health care system.

UNIT I Laws relating to Hospital formation: Promotion-Forming society-The Companies Act-Law of Partnership-A Sample Constitution for the Hospital-The Tamil Nadu Clinics Act – Medical Ethics.

UNIT II Laws relating Purchases and funding: Law of contracts-Law of Insurance-Export Import Policy- FEMA-Exemption of Income Tax for Donations-Tax Obligations: Filing Returns and Deductions at Source. Laws pertaining to Health: Central Births and Deaths Registration Act, 1969- Recent amendments – Medical Termination of Pregnancy Act, 1971 – Infant Milk Substitutes, Feeding Bottles and Infant Food Act, 1992.

UNIT III Laws pertaining to Hospitals: Transplantation of Human Organs Act, 1994 – Pre-natal Diagnostic Techniques (Regulation and Prevention of Misuse) Act, 1994 – Medical Negligence – Medico Legal Case – Dying Declaration-MCI act on medical education. The Biomedical Waste (Management and Handling) Rules-Radiation Safety System.

UNIT IV Medical Terminology- Glossary of medical terms: major Diseases and medical specialties-Roots, Prefixes, Suffixes, Abbreviations and symbols-Common roots: element referring to, usage and definition-Common prefixes and suffixes-Common abbreviations: departments, time, general healthcare, routes of medication and laboratory-Symbols.

UNIT V Illness- Classification and description of diseases-Infection Control- Medical asepsis, Nosocomial infection and communicable diseases, Reservoir, carrier and mode of transmission-Overview of Hospital Services -Intensive care unit – Coronary care Unit – Burns, paraplegic & Malignant disease treatment – Hospital welfare services – Hospital standing services – Indian red cross society – Nursing services- Pharmacy – Medical Stores – Housekeeping – Ward Management – Central sterile supply department-Medical Records – Fatal documents – Medical Registers – Statutory records.

Suggested Readings:

BM Sakharkar, Principles of Hospital Administration and Planning, Jaypee brothers Publications.

Francis CM,Mario C de Souza ; Hospital Administration – Jaypee brothers Medical Publishers.

EHC-404	HOSPITAL MANAGEMENT AND INFORMATION SYSTEMS	100	4	0	0	3

Objective: To understand the role of IT in hospital management and to familiarise with the latest developments in technology with relevance to hospitals.

Unit I The Information Explosion: Information is important – Impact on society – Impact on teaching and learning – Impact on Government – Impact on Healthcare – The future of healthcare technology – The future healthcare record – Preparing for the future – Summary. The world of Informatics.

Unit II The Electronic health record: Functions of the health record –Changing functions of the patients record – Advantages of the paper record – Disadvantages of the paper record – Optically scanned records – The electronic health record – Automating the paper record – Advantages of the EHR – Disadvantages of the EHR – Bedside or point-or-care systems – Human factors and the EHR – Roadblocks and challenges to EHR implementation –The future

Unit III Securing the Information: Privacy and confidentiality and Law – Who owns the data? – Security – Computer crime – Role of healthcare professionals – Summary. Information Systems cycle: The information systems cycle – Analysis – Design phase – Development – Implementation – Why some projects fails?

Unit IV Electronic Communications: A bit of history – Hardware and software for connecting – Methods of accessing information – World Wide Web (WEB) – Communication Technologies

Unit V Telehealth– Historical perspective on telehealth – Types of Technology – Clinical initiatives – Administrative initiatives – Advantages and Barriers of telehealth – Future trends – Summary- The future of Informatics: Globalization of Information Technology – Electronic communication – Knowledge management – Genomics – Advances in public health – Speech recognition – Wireless computing – Security – Telehealth – Informatics Education – Barriers to Information Technology implementation.

Suggested Readings: Kathleen M., Informatics for Healthcare Professional James O'Brien, Tat McGraw Hill,

Management Information System Peter Norton, Introduction to computer, Tata McGraw Hill

EHC-405	HEALTH ANALYTICS	100	4	0	0	3

Objective: the role of data analytics in quality and performance improvement efforts, the tools and techniques used for data analytics in health care organizations.

UNIT I: Quality Improvement and Data Analytics – Meaning – Drivers for health care transformation - Identify quality initiatives that have shaped the national health care landscape - Health care quality and value - background and evolution of quality and performance improvement - Quality improvement frameworks that utilize analytics .

UNIT II: Health Care Data as an Organizational Asset - Data information, knowledge and wisdom hierarchy- organizational asset - sources of health care data – challenges for quality and performance improvement - organizational approach for effective use of data analytics

UNIT III: Working with Data - information value chain - importance of data context and relevance to business processes - common data types - basic statistical terms - Recognize common patterns or distributions in statistics - distributions using numerical measures such as mean, median and standard deviation - common graphical representations of data including histograms, bar charts and scatterplots

UNIT IV; Data Analytics Tools and Techniques – Definitions - Process steps of data analytics and the tools - role of the data analyst - tools and techniques used to analyze and interpret healthcare data effectively - various types of databases and how they are structured - data warehouse concepts - enterprise data architecture in health care organizations.

UNIT V: Solve Problems- measures, metrics, and indicators- purpose and use of Key Performance Indicators (KPI's) - health care organizations use the IHI Triple Aim to prioritize performance goals - DMAIC problem-solving model and the tools and techniques used in each step of the process - Apply the DMAIC methodology to a health care issue.

Suggested Readings:

Trevor L. Strome (2013). Healthcare Analytics for Quality and Performance Improvement. John Wiley & Sons, Inc

AGRO BUSINESS

MBA III SEMESTER

EA-301	**AGRO MARKETING MANGEMENT**	**100**	**4**	**0**	**0**	**3**

Objective: The objective of this course is to give the students an understanding of concept, various policies, strategies and decisions relating to marketing that can be developed by agribusiness firms.

UNIT I Meaning and scope, agricultural marketing and economic development Agricultural market structure - meaning, components and dynamics of market structure; marketing strategy - meaning & significance, formulation of marketing strategy; agribusiness marketing environment, design of marketing mix, market segmentation and targeting, determinants of consumer's behaviour.

UNIT II Product management – Introduction - process and decisions, new product development - significance and classification of new product, stages and estimation of demand of new product; product life cycle.

UNIT III Product policies and practice for agribusiness - determinants of price, objectives of pricing policies and pricing methods.

UNIT IV Promotional management - advertising planning and execution; sales promotion; grading and standardization.

UNIT V Distribution management - storage and warehousing and transportation management for agricultural products; marketing agencies/intermediaries – role and functions; distribution channels involved in agribusiness.

Suggested Readings:

Acharya SS & Agarwal NL. 2004. Agricultural Marketing in lndia" 4th Ed. Oxford & lBH. Kohls RL & Uhj JN. 2005.

Marketing of Agricultural Products.gth Ed. Prentice Hall. Kotler P. 2002.

Marketing Management - Analysis, Planning, implementation and Control. Pearson Edu.

Krishnamacharyulu C & Ramakrishan L. 2002. Rural Marketing. Pearson Edu.

Ramaswamy VS & Nanakumari S. 2002. Marketing Management.2nd Ed. Mac Millan India.

EA-302	**AGRO BUSINESS AND RURAL GREEN MARKET**	**100**	**4**	**0**	**0**	**3**

Objective: To develop understanding regarding issues in rural markets like rnarketing environment, consumer behaviour, distribution channels, marketing strategies, etc.

UNIT I Concept and scope of rural green marketing, nature and characteristics of rural markets, potential of rural rnarkets in India, rural communication and distribution.

UNIT II Environmental factors - socio-cultural, economic, demographic, technological and other environmental factors affecting rural green marketing.

UNIT III Rural consumer's behaviour - behavior of rural consumers and farmers; buyer characteristics and buying behaviour; Rural v/s urban markets, customer relationship management, rural market research.

UNIT IV Rural green marketing strategy - Marketing of consumer durable and non-durable goods and services in the rural markets with special reference to product planning; product mix, pricing objective, pricing policy and pricing strategy, distribution strategy.

UNIT V promotion and communication strategy - Media planning, planning of distribution channels, and organizing personal selling in rural market in India, innovation in rural marketing.

Suggested Readings

Krishnamacharyulu C & Ramakrishan L. 2002. Rural Marketing. Pearson Edu.
Ramaswamy VS & Nanakumari S. 2006. Marketing Mandgement.3rd Ed. MacMillan Publ.
Singh AK & Pandey S. 2005. Rural Marketing. New Age' Singh Sukhpal.2004.
Rural Marketing. Vikas Publ. House

EA-303	AGRO BUSINESS ENVIRONMENT	100	4	0	0	3

Objective: To expose learners to the environment in which the agri-business is conducted. Focus will be on understanding micro and macro environmental forces and their impact on agri-business.

UNIT I Role of agriculture in Indian economy; problems and policy changes relating to farm supplies, farm production, agro processing, agricultural marketing, agricultural finance etc. in the country.

UNIT II Structure of Agriculture - Linkages among sub-sectors of the Agro business sector; economic reforms and lndian agriculture; impact of liberalization, privatization and globalization on Agro business sector.

UNIT III Emerging trends in production, processing, marketing and exports; policy controls and regulations relating to the industrial sector with specific reference to agro-industries.

UNIT IV Agro business policies- concept and formulation; and new dimensions in Agro business environment and policy.

UNIT V Agricultural price and marketing policies; public distribution system and other policies.

Suggested Readings:

Adhikary M. 1986. Economic Environment of Business. S. Chand & Sons.
Aswathappa K. 1997. Essentials of Business Environment Himalaya Publ.
Francis Cherunilam 2003" Business Environment. Himalaya Publ.

EA-304	AGRO SUPPLY MANAGEMENT	100	4	0	0	3

Objective: The concepts and processes of agricultural supply chain management, framework for structuring supply chain drivers; network designs, demand forecasting, inventory planning, sourcing decisions and lT enablement of supply chain.

UNIT I Supply Chain: Changing Business Environment SCM: Present Need; Conceptual Model of Supply Chain Management; Evolution of SCM; SCM Approach; Traditional Agri. Supply Chain Management Approach; Modern Supply Chain Management Approach; Elements in SCM.

UNIT II Demand Management in Supply Chain: Types of Demand, Demand Planning and Forecasting; Operations Management in Supply Chain, Basic Principles of Manufacturing Management.

UNIT III Procurement Management in Agri. Supply chain: Purchasing Cycle, Types of Purchases, Contract/Corporate Farming, Classification of Purchases Goods or Services, Traditional Inventory Management, Material Requirements Planning, Just in Time (JlT), Vendor Managed Inventory (VMI).

UNIT IV Logistics Management: History and Evolution of Logistics; Elements of Logistics; Management; Distribution Management, Distribution Strategies; Pool Distribution; Transportation Management; Fleet Management Service innovation; Warehousing; Packaging for Logistics, Third-Party Logistics; GPS Technology.

UNITV Concept of Information Technology: lT Application in SCM; Advanced Planning and Scheduling; SCM in Electronic Business; Role of Knowledge in SCM; Performance Measurement and Controls in Agri. Supply Chain Management- Benchmarking: introduction, concept and forms of Benchmarking.

Suggested Readings:

Altekar RV. 2006. Supply Chain Management: Concepts and Cases. Prentice Hall of India. Fronczka R, Trent R & Handfield R. 2002. Purchasing and Supply Chain Management. Thomson Asia. van Weefe AJ. 2000. Purchasing and Supply Chain Management Analysis, Planning and Practice. Vikas Publ. House.

EA-305	**ENTREPRENEURSHIP FOR AGRICULTURE**	**100**	**4**	**0**	**0**	**3**

Objective: To expose the learner to the fields of entrepreneurship development focus will be to train the students to develop new projects and encouraging them to start their own ventures.

UNIT- I Entrepreneurship: Definition, concept, characteristics, Classes, Theories of Entrepreneurship - Significance of entrepreneurship in economic development qualities of entrepreneur.

Unit – II Entrepreneurial Process and Structure, Barriers to Enterprise, Sources of Innovative Opportunities, Marketing Research; Business Environment – Micro Environment, Macro Environment, Venture Feasibility – Technical, Marketing, Financial Feasibility, Starting new business or buy firms. Entrepreneurship in Agricultural Sector.

Unit – III Business strategy - concept - long term and short term focus; Business organization; Sources of Finance, Venture capital financing - concept, purpose and schemes, Capital Markets; Government Policies and Regulations for Agribusiness

UNIT- IV Entrepreneurship development programs and role of various institutions in developing entrepreneurship, life cycles of new business, environmental factors affecting success of a new business, reasons for the failure and visible problems for business

Unit – V Business Plan – Sources of Product, Pre-Feasibility Study, Criteria for selection of product, Ownership & Capital; Growth Strategies in business – Market penetration, Market expansion, Product Expansion, Diversification, Acquisition; Steps in Product launch.

Suggested Readings:

1. Dandekar, V. M. and Sharma, V. K., 2016, Agri-Business and Entrepreneurship Development. Manglam Publications, New Delhi.

2. Desai, V., 2006, Entrepreneurship Development, Project formulation, Appraisal & Financing for Small Industry. Himalaya Publications, New Delhi.

3. Hisrich, R. D. and Peters, M. P., 2002, Entrepreneurship, Tata McGraw Hill.

4. Kaplan, J. M. and Warren, A. C., 2013, Patterns of Entrepreneurship Management, John Wiley & Sons; 4th revised edition.

5. Nandan, H., 2007, Fundamentals of Entrepreneurship Management, Prentice Hall

AGRO BUSINESS

MBA IV SEMESTER

EA-401	**FOOD PROCESSING MANGEMENT**	**100**	**4**	**0**	**0**	**3**

Objective: To acquaint the students with different food processing techniques and their management.

UNIT I Present status of food industry in India; Organization in food industry; Introduction to operations of food industry; Deteriorative factors and hazards during processing, storage, handling and distribution.

UNIT II Basic principles of food processing and food preservation by manipulation of parameters and factors and application of energy, radiations, chemicals and biotechnological agents; Packaging of foods.

UNIT III Quality Management: TQCM (Total quality control management), control of raw materials, process and finished products, quality standards: BlS, PFA, HACCP, ISO etc", Food plant sanitation.

UNIT IV Analysis of costs in food organization; Risk management- Post Harvest process, losses and management for loss reduction, Management for value addition in food products, Laws and regulations related to food industry and food production and marketing; Quality management - quality standards, PFA, lSO, etc.

UNIT V Case studies on project formulation in various types of food industries - milk and dairy products, cereal milling, oil-seed and pulse milling, sugarcane milling, honey production, baking, confectionery, oil and fat processing, fruits and vegetable storage and handling, processing of fruits and vegetables, egg, poultry, fish and meat handling and processing, etc.

Suggested Readings:

Acharya SS & Aggarwal NL. 2004. Agriculturol Marketing in Indio. Oxford & lBH.

Earfy R. 1995. Guide to Quality Monogement Systems for Food lndustries.

Blackie. Jef en P. 1985. lntroduction to Food Processing. Reston Publishing.
Potly VH & Mulky MJ. 1993. Food Processing. Oxford & lBH

EA-402	**DISASTER MANAGEMENT**	**100**	**4**	**0**	**0**	**3**

Objective: To introduce learners to the key concepts and practices of natural disaster management; to equip them to conduct thorough assessment of hazards, and risks vulnerability; and capacity building.

UNIT I Natural Disasters- Meaning and nature of natural disasters, their types and effects. Floods, Drought, Cyclone, Earthquakes, Landslides, Avalanches, Volcanic eruptions, Heat and cold Waves, Climatic Change: Global warming, Sea Level rise, Ozone Depletion.

UNIT II Man Made Disasters- Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire. Oil fire, air pollution, water pollution, deforestation, Industrial wastewater pollution, road accidents, rail accidents, air accidents, sea accidents.

UNIT III Disaster Management- Efforts to mitigate natural disasters at national and global levels. International Strategy for Disaster reduction.

UNIT IV Concept of disaster management, national disaster management framework; financial arrangements; role of NGOs, Community based organizations, and media.

UNIT V Central, State, District and local Administration; Armed forces in Disaster response; Disaster response: Police and other organizations.

Suggested Readings

Gupta HK. 2003. Disaster Management. Indian National Science Academy. Orient Blackswan.
Hodgkinson PE and Stewart M. 1991. Coping with Catastrophe: A Handbook of Disaster Management. Routledge.
Sharma VK. 2001. Disaster Management. National Centre for Disaster Management, India.

EA-403	**FOOD RETAIL MANAGEMENT**	**100**	**4**	**0**	**0**	**3**

Objective: To assist students in understanding the structure and working of food marketing system in India, to examine how the system affects farmers, consumers and middlemen and to illustrate the response of this dynamic marketing system to technological, socio-cultural, political and economic forces over time.

UNIT I Introduction to International Food market, India's Competitive Position in World Food Trade, Foreign Investment in Global Food Industry, Retail management and Food Retailing, The Nature of Change in Retailing, Organized Retailing in India, E-tailing and Understanding food preference of Indian Consumer, Food consumption and Expenditure pattern, Demographic and Psychographic factors affecting Food Pattern of Indian Consumer.

UNIT II Value Chain in Food Retailing, Principal trends in food wholesaling and retailing, food wholesaling, food retailing, the changing nature of food stores, various retailing formats, competition and pricing in food retailing, market implications of new retail developments, value chain and value additions across the chain in food retail, food service marketing.

UNIT III 4 Ps in Food Retail Management, Brand Management in Retailing, Merchandise pricing, Pricing Strategies used in conventional and nonconventional food retailing, Public distribution system, Promotion mix for food retailing, Management of sales promotion and Publicity, Advertisement Strategies for food retailers.

UNIT IV Managing Retail Operations, Managing Retailers' Finances, Merchandise buying and handling, Merchandise Pricing, Logistics, procurement of Food products and Handling Transportation of Food Products.

UNIT V Retail Sales Management, Types of Retail Selling, Salesperson selection, Salesperson training, Evaluation and Monitoring, Customer Relationship Management, Managing Human Resources in retailing, Legal and Ethical issues in Retailing.

Suggested Readings

Berman and Evans. 2008. Retail Management: A Strategic Approach. 10th Ed. Prentice Hall of

India.
Cox. 2006. Retailing: An Introduction. 5th Ed. Pearson Edu.
Levy M and Weitz BW. 2004. Retailing Management. 5th Ed. McGraw Hill.

EA-404	**AGRO TECHNOLOGY MANAGEMENT**	**100**	**4**	**0**	**0**	**3**

Objective: To acquaint the students in latest advances in fertilizer technology management.

UNIT I Fertilizer development – concept, scope, need, resource availability; import and export avenues for fertilizer; types of fertilizers, grading and chemical composition, role of fertilizers in agricultural production, production and consumption of fertilizer in India.

UNIT II Raw material needed, technology and use of straight, complex, liquid and suspension fertilizers. Fertilizer use efficiency.

UNIT III Production efficiency and capacity utilization; quality control and legal aspects - fertilizer control order; Fertilizer pricing policy.

UNIT IV Field trials and demonstration. Importance of renewal wastes and their recycling; Scope of biofertilizer; environmental pollution due to fertilizer use.

UNIT V Testing facilities; constraints in fertilizer use and emerging scenario of fertilizer use; assessment of demand and supply of different fertilizers, fertilizer distribution, fertilizer storage.

Suggested Readings

Brady NC and Weil RR. 2002. The Nature and Properties of Soils. 13th Ed. Pearson Edu. Fertilizer Control Order (different years). Fertilizer Association of India, New Delhi.

Fertilizer Statistics (different years). Fertilizer Association of India, New Delhi Indian Journal of Fertilizers (different years).

Fertilizer Association of India, New Delhi. San Chilli V. 1960. Chemistry and Technology of Fertilizers. American Chemical Soc. Monograph Series. Reinhold Publ. Corp.

Tisdale SL, Nelson WL, Beaton JD and Havlin JL. 2002. Soil Fertility and Fertilizers. 5th Ed. Prentice Hall.

EA-405	**ORGANIC FOOD TECHNOLOGY**	**100**	**4**	**0**	**0**	**3**

Objective: to acquaint the students with different food processing techniques and their management.

UNIT I Present status of food industry in India; Organization in food industry; Introduction to operations of food industry; Deteriorative factors and hazards during processing, storage, handling and distribution.

UNIT II Basic principles of food processing and food preservation by manipulation of parameters and factors and application of energy, radiations, chemicals and biotechnological agents; Packaging of foods.

UNIT III Quality Management: TQCM (Total quality control management), control of raw materials, process and finished products, quality standards: BlS, PFA, HACCP, ISO etc", Food plant sanitation

UNIT IV Analysis of costs in food organization; Risk management; Laws and regulations related to food industry and food production and marketing; Quality management – quality standards, PFA, ISO, etc.

UNIT V Case studies on project formulation in various types of food industries –milk and dairy products, cereal milling, oil-seed and pulse milling, sugarcane milling, honey production, baking, confectionery, oil and fat processing, fruits and vegetable storage and handling, processing of fruits and vegetables, egg, poultry, fish and meat handling and processing, etc.

Suggested Readings

Acharya SS & Aggarwal NL. 2004. Agricultural Marketing in India. Oxford & IBH.

Early R. 1995. Guide to Quality Management Systems for Food Industries.

Blackie. Jelen P. 1985. Introduction to Food Processing. Reston Publishing.

Potly VH & Mulky MJ. 1993. Food Processing. Oxford & IBH

EL-301	**STORE KEEPING AND WAREHOUSING MANAGEMENT**	**100**	**4**	**0**	**0**	**3**

UNIT I

Objectives of Procurement System, Principles of Procurement, History of procurement function: from administrative to strategic, value added role, Procurement Cycle, Procurement Planning, Purchasing Mix: Six Rights, Selecting the right supplier, Source of information and process, Supplier appraisal/vendor capability, Bidding process.

UNIT-II

Introduction to Warehousing Concepts -Role of warehouse-types of warehouse- warehouse location- Need for warehousing- Supply chain trends affecting warehouse –Warehouse functions- Role of warehouse manager-Warehouse process: e-commerce warehouse- Receiving and put away- Warehouse process – pick up preparation-Receiving - Pre-receipt - In- handling - Preparation - offloading - Checking - Cross-docking - Quality control - Put-away - Pick preparation - Pick area layout – Picking strategies and equipment -order picking methods - Warehouse processes- Replenishment to dispatch- Value adding services - Indirect activities - Stock management - Stock or Inventory counting - Perpetual inventory counts - Security - Returns processing – Dispatch.

UNIT-III

Strorage Management system – Storage Inventory Management – Functions of storage & Inventory - Classification of Inventory- Methods of Controlling Stock Levels- Always Better Control (ABC) Inventory system- Warehouse Management Systems (WMS) - choosing a WMS- the process implementation-cloud computing- Warehouse layout-Data collection-space calculation-aisle width- finding additional space.

UNIT – IV

Storage and Warehousing Information system -Storage Equipment: storage option - shuttle technology - very high bay warehouse - warehouse handling equipment - vertical and horizontal movement - Automated Storage/ Retrieval System (AS/RS)-specialised equipment- Technical advancements- Resourcing a warehouse- warehouse costs- Types of cost - Return on Investment (ROI) - Charging for shared-user warehouse service - Logistics charging methods Warehousing Information System (WIS)- Performance management- outsourcing decisions.

UNIT – V

Material Handling and Warehouse safety Material handling- Product movement- concept- costs-product load activity—dispatch activityunload activity-control device-impact of the computer technologyautomatic identification-issues and trends in product transport—Packaging - Pallet - Stretch wraps - Cartons – Labeling- Health and safety- Risk assessment - Layout and design - Fire safety- Slips and trips – Manual handling - Working at height - Vehicles - Forklift trucks – Warehouse equipment legislation. Warehouse safety check list- Warehouse Environment-Energy production - - Product waste - waste disposal - Hazardous waste- Sustainable warehouse Management.

Text Books:

1. GWYNNE RICHARDS (2014) Warehouse Management: A Complete Guide to Improve Efficiency and Minimizing Cost in the Modern Warehouse. The Chartered Institute of Logistics and Transport, Kegan page limited.
2. DAVID E. MULCHY & JOACHIM SIDON (2008) A Supply Chain Logistics Program for Warehouse Management. Auerbachian Publications

References

1. Bowersox, D.J., Closs, D.J., Cooper, M.B., & Bowersox, J.C. (2013). Supply Chain Logistics Management. (4 th ed.), McGraw Hill/Irwin.
2. Arnold, J.R., Chapman, S.N. (2012). The Introduction to Materials Management. (7 th ed.), Prentice-Hall.
3. Coyle, J.J., Jr. Langley, C.J., Novack, R.A, & Gibson, B.J. (2013). Managing Supply Chains: A Logistics Approach. (9 th ed.), McGrawHill. Edward, F.(2002).
4. World-Class Warehousing and Material Handling. (International ed.), McGraw-Hill.
5. Muller, M. (2011). Essentials of Inventory Management. (2 nd ed.), American Management Association.

EL-302	**TRANSPORTATION AND INFRASTRUCTURE MANAGEMENT FOR SCM**	**100**	**4**	**0**	**0**	**3**

UNIT I

Basics of Transportation, Transportation Functionality and Principles; Multimodal Transport: Modal Characteristics; Modal Comparisons; International Air Cargo Transport; Coastal and Ocean transportation, Characteristics of shipping transport- Types of Ships. Containerization: Genesis, Concept, Classification, Benefits and Constraints; Inland Container Depot (ICD): Roles and Functions, CFS, Export Clearance at ICD; CONCOR; ICDs under CONCOR;

UNIT II

Logistics management and Supply Chain management - Definition, Evolution, Importance. The concepts of logistics and Supply Chain Management, Key Drivers of Supply Chain Management and Logistics relationships. Drivers of Supply Chain Performance : Framework for structuring drivers- Facilities- Inventory- Transportation- Information- Sourcing- Pricing - an over view of Designing distribution network – and overview of Network Design in the Supply Chain - an overview of Network design in Uncertain Environment.

UNIT III

Packing and Packaging: Meaning, Functions and Essentials of Packing and Packaging, Packing for Storage- Overseas Shipment- Inland-Transportation- Product content Protection, Packaging Types: Primary, Secondary and Tertiary- Requirements of Consumer Packaging, Channel Member Packaging and Transport Packaging - Shrink packaging –Identification codes, bar codes, and electronic data interchange (EDI)- Universal Product Code- GS1 Standards- package labels- Symbols used on packages and labels.

UNIT IV

Sourcing and Planning Transportation Networks in Supply Chain: Sourcing decision in supply chain : Role of sourcing – in-house or outsource – Third and Fourth – Party Logistics providers – Supplier scoring and assessment – Transportation in Supply Chain : role- modes- performance characteristics – Logistics - Design options- role of IT- risk – Trade–offs in transportation design.

UNIT V

Special Aspects of Export logistics: Picking, Packing, Vessel Booking [Less-than Container Load(LCL) / Full Container Load (FCL)], Customs, Documentation, Shipment, Delivery to distribution centers, distributors and lastly the retail outlets- Import Logistics: Documents Collection- Valuing- Bonded Warehousing- Customs Formalities- Clearing ,Distribution to Units.

References:

1. 1.Bowersox, Closs, Cooper, Supply Chain Logistics Management, McGraw Hill.
2. Burt, Dobbler, Starling, World Class Supply Management, TMH.
3. Donald J Bowersox, David J Closs, Logistical Management, TMH
4. Pierre David, “International Logistics”, Biztantra.
6. Sunil Chopra, Peter Meindl, Supply Chain Management ,Pearson Education, India.
5. Liu, J., Supply Chain Management and Transport Logistics, Routledge, 2011.
6. Sinha, A. and Kotzab, H., Supply Chain Management: A Managerial Approach, Tata McGraw-Hill Education, 2011.
7. Sople, V.V., Supply Chain Management: Text and Cases, Pearson, 2011.

EL-303	PURCHASING AND MATERIAL MANAGEMENT	100	4	0	0	3

UNIT I

The purchasing and supply process - Introduction to purchasing and SCM - Strategic supply management roles and responsibilities - Improving the procure to pay process - Approval, contract and purchase order preparation - Types of purchases - Purchasing policy and procedures -Policy overview - Purchasing policies Policy defining- Role and conduct of purchasing, Buyer-supplier Relationship, operational issues- Purchasing procedures.

UNIT II

Organizing the purchasing function: Purchase function position within the organization structure, factors affecting purchasing's position, reporting of purchasing function, organizing of purchasing, separating operational and strategic purchasing- advantages and disadvantages of centralized- decentralized purchasing, hybrid purchasing structure.

UNIT III

Concept of Integrated Materials Management (IMM) – Organising for IMM – Types of Inventories – Inventory Problems in India. Codification – Computerisation and Information Systems – Standardisation and Variety Reduction – Value Analysis: ABC, VED, XYZ and other methods of Selective Analysis.

UNIT-IV:

Q-Based Inventory System – P-Based Inventory System – S-S based Inventory System – Practical Inventory Models – Inventory Valuation.Purchasing – Source Selection – Vendor Rating – Purchase Budget – Systems – Tenders – Price Negotiations – Forward Buying – Purchasing Capital Equipments – Seasonal Goods – Special Items – Deferred Payment Schemes – Lending Institutions – Global Purchases – Government Buying – EGS & D – Rate Contract – Insurance – Legal Aspects in Purchasing – Evaluation of Purchase Performance.

UNIT-V:

Stores Layouts – Stores Accounting Procedures and Forms – Stock Verification – Practical Problems in Management of Dead Stocks – Surplus and Scraps – Evaluation of Stores Performance – Materials Handing and Transportation Management.

TEXT BOOKS:

1. Parasram, "In Coterms Exports Coartind and Pricing with Practical Guide to in Co-Terms, 1st Edition, Jain Book, 6th Edition, 2010.
2. Gopalakrishnan, P & Sundaresan, M: MATERIALS MANAGEMENT – AN INTEGRATED APPROACH; Prentice Hall of Indian Private Ltd.
3. Gopalakrishnan, P & Sandilya, M.S: INVENTORY MANAGEMENT – TEXT AND CASES; The Macmillan Company of India Ltd.

REFERENCES:

1. John Wiley, "Global Operations & Logistics:Text & Cases-Dornier", Pearson Education, 2nd Edition 2013.
2. David Simchi-Levi, "Designing & Managing Supply Chain-Concepts, Strategies", Tata-McGraw- Hill, 8th Edition, 2000.
3. Ammer, D.S, MATERIALS MANAGEMENT; Irwin.
4. Datta, A.K: MATERIALS MANAGEMENT – PROCEDURES, TEXT AND CASES; Prentice Hall of India Private Ltd.
5. Gokaran, P.R: ESSENTIALS OF MATERIALS MANAGEMENT; Somaiya Publications.
6. Menon,P.G: MATERIALS MANAGEMENT AND O.R. IN INDIA; M.M.J. Publication.

EL-304	REVERSE LOGISTICS	100	4	0	0	3

UNIT I

Reverse logistics and forward logistics Commercial logistics and the military Measuring reverse logistics and improvement Best practices of military reverse logistics Management of complex systems and reverse logistics. Successful management principles are successful reverse logistics principles Best practices in retail, apparel, electronics, food, beverage, and sporting goods.

UNIT II

Customer Service Returns RMA and other elements of returns Best practices in customer service and after sales customer support Reverse logistics concerns of the secondary market- Green reverse logistics practices Green buildings that support logistics (LEED Certification) Successful global projects

UNIT III

Explain and describe organizational culture and review how it applies to reserve logistics Review cultural design to support reverse logistics Reduction of risk in the reverse supply chain Securing the supply chain

UNIT IV

Understand reverse logistics for manufacturing Understand reverse logistics for food and beverage operations Understand reverse logistics for warehouse management Understand reverse logistics inventory management Understand reverse logistics as applied to product life cycle management.

UNIT V

Carbon Credits Carbon Footprint Logistics and reverse logistics as applied to carbon footprint What can you do to reduce your carbon footprint - Complexity theory Continuous improvement Lean principles New technologies for reverse logistics Communities and teams Future of revere logistics and supply chain management

Text books:

1. Joseph Sarkis, Yijie Dou. Green Supply Chain Management: A Concise Introduction, Routledge, 2017.
2. Charisios Achillas, Dionysis D. Bochtis, Dimitrios Aidonis, Dimitris Folinas. Green Supply Chain Management, Routledge, 2018.
3. Janat Shah, Supply Chain Management: Text and Cases, 2nd Edition 2017.
4. John Manners-Bell, Logistics and Supply Chains in Emerging Markets, Kogan Page, 2017.

REFERENCE BOOKS:

1. Coyle, John Joseph. (2017). Supply chain management: a logistics perspective. 10th ed. Australia: Cengage Learning. HD 38.5 C69 2017
3. Abbey, J. D., & Guide Jr, V. D. R. (2017). Closed-loop supply chains: a strategic overview Sustainable Supply
4. Hsiao-Fan Wang, Surendra M. Gupta. Green Supply Chain Management: Product Life Cycle Approach, McGraw Hill publishing, 2011

EL-305	SUPPLY CHAIN RISK MANAGEMENT	100	4	0	0	3

UNIT I

Basics of Risk Management: Risk and Management-Growth of risk Management-defining Risk--Features of Risk. Decisions and Risk- Decisions with Certainity-Uncertainity-risk-ignorance-Managing risk.

UNIT II

Risks in Supply Chain: Risks arising out of Trends affecting Supply Chain-Integration-Cost Reduction-Agile Logistics-E Business- Globalization,Outsourcing-Supply chain risk management-Aims steps and Principles. Trends in Supply Chain Management. Integration of supply Chains, Cost Reduction, Agile logistics, E – Business, Globalization, Outsourcing, Changing practices in Logistics. Approaches to Risk Management.

UNIT III

Identifying and Analysing Risks: Types of Risks-Identifying Risks-Tools for analyzing past events-Collecting opinions—analyzing operations—Measuring Risk—Likelihood of a risky event-Consequences of risk—Responding to Risks—Alternative Responses—Defining the options and choosing the best response—Network view of risk—Shared risks.

UNIT IV

Creating Resilient Supply Chains: Designing of a Resilient Supply Chain—Principles of designing resilient Supply Chain—Physical features of a resilient supply chain—Relationship within a resilient supply chain—Risk compensation and Business Continuity. Risk and Management - Risk in the Supply Chain, Features of Risk, Decisions &Risk, Structure of Decisions, Decisions with uncertainty, Risk, ignorance, Managing Risk Structure of a Supply Chain, Increasing Risk.

UNIT V

Identifying Risks – Types of Risks, Tools for analyzing past events, Operations, Problems with Risk Identification, Measuring Risk, Consequences of Risk, Responding to Risk – Alternative responses, Defining Options, Choosing the best response, Implementation & Activation, A Network view of Risk – Shared Risks, Achieving an Integrated approach, Analyzing & responding to risks. Business Continuity Management: Emergencies and Crisis—Views of BCM and steps in BCM

Text Books:

1. Supply Chain Risk Management by Donald Walters,Kogan Page First Edition
2. 2.The New Supply Chain Challenge Risk Management in a Global Economy by Bosman R,FM Global,Johnson RI 2006
3. Gregory L. Schlegel , Robert J. Trent Supply Chain Risk Management: An Emerging Discipline (Resource Management) Hardcover – Import, 3 Nov 2014.
4. Donald Waters – Supply Chain Risk Management, Published by the Chartered Institute of Logistics & Transport, U.K
5. Jeremy F.Shapiro, Modelling the Supply Chain, Duxbury.

EL-401	ENTERPRISE RESOURCE PLANNING	100	4	0	0	3

UNIT I

Introduction to Enterprise resource planning (ERP), Evolution of ERP, Reasons for the growth of ERP, Scenario and Justification of ERP in India, Evaluation of ERP, Various Modules of ERP, Advantage of ERP - MRP – problems of systems islands – need for system integration and interface.

UNIT II

An overview of Enterprise: Integrated modules, Business Process Mapping for ERP Module Design, Organizational Environment and its selection for ERP Implementation. ERP – Packages – products and market opportunities – problems of ERP selection and implementation – identifying ERP benefits.

UNIT III

ERP and Related Technologies: ERP and Related Technologies, Business Process Reengineering (BPR), Management Information System (MIS), Executive Information System (EIS), Decision support System (DSS), Supply Chain Management (SCM). ERP process – implementation – managing changes in IT organisations – preparing IT infrastructure – measuring benefits of ERP. Modules of ERP.

UNIT IV

ERP Modules: ERP Modules, Introduction, Finance, Plant Maintenance, Quality Management, Materials Management, ERP Market. A Comparative Assessment and Selection of ERP Packages and Modules.

UNIT V

ERP implementation lifecycle, issues in implementing ERP packages, pre-evaluation screening, package evaluation, project planning phase, gap analysis, reengineering, configuration, implementation, team training, testing, going live, end-user training, post implementation (Maintenance mode).

Text Books:

1. Alexis Leon, ERP demystified, second Edition Tata McGraw-Hill, 2007.
2. Jagan Nathan Vaman, ERP in Practice, Tata McGraw-Hill, 2008.
3. Hammer, Michael – Reengineering the corporation.
4. E-commerce strategy, technologies and applications by David Whitley.

Reference books:

1. Alexis Leon, Enterprise Resource Planning, second edition, Tata McGraw-Hill, 2008.
2. Mahadeo Jaiswal and Ganesh Vanapalli, ERP Macmillan India, 2009.
3. Vinod Kumar Grag and N.K. Venkitakrishnan, ERP- Concepts and Practice, Prentice Hall of India,2 nd edition, 2006.
4. Summer, ERP, Pearson Education, 2008.

EL-402	INTERNATIONAL LOGISTICS MANAGEMENT	100	4	0	0	3

UNIT I

International Trade: Need and Importance – Recent Trends in World Trade – Leading players – India's Foreign Trade – Commodity Composition and Destination - Overview of International Logistics- Components, Importance, Objectives; Logistic Subsystem;- Integrated Logistics; - Barrier to Internal Integration – Logistics Documents for International Trade.

UNIT II

Marketing and Logistics Customer Focused Marketing; International Marketing: International Marketing Channel: Role of Clearing Agent, Various Modes of Transport, Choice and Issues for Each Mode, Transport Cost Characteristics

UNIT III

Basics of Transportation Transportation Functionality and Principles; Multimodal Transport: Modal Characteristics; Modal Comparisons; Legal Classifications; International Air Transport; Air Cargo Tariff Structure; Freight: Definition, Rate; Freight Structure and Practice

UNIT IV

Containerization and Chartering Containerization: Genesis, Concept, Classification, Benefits and Constraints; Inland Container Depot (ICD): Roles and Functions, CFS, Export Clearance at ICD; CONCOR; ICDs under CONCOR; Chartering: Kinds of Charter, Charter Party, and Arbitration.

UNIT V

Inventory Management and Packaging Inventory Management: Introduction, Characteristics, Functionality, Components, Planning; Packaging and Packing: Labels, Functions of Packaging, Designs, Kinds of Packaging; Packing for Transportation and Marking: Types of Boxes, Container, Procedure, Cost, Types of Marking, Features of Marking -Dynamic Component for Continuous Internal Assessment only: Contemporary Developments Related to the Course during the Semester concerned.

References:

1. International Marketing by SakOnkvisit& John J. Shaw, Publisher: Prentice Hall of India
2. International Marketing by Gupta and Varshing, Publisher: Sultan Chand and Sons
3. Logistic Management and World Sea Borne Trade by MultiahKrishnaveni, Publisher: Himalaya Publication
4. Logistic and Supply Chain Management by Donald J. Bowerson, Publisher: Prentice Hall of India

EL-403	LEAN SUPPLY CHAIN MANAGEMENT	100	4	0	0	3

UNIT I:

Lean Manufacturing: Principle And Tools : Evolution of Just-In-Time and Lean Manufacturing – Principle – Seven wastes – Just-In-Time (JIT) – One-Piece or Continuous Flow – Kanban or Pull System – Basic tools such as 5S, Kaizen, PokaYoke and Single-Minute Exchange of Dies (SMED). -- Lean Manufacturing--Fit into Operations Strategy-- Mapping for supply chain management-- Lean thinking and supply chain management.

UNIT II:

Technique: Value Stream Mapping: Value Stream Mapping (VSM) – Material and Information Flow – VSM symbols – Identification of Product or Product Family – Current-State Mapping – Future-State Mapping by key questions – Plan and Implementation.

UNIT III:

SIX SIGMA: Evolution – TQM vs. Six Sigma – What is Six Sigma – Six Sigma methodologies Such as DMAIC, DFSS – Six Sigma Belts. LEAN SIX SIGMA: The Synergy of Six Sigma and Lean – Lean Six Sigma – Principle – Lean tools in DMAIC – Implementation of Lean Six Sigma.

UNIT IV

DMAIC: TOOLS -- Define – Measure – Analyze – Improve – Control – SIPOC model – VOC – CTQ – Seven Quality or SPC tools such as Pareto Analysis, Cause and Effect Diagram, Control Charts etc. – Process Capability Analysis such as Cp, Cpk – Design of Experiments (DoE).

UNIT V :

Supply Chain Processes and Strategies: Integrated supply chains design - Customer relationship process - Order fulfillment process - Supplier relationship process - Supply chain strategies - Strategic focus - Mass customization - Lean supply chains - Outsourcing and offshoring - Virtual supply chains

References:

1. Feld, W. M., Lean Manufacturing tools, Techniques and How to Use Them, St. Lucie Press, Florida, 2000.
2. Michael L. George, et al., The Lean Six Sigma Pocket tool book: A Quick REFERENCES Guide Nearly 100 tools for Improving Process Quality, Speed, and Complexity, McGrawHill, 2005
3. Rother, M. and Shook, J., Learning see: Value strean mapping create value and eliminate muda, The lean enterprises institute Brookline, Massachusetts, USA, 1999.
4. Liker, J., The yota Way: 14 Management Principles from the World's Greatest Manufacturer, McGraw-Hill Education, 2004.
5. Pyzdek, T. and Keller, P. A., The Six Sigma Handbook, Fourth Edition, McGraw-Hill Professional, 2014.

EL-404	SHIPPING AND MARITIME LAW	100	4	0	0	3

UNIT I

Shipping Features, Types and Terminology- Features, Advantages and Disadvantages of using sea mode, Classification of ships, Shipping Methods, S wage in Ship, Major Sea-routes around the world, Important Terminology, Freight, Parties and Perils Associated with Sea Mode- Parties involved in sea mode of transportation- Ocean Freight- Types of Sea Freight, Calculation of Freight; Maritime Risks, Marine Insurance.

UNIT II

Nature of Admiralty Law: Admiralty Law in relation to public and private international law – admiralty law as a part of mercantile law – admiralty law in relation to common law and civil law –Common law of sea – Sources of maritime law and admiralty law. History of admiralty law in England, other parts of the world and in India – History of admiralty jurisdiction of High Courts of India – admiralty courts – immunity of Government ships.

UNIT III

Admiralty and maritime jurisdiction (scope and extent) – Enforcement of maritime claims by actions in rem and in personam – juridical personality of the ship – maritime liens and priorities. Jurisdiction in matters of collision – Extra territorial jurisdiction – Changing concept of maritime frontiers. International waters; Territorial Waters; Contiguous Zone; EEZ; Continental shelf; High seas; International straits; archipelagoes; Conservation and exploitation of maritime sources; International fisheries -Sea as a common heritage of mankind – Role of IMO – Piracy and hot pursuits.

UNIT IV

The ship as property – ownership – registration – flag of convenience – ship construction rules – acquisition of ships – transfer of ships –negotiation and contract – terms of contract – inspection by buyer – ship mortgages – ship's sale and purchase– ISM and issues of safety.

UNIT V

Safety & security regulations at sea and in port, accidents, collisions, salvage, towage – The laws of harbours and pilot age – Jurisdiction in maritime ports; Access to maritime ports; Indian law – The maritime zones Act 1976; civil and criminal jurisdiction over ships; Ship owner's liabilities for damage to ports – Limitation of ship owner's liability.

References:

1. Aleka Mandaraka – Sheppard – Modern Maritime Law (Second Edition)(2009)
2. D.C. Jackson, Enforcement of Maritime Claims, London: LLP (2005)
3. Southampton on Shipping Law, Informa (2008)
4. Halsbury's Laws of England, 4th Edn, London (1983)
5. Marsden, Collisions at Sea, London (1961)
6. Francis D. Rose, The Modern Law of Pilotage, London 91984)
7. Geoffrey Brice, Maritime Law of Salvage, London (1983)
8. Chorly and Giles, Shipping Law, 6th Edn. London
9. Kochu Thommen, International Legislation on Shipping, U.N. New York (1968).
10. Samareshwar Mahanty, Maritime Jurisdiction and Admiralty Law in India, Universal Publishing (2009)

EL-405	GREEN SUPPLY CHAIN MANAGEMENT	100	4	0	0	3

UNIT I

Introduction – Traditional Supply Chain and Green Supply Chain – Environmental Concern and Supply Chain – Closed-loop Supply Chain – Corporate Environmental Management – Green Supply Chain (GSCM): Definition, Basic Concepts – GSCM Practices

UNIT II

ECO-DESIGN : Design for the Environment (DFE) or Eco-Design – Eco-Design and Supplier Relationships – Definitions of Eco-Design – Tools of Product Eco-Design – Involving suppliers in product ecodesign: Drivers, Challenges and Successful factors

UNIT III

Green Purchasing: Green Procurement and Purchasing – Definitions of green purchasing – Drivers of green purchasing – Green purchasing strategies – Green purchasing performance measurement –Green Supplier Development and Collaboration.

UNIT IV

Green Manufacturing: Green Manufacturing or Production: Evolution, Definitions – 4Re's: recycling, remanufacturing, reuse and reduction – Closed-loop Manufacturing – ISO 14000 systems – Life Cycle Analysis (LCA) – Lean Manufacturing for Green Manufacturing or Production.

UNIT V

Green Logistics And Transportation: Green Logistics and Transportation – Definitions of Green Logistics – Critical drivers of Green Logistics – Green transportation and logistics practices – Environmental impacts of transportation and logistics – Closing the Loop: Reverse Logistics.

Text books:

1. Joseph Sarkis, Yijie Dou. Green Supply Chain Management: A Concise Introduction, Routledge, 2017.
2. Charisios Achillas, Dionysis D. Bochtis, Dimitrios Aidonis, Dimitris Folinas. Green Supply Chain Management, Routledge, 2018.

Reference books:

1. Hsiao-Fan Wang, Surendra M. Gupta. Green Supply Chain Management: Product Life Cycle Approach, McGraw Hill publishing, 2011
2. Stuart Emmett, Vivek Sood. Green Supply Chains: An Action Manifes by Stuart Emmett, Wiley publications, 2010

EB-301	**ESSENTIAL OF BUSINESS ANALYTICS**	**100**	**4**	**0**	**0**	**3**

COURSE OBJECTIVES This course helps the students to understand and analyze basic essentials of business analytics business framework. They shall be exposed to fundamental statistical techniques to solve real life problems and enable them to take better decisions.

Unit I:

Introduction to Business Analytics, Types of data, Integrating Analytics with business, Business Analytics for Competitive Advantage, Descriptive, Predictive, and Prescriptive Analytics, Dashboards History; Subdivisions within Statistics; Data collection, Editing, Classification, Tabulation, Diagrammatic and Graphical representation of data.

Unit II:

Measures of Central tendency and Dispersion: Arithmetic Mean, Geometric Mean, Harmonic Mean, Median, Mode, Mean Deviation, Quartile Deviation, Standard Deviation, Skewness, Kurtosis and Moments.

Unit III:

Probability and Probability Distributions: Introduction to Probability, Probability Rules, Probabilities under Conditions of Statistical Independence, Probabilities under Conditions of Statistical Dependence, Revising Prior Estimates of Probabilities, Bayes' Theorem, Random Variables, Use of Expected Value in Decision Making, Binomial Distribution, Poisson Distribution, Normal Distribution.

Unit IV:

Sampling and Estimation: Random Sampling, Introduction to Sampling Distributions, Relationship Between Sample Size and Standard Error, Point Estimates, Interval Estimates, Confidence Intervals, Calculating Interval Estimates of the Mean from Large Samples.

Unit V:

Testing of Hypotheses: Hypothesis, Steps in Hypothesis Testing, Measuring the Power of a Hypothesis Test, Hypothesis Testing of Means and Proportions, Hypothesis Testing for Differences between Means and Proportions, Analysis of Variance, One way ANOVA and Two way ANOVA, Non-parametric tests: Chi-Square Test, The Sign Test for Paired Data, The MannWhitney U Test, Kruskal-Wallis Test, The Kolmogorov-Smirnov test. Unit 6: Correlation, Regression and Time Series: Correlation, Product moment correlation, Rank correlation, Bi-variate correlation, Regression, Simple linear Regression, Line of best fit, Time Series, Trend Analysis, Cyclical Variation, Seasonal Variation, Irregular Variation, Time Series Analysis in Forecasting.

References:

1. Richard I. Levin & David S.Rubin, Statistics for Management, PHI.1999, New Delhi.
2. Kishor S. Trivedi, Probability and Statistics with Reliability, Queuing and Computer Science Applications, John Wiley & Sons, Singapore, 2002.
3. John E.Freund & Ronald E. Walpole, Mathematical statistics, PH, New Jersey, 1980.
4. E.L.Lehmann, Testing Statistical Hypotheses, John Wiley & Sons, New York, 1986.
5. S.P. Gupta, Statistical Methods, Sultan Chand &Sons, New Delhi 1998.
6. Sundar Rao P.S.S, Richard J, Introduction to biostatistics – A manual for students in Health Sciences, PHI Learning Pvt. Ltd. 1996, New Delhi.
7. Susan Miltan , Statistical methods in the Biological and Health Sciences,1999, McGraw-Hill
8. B. Burt Gerstman, Basic Biostatistics: Statistics for Public Health Practice, Jones & Bartlett Learning, 2008.
9. Wayne W. Danial, John Wiley, Biostatistics: A Foundation for analysis in the Health Sciences

EB-302	Text, Social Media& Web Analytics	100	4	0	0	3

UNIT I:

Text Analytics: Text Analytical Approach and Tools to Analyze Data: Analytical Approaches-- History of Analytical Tools-- Introducing Popular Analytical Tools-- Comparing Various Analytical Tools. Text mining –unstructured text, episode rule discovery for texts, hierarchy of categories, text clustering.

UNIT II:

Social Media Analytics: Introduction to Semantic Web: Limitations of current Web-- Development of Semantic Web-- Emergence of the Social Web. Social Network analysis: Development of Social Network Analysis -Key concepts and measures in network analysis. Electronic sources for network analysis: Electronic discussion networks- Blogs and online communities - Web-based networks.

UNIT III

Knowledge representation on the Semantic web: Ontology and their role in the Semantic Web: Ontology-based knowledge Representation – Ontology languages for the Semantic Web: Resource Description Framework - Web Ontology Language. Modelling and aggregating social network data: State-of-the-art in network data representation - Ontological representation of social individuals - Ontological representation of social relationships - Aggregating and reasoning with social network data. Social-semantic applications: Generic Architecture- Sesame-Elmo – Graph util, Flink-Open academia. Social network extraction: Survey method-electronic data extraction- Data collection Optimiztionprediction- Evaluation.

UNIT IV:

Understanding web analytics: The foundations of Web analytics: Techniques and Technologies – Present and Future of Web analytics.---Data Collection: Importance and Options –Web server log files: Click stream data – User submitted information – Web server performance data – Page tags –First and third party tracking - Web Analytics Strategy: Key performance indicators – Web analytics process – Heuristics evaluations – Site visits – Surveys – Measuring reach – Measuring acquisition – Measuring conversion – Measuring retention – Security and privacy implications of Web analytics.

UNIT V:

Web Analytics Tools: Content organization tools – Process measurement tools – Visitor segmentation tools – Campaign analysis tools – Commerce measurement tools – Google analytics – Omniture – Web trends – Yahoo! Web analytics. Google Analytics: Key features and capabilities – Quantitative and qualitative data - Working of Google analytics – Privacy - Tracking visitor clicks, Outbound links and Non HTML files.

Reference Books:

1. Bernard J. Jansen, “Understanding User-Web Interactions via Web analytics”, Morgan and Claypool, 2009.
2. Avinash Kaushik, “Web Analytics2.0”, John Wiley and Sons, 2010.
3. Brian Clifton, “Advanced web metrics with Google analytics”, John Wiley and Sons, 2012.
4. Justin Cutroni, “Google Analytics”, O‟Reilly, 2015.
5. Jerri L. Ledford, Joe Teixeira and Mary E. Tyler, “Google Analytics”, John Wiley and Sons, 2013.
6. Charu C. Aggarwal and ChengXiang Zhai, Mining Text Data. Springer, 2012.
7. Dan Jurafsky and James H Martin,Speech & Language Processing. Pearson Education India, 2000.
8. Guandong Xu, Yanchun Zhang and Lin Li, Web Mining and Social Networking – Techniques and applications, First Edition, Springer, 2011.
9. Dion Goh and Schubert Foo - Social information Retrieval Systems: Emerging Technologies and Applications for Searching the Web Effectively, IGI Global Snippet, 2008.
10. Max Chevalier, Christine Julien and Chantal Soulé-Dupuy, Collaborative and Social Information Retrieval and Access: Techniques for Improved user Modelling, IGI Global Snippet, 2009.

11. John G. Breslin, Alexander Passant and Stefan Decker, -The Social Semantic Web, Springer, 2009.

EB-303	**PREDICTIVE ANALYTICS**	**100**	**4**	**0**	**0**	**3**

Course Objective: This course will enable students to apply specific statistical and regression analysis methods applicable to predictive analytics to identify new trends and patterns, uncover relationships, create forecasts and to develop and use various quantitative and classification predictive models based on various regression and models.

Unit I

Linear Regression: Coefficient of determination-- Significance test, Residual analysis - Standard Error - Ratio of variance- Galton Graph – Ratio of Regression – Interpretation of Galton's Graph - Confidence and Prediction intervals.

Unit II

Multiple Linear Regression: Coefficient of determination--Interpretation of regression coefficients-- Categorical variables— heteroscedasticity - Multi-co linearity outliers-- Auto regression and Transformation of variables—Regression--Model Building.

Unit III

Logistic And Multinomial Regression: Logistic function-- Estimation of probability using Logistic regression, Variance-- Wald Test-- Hosmer Lemshow Test-- Classification Table-- Gini Co-efficient.

Unit IV

Forecasting: Moving average-- Exponential Smoothing-- Casual Models. Time Series Analysis-- Moving Average Models-- ARIMA models-- Multivariate Models.

Unit V

Index numbers: construction of Index numbers – selection of items- selection of base – selection of average and system of weighting – construction of various types of index numbers. Theory of probability ad sampling: statistical probability – the Laws of probability – permutations and combinations.

Reference Books:

1. Anderson, Sweeney and Williams "Statistics for business and economics", Cengage Learning, 2011.
2. Richard I. Levin. David S. Rubin, "Statistics for Management", Pearson Education, 2012.
3. Richard A. Johnson, Irwin Miller and John Freund, "Probability and Statistics for Engineers", Pearson Education, 2014.
4. Ronald E. Walpole, Raymond H. Meyers, Sharon L. Meyers, "Probability and Statistics for Engineers and Scientists", Pearson Education.
5. Asthana B.N., "Elements of Statistics" Chaitanya publishing house, Allahabad.

EB-304	BIG DATA ANALYTICS	100	4	0	0	3

COURSE OBJECTIVES : • Understand the Big Data Platform and its Use cases • Provide an overview of Apache Hadoop • Provide HDFS Concepts and Interfacing with HDFS • Understand Map Reduce Jobs • Provide hands on Hodoop Eco System • Apply analytics on Structured, Unstructured Data. • Exposure to Data Analytics with R.

Unit I

Introduction to Big Data: Big Data-definition, Characteristics of Big Data (Volume, Variety,Velocity, Veracity, Validity), Importance of Big Data , Patterns for Big Data Development, Data in the Warehouse and Data in Hadoop [Zikopoulos] - Introduction to Hadoop**:** Hadoop- definition, Understanding distributed systems and Hadoop,Comparing SQL databases and Hadoop, Understanding MapReduce, Counting words with Hadoop—running your first program, History of Hadoop, Starting Hadoop - The building blocks of Hadoop, NameNode, DataNode, Secondary NameNode, JobTracker and Task Tracker.

Unit II

HDFS: Components of Hadoop -Working with files in HDFS, Anatomy of a MapReduceprogram, Reading and writing the Hadoop Distributed File system -The Design of HDFS, HDFS Concepts, The Command-Line Interface, Hadoop Filesystem, The Java Interface, Data Flow, Parallel Copying with distcp, Hadoop Archives. Hadoop I/O: Compression—Serialization-- Avro and File-Based Data structures.

Unit III

MapReduce Programming: Writing basic Map Reduce programs - Getting the patent data set,constructing the basic template of a Map Reduce program, Counting things, Adapting for Hadoop's API changes, Streaming in Hadoop. MapReduce Advanced Programming: Advanced MapReduce - Chaining Map Reduce jobs,joining data from different sources.

Unit IV

Hadoop Eco System --User Defined Functions-- Data Processing operators. Hive : Hive Shell--Hive Services-- Hive Metastore-- Comparison with Traditional Databases—HiveQL-- Tables, Querying Data and User Defined Functions. Hbase : HBasics—Concepts—Clients—Example--Hbase Versus RDBMS. Big SQL : Introduction

Unit V

Graph Representation in MapReduce: Modeling data and solving problems with graphs,Shortest Path Algorithm, Friends-of-Friends Algorithm, PageRank Algorithm, BloomFilters. Data Analytics with R Machine Learning : Introduction, Supervised Learning, Unsupervised Learning, Collaborative Filtering. Big Data Analytics with BigR.

References

13. Tom White " Hadoop: The Definitive Guide" Third Edit on, O'reily Media, 2012.
14. Seema Acharya, Subhasini Chellappan, "Big Data Analytics" Wiley 2015.
15. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.
16. Jay Liebowitz, "Big Data and Business Analytics" Auerbach Publications, CRC press (2013)
17. Tom Plunkett, Mark Hornick, "Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R Enterprise and Oracle R Connector for Hadoop", McGraw-Hill/Osborne Media (2013), Oracle press.
18. Anand Rajaraman and Jef rey David Ulman, "Mining of Massive Datasets", Cambridge University Press, 2012.

19. Bill Franks, “Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics”, John Wiley & sons, 2012.
20. Glen J. Myat, “Making Sense of Data”, John Wiley & Sons, 2007
21. Pete Warden, “Big Data Glossary”, O’Reily, 2011.
22. Michael Mineli, Michele Chambers, Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley Publications, 2013.
23. ArvindSathi, “BigDataAnalytics: Disruptive Technologies for Changing the Game”, MC Press, 2012
24. Paul Zikopoulos ,Dirk DeRoos , Krishnan Parasuraman , Thomas Deutsch , James Giles , David Corigan , "Harness the Power of Big Data The IBM Big Data Platform ", Tata McGraw Hill Publications, 2012.

EB-305	MARKETING ANALYTICS	100	4	0	0	3

Course Objective:
This course aims to provide knowledge on elements of market analysis and to use marketing analytics to predict outcomes and systematically allocate resources.

Unit I:
Introduction: Marketing Analytics, Models and metrics- Market Insight – Market data sources, sizing, PESTLE trend analysis, and Porter five forces analysis – Market segment identification and positioning.

Unit II:
Competitive Analysis And Business Strategy: Competitor identification, Intelligence gathering, analysis and strategy- Analytics based strategy selection, with strategic models and metrics, Forecasting, balanced scorecard, and critical success factors.

Unit III:
Product, Service and Price Analytics: Conjoint analysis model, decision tree model, portfolio resource allocation, Pricing techniques, pricing assessment, pricing for business markets, price discrimination.

Unit IV:
Distribution And Promotion Analytics: Retail location selection, distribution channel evaluation, and multi-channel distribution, Promotion budget estimation and allocation, promotion metrics for traditional media and social media.

Unit V:
Market basket Analysis, Text Analytics, Spreadsheet Modelling - Sales Analytics: E Commerce sales mode, sales metrics, profitability metrics and support metrics.

Reference Books

1. Stephan Sorger, “Marketing Analytics – Strategic Models and Metrics”, Admiral Press, 2013.
2. Mark Jeffery, “Data Driven Marketing: The 15 Metrics Everyone in Marketing should know”, Wiley, 2013.
3. Paul W. Farris, Neil T. Bendle, Phillip E. Pfeifer, David J. Reibstein “Marketing Metrics: The Definitive Guide to Measuring Marketing Performance”, Pearson FT press, 2012.

EB-401	FINANCIAL ANALYTICS	100	4	0	0	3

UNIT -I

Financial analytics: Concept and Practices- Data science - What is R and its application - Language features: functions-- Assignment-- Aruguments and types. Financial Statistics: Concept and mathematical expectation - Probability - Mean; SD and Variance - Skewness and Kurtosis - Covariance and correlation - Capital Asset Pricing model.

UNIT –II

Financial Securities : Bond and Stock investments - Housing and Euro crisis - Securities Datasets and Visualization - Plotting multiple series. Time Series and Sharpe ratio: Examining and Stationary - Auto Regressive and integrated moving average Processes-- Time periods and Annualizing - Ranking investment candidates - Sharpe Ratio for Income Statement growth.

UNIT –III

Markowitz means - variance optimization - Optimal Portfolio of two risky assets - Data mining with Portfolio optimization- Cluster Analysis - K -means Clustering and Algorithm - Covariance and Precision matrices - Usage of Regression.

UNIT -IV

Ganging the market Sentiment: Mark ov Regime Switching model - Bayesian reasoning - Beta distribution. Stimulating Trading Strategies: Foreign exchange markets - Chart analytics - Initialization and finalization - Bayesian Reasoning within Positions. Black - Scholes model and option - Implied volatility: Black - Scholes model: Concept and applications - Derivation - Algorithm for - Implied volatility.

UNIT -V

Prediction using fundamentals and binomial model for options: Best income statement Portfolio - obtaining Price Statistics - combining the income statement with Price statistics - Prediction using classification trees and Recursive Partitioning. Applying Computational finance - risk Neutral Pricing and No Arbitrage - High Risk - Free Rate Environment

Reference Books

Financial Analytics with R _ Mark J. Bennets, Cambridge University Press.

EB-402	HR ANALYTICS	100	4	0	0	3

Unit I

HR Analytics in Perspective: Role of Analytics, Defining HR Analytics, HR Analytics: The Third Wave for HR value creation, HR Measurement journey in tune with HR maturity journey Understanding the organizational system (Lean) , Locating the HR challenge in the system , Valuing HR Analytics in the organizational system, Typical problems. Case Studies

Unit II

HRA Frameworks: Current approaches to measuring HR and reporting value from HR contributions, Strategic HR Metrics versus Benchmarking, HR Scorecards & Workforce Scorecards and how they are different from HR Analytics, HR Maturity Framework: From level 1 to level 5, HR Analytics Frameworks: (a) LAMP framework; (b) HCM:21 Framework and (c) Talentship Framework, 5 overarching components of an effective Analytics framework.

Unit III

Basics of HR Analytics: Basics of HR Analytics, what is Analytics, Evolution, Analytical capabilities, Analytic value chain, Analytical Model, Typical application of HR analytics. **Insight into Data Driven HRA:** Typical data sources, Typical questions faced (survey), Typical data issues, Connecting HR Analytics to business benefit (case studies), Techniques for establishing questions, Building support and interest, Obtaining data, Cleaning data (exercise), Supplementing data.

Unit IV

HR Matrics: Defining metrics, Demographics, data sources and requirements, Types of data, tying data sets together, Difficulties in obtaining data, ethics of measurement and evaluation. Human capital analytics continuum. **HR Dashboards:**Statistical software used for HR analytics: MS-Excel, IBM- SPSS, IBMAMOS, SAS, and R programming and data visualisation tools such as Tableau, Ploty, Click view and Fusion Charts.

Unit V

HR Scorecard: Assessing HR Program, engagement and Turnover, Finding money in Analytics, Linking HR Data to operational performance, HR Data and stock performance. Creating HR Scorecard, develop an HR measurement system, guidelines for implementing a HR Scorecard.

References

1. Moore, McCabe, Duckworth, and Alwan. The Practice of Business Statistics: Using Data for Decisions, Second Edition, New York: W.H.Freeman, 2008.
2. Predictive analytics for Human Resources, Jac Fitz- enz, John R. Mattox, II, Wiley, 2014.
3. Human Capital Analytics: Gene Pease Boyce Byerly, Jac Fitz-enz, Wiley,2013.
4. The HR Scorecard: Linking People, Strategy, and Performance, by Brian E. Becker, Mark A. Huselid, Mark A Huselid, David Ulrich, 2001.
5. HR Analytics: The What, Why and How, by Tracey Smith
6. The New HR Analytics: Predicting the Economic Value of Your Company's Human By Jac FITZ-ENZ, 2010.

EB-403	ECONOMETRICS AND BUSINESS FORECASTING	100	4	0	0	3

Unit I

Introduction: Broad classification of economic relations-- stochastic and non-stochastic relations-- econometrics versus mathematical economics-- econometrics versus statistics-- concepts of econometric and mathematical models and their essential ingredients-- functions of econometrics-- essential steps of an empirical study.

Unit II

The simple linear regression model: ordinary least squares (OLS) estimators and their properties-- goodness of fit and tests of hypotheses-- effect of changing scale and units of measurement of variables. - testing of hypotheses-- testing individual coefficients-- testing several coefficients jointly-- testing linear combination of coefficients-- computing R2 -- R2 and F-statistic when there is no intercept term-- effect of omitting intercept term-- effect of inclusion of irrelevant and exclusion of relevant variable in the model.

Unit III

Stationary time series models: stochastic difference equation models-- ARMA models—stationarity-- the autocorrelation function-- the partial autocorrelation function-- sample autocorrelations of stationary series-- Box-Jenkins model selection-- and seasonality.-- Modeling Economic Time Series: Trends and Volatility-- ARCH process-- GARCH model-- ARCH-M model-- Testing for Trends and Unit Roots: Unit root processes, Dicky-Fuller tests, Augmented Dicky-Fuller test, Phillips Perron test. Introduction to VAR model-- estimation and identification-- the Impulse response function-- structural VAR-- Co-integration and Error Correction Models-- Testing for co-integration-- The Engle Granger methodology-- Johansen methodology-- ARDL bounds-testing approach.

Unit IV

First Generation Forecasting Model – The Deterministic Trend/Deterministic Seasonal (DTDS) Model A. The Simple Trend Model – A Deterministic Trend -- Trend Model with Seasonal Dummies -- DTDS plus Autocorrelated Errors -- Tests for Trend and Seasonality – F-tests . Some Important Concepts Leading up to Box-Jenkins Modeling -- Mean, Variance, and Autocorrelation in Time Series --- Definition of Covariance Stationarity -- Example of a Stationary Time Series: the AR(1) model

i. AR(1) Time Series Model $yytt = \emptyset 0 + \emptyset 1 yytt{-}1 + aatt$ when $|\emptyset 1| < 1$
ii. Mean, Variance, Autocovariance, and Autocorrelation
iii. The Special Case of $\emptyset 1 = 1$. The Random Walk model.
iv. The Random Walk Model in not Stationary
v. Differing Prediction Profiles for the two cases: $|\emptyset 1| < 1$ versus $\emptyset 1 = 1$
vi. Do Stock Prices follow a Random Walk?

Unit V

Box Jenkins Models for Stationary-- Non-Seasonal Time Series -- Some Simple Box-Jenkins Models and Their Properties i. ARMA(0,0) ii. MA(1) iii. AR(1) iv. ARMA(1,1) v. General Notation vi. Concepts of Stationarity and Invertibility-- Identification Tools -- Autocorrelation Function (ACF) --Partial Autocorrelation Function (PACF) -- Pattern Table -- Sample Counterparts -- Information Criteria -- P/Q Box -- Box-Jenkins Models – Forecasting for Stationary, Non-Seasonal Time Series-- Box-Jenkins Models for Non-Seasonal, Stochastically-Trending Time Series - The Transfer Function Model --- The Equal-Lag Length Vector Autoregressive Model -- System-Wide Goodness of Fit Measures to Help Choose the Lag-Length E. Using Out-of-Sample Forecasting Experiments to Detect Useful “Extra” Variables for use in Forecasting a Variable of Interest -- Diebold-Mariano Test for Significant Differences in

Forecasting Accuracies-- Combination Forecasting --Some Basic Theorems on Diversification of Forecasts -- Nelson Combination Method -- Granger-Ramanathan Combination Method -- Combinations with Time-Varying Weights --- Application to Economic Time Series

References

1. Berndt, E.R. (1991) "The Practice of Econometrics", Reading, Mass: AddisonWesley,
2. Gujrati, Damodar, N. (1995), Basic Econometrics, Mc Graw Hill, New Delhi.
3. Intriligator, M., R.G. Bodkin, and C. Hsiaq. (1996), Econometric Models, Techniques and Applications. Prentice Hall,
4. Johnson, J. (1984), Econometric Methods. New York: Mc Graw-Hill.
5. Kmenta, J. (1986), Elements of Econometrics. New York: Macmillan,
6. Krishna, K.L. ((1997) (Ed), Econometric Application in India Oxford University Press, New Delhi.
7. Lott, W., and S.C. Ray. (1992), Applied Econometrics: Problems and Data Sets. Fort Worth, Tex: The Dryden Press.
8. Maddala, G.S. (1977), Econometrics. Mc Graw-Hill, Inc.
9. J. Holton Wilson and Barry Keating(2009). **Business Forecasting, *Sixth Edition*** McGraw-Hill/Irwin
10. Ramanathan, Ramu. (2002), Introductory Econometrics with Applications. South Western: Thomson.
11. Walter Enders, (2010), Applied Econometrics Time Series", Wiley India Pvt. Ltd.
12. Kerry Patterson, (2008), An Introduction to Applied Econometrics: A Time Series Approach", Palgrave, MacMillan.
13. Davidson, R. and J.MacKinnon (2004): Econometric theory and methods, Oxford, Oxford University Press.
14. Hsiao, C. (1986): Analysis of panel data, Cambridge, Cambridge University Press.
15. Baltagi , B.H (2005): Econometrics Analysis of panel data, Wiley and Sons Ltd Wooldridge,
16. J.M. (2002): Econometric analysis of cross-section and panel data, Cambridge, Mass. MIT Press

EB-404	DATA WAREHOUSING AND OLAP	100	4	0	0	3

Course Objective: This course equips a student with Data Warehousing knowledge,OLAP Architectures which helps in applying whenever required.

Unit I

Data Warehouse Fundamentals: Introduction to Data Warehouse,--OLTP Systems-- Differences between OLTP Systems and Data Warehouse-- Characteristics of Data Warehouse-- Functionality of Data Warehouse-- Advantages and Applications of Data Warehouse; Advantages-- Applications: Top- Down and Bottom-Up Development Methodology--Tools for Data warehouse development-- Data Warehouse Types:

Unit II

Planning and Requirements: Introduction-- Planning Data Warehouse and Key Issues-- Planning and Project Management in constructing Datawarehouse-- Data Warehouse Project-- Data Warehouse development Life Cycle, Kimball Lifecycle Diagram-- Requirements Gathering Approaches-- Team organization—Roles-- and Responsibilities:

Unit III

Data Warehouse Architecture: Introductions-- Components of Data warehouse Architecture-- Technical Architectures; Data warehouse architectures 1, 2, and 3- Tool selection-- Federated Data Warehouse Architecture. Dimensional Modeling: Introduction: E-R Modeling-- Dimensional Modeling-- E-R Modeling VS Dimensional Modeling-- Data Warehouse Schemas-- Star Schema-- Inside Dimensional Table-- Inside Fact Table, Fact Less Fact Table—Granularity-- Star Schema Keys-- Snowflake Schema-- Fact Constellation Schema.

Unit IV

Extract, Transform and Load: Introduction: ETL Overview or Introduction to ETL-- ETL requirements and steps-- Data Extraction-- Extraction Methods-- Logical Extraction Methods-- Physical Extraction Methods-- Data Transformation-- Basic Tasks in Transformation--Major Data Transformation Types-- Data loading-- Data Loading Techniques-- ETL Tools: Data Warehouse & OLAP: Introduction: concept and Characteristics of OLAP-- Steps in the OLAP Creation Process-- Advantageous of OLAP—Concept of Multidimensional Data-- OLAP Architectures—MOLAP—ROLAP—HOLAP-- Data Warehouse and OLAP-- Hypercube & Multicubes

Unit V

Meta data Management in Data Warehouse-- Introductions to Metadata-- Categorizing Meta data-- Meta data management in practice-- Meta data requirements gathering-- Meta data classification-- Meta data collection strategies-- Meta Data Management in Oracle and SAS-- Tools for Meta data management.

References

1. Data Warehousing Data Mining and OLAP by Alex Berson,Stephen J.Smith Tata Mc Graw Hill
2. Data Mining: Concepts and Techniques, Third Edition by Han, Kamber & Pei.
3. Data Mining and Analysis Fundamental Concepts and Algorithms by Zaki & Meira.
4. Data Mining for Business Intelligence by Galit Shmueli,Nitin R.Patel,PeterC.Bruce

EB-405	DATA MINING AND MACHINE LEARNING	100	4	0	0	3

UNIT- I:

Introduction to Data Mining: Introduction-- Scope of Data Mining-- What is Data Mining-- How does Data Mining Works-- Predictive Modeling-- Data Mining and Data arehousing-- Architecture for Data Mining: Profitable Applications-- Data Mining Tools:

UNIT- II:

Data Mining Techniques An Overview: Introduction-- Data Mining-- Data Mining Versus Database Management System-- Data Mining Techniques- Association rules—Classification—Regression—Clustering-- Neural networks.

UNIT- III:

The ingredients of machine learning, Tasks: the problems that can be solved with machine learning, Models: the output of machine learning, Features, the workhorses of machine learning. **Binary classification and related tasks:** Classification, Scoring and ranking, Class probability estimation **Beyond binary classification:** Handling more than two classes, Regression, Unsupervised and descriptive learning. **Concept learning**: The hypothesis space, Paths through the hypothesis space, Beyond conjunctive concepts

UNIT- IV:

Tree models: Decision trees, Ranking and probability estimation trees, Tree learning as variance reduction. **Rule models:** Learning ordered rule lists, Learning unordered rule sets, Descriptive rule learning, First-order rule learning **Linear models:** The least-squares method, The perceptron: a heuristic learning algorithm for linear classifiers, Support vector machines, obtaining probabilities from linear classifiers, Going beyond linearity with kernel methods.

UNIT- V:

Features: Kinds of feature, Feature transformations, Feature construction and selection. Model ensembles: Bagging and random forests, Boosting- **Dimensionality Reduction:** Principal Component Analysis (PCA), Implementation and demonstration. **Artificial Neural Networks:** Introduction, Neural network representation, appropriate problems for neural network learning, Multilayer networks and the back propagation algorithm.

TEXT BOOKS:

1) Machine Learning: The art and science of algorithms that make sense of data, Peter Flach, Cambridge.
2) Machine Learning, Tom M. Mitchell, MGH.

REFERENCE BOOKS:

1) Understanding Machine Learning: From Theory to Algorithms, Shai Shalev-Shwartz, Shai Ben-David, Cambridge.

Machine Learning in Action, Peter Harington, 2012, Cengag

ENTREPRENEURSHIP AND SMALL ENTERPRISE MANAGEMENT
III SEMESTER

EE 301	**INDIAN MODELS IN ENTREPRENEURSHIP**	**100**	**4**	**0**	**0**	**3**

UNIT-I : Introduction : Concept and Characteristics of Entrepreneurship. Theories of Entrepreneurship. Process of Entrepreneurship. Entrepreneurship Environment. Barriers to Entrepreneurship. Entrepreneurship and Innovation-Innovation and Creativity-Innovation in Current Environment – Types of Innovation- Entrepreneurship and Economic Development. Corporate Entrepreneurship – Concept and Types.

UNIT-II : Entrepreneur : Concept, Characteristics Types, Roles and Functions of Entrepreneurs. Qualities of a Successful Entrepreneur, Ethical and Social Responsibilities of Entrepreneurs. Entrepreneur Vs. Manager. Entrepreneur Vs. Entrepreneurship. Entrepreneurial Mobility. Entrepreneurial Culture. Entrepreneurial Motivation.

UNIT-III : Entrepreneurship Development Programmes (EDP) : Need for and Significance of EDP. Objectives of EDP. Phases of EDP. Course Contents of and Curriculum for EDP. EDP at International Levels. EDP Programmes in India. Small and Medium Enterprises – Government Policies for Micro, Small and Medium Enterprises (MSMEs), Institutional Support System for MSMEs in India. Role of DICs, SFCs, SIDBI, EDI etc. Women Entrepreneurship-Rural Entrepreneurship.

UNIT-IV : New Venture Promotion : Identification of Business Opportunities- Choice of Appropriate Form of Business Organization. Step by step approach for starting a new venture-Determining the Size of Operation. Plant Location Decision- Choice of Technology- Sources of Raising Capital.

UNIT-V : Project Management : Concept, Characteristics, Components and Significance of Project Management-Role of Project Managers - Stages of Project Management- Components of Project Management. Project Life Cycle. Project Identification and Selection. Project Formulation and Appraisal.

References:

1. David H. Holt : Entrepreneurship – New Venture Creation (Prentice Hall of India, New Delhi)
2. Marc. J. Dollinger : Entrepreneurship – Strategies & Resources (Pearson Education, New Delhi)
3. Peter F. Drucker : Innovation and Entrepreneurship (William Heinemann Ltd., Landon)
4. M.B. Shukla : Entrepreneurship and Small Business Management (Kitab Mahal, Allahabad)
5. S.S. Khanaka : Entrepreneurial Development (S. Chand & Company Ltd., New Delhi)
6. Vasant Desai : Dynamics of Entrepreneurial Development & Management (Himalaya Publishing House, Bombay)
7. B.K. Singh : Entrepreneurship (Wisdom Books)

EE 301	SOCIAL ENTREPRENEURSHIP	100	4	0	0	3

UNIT I

Need and importance of Third Sector in development. Typologies of third sector - Voluntary, NGO, NPO, CBO, CSO, Growth of third sector in India – Performance and environment of third sector. Third sector relationship to state and civil society

UNIT II

Concept, Definition, Importance – Role of a social entrepreneurship –History of Social Entrepreneurship- Social entrepreneurship Vs business entrepreneurship –Shift to Social Entrepreneurship- social entrepreneurs and social change –qualities and traits of social entrepreneurs.

UNIT III

Concept, Definition, Importance of social enterprises – Social Business-Principles and Social Innovation-similarities and differences between social enterprises and non profits – types of social enterprises – concept of Triple Bottom Line, Bottom of the Pyramid, Sustainopreneurship – Corporate Social Responsibility– Boundaries of Social Entrepreneurship. Select case studies of Indian Social Enterprises.

UNIT IV

Global & National environment to promote social enterprises and social entrepreneurship. Financial Management of social enterprises – venture capital for social enterprises – Corporate, Community and government support for social enterprises

UNIT V

Application of marketing principles in welfare and development field – social marketing. Marketing of Social Services – Case studies related to Social and service marketing in the field of Health, Education, Environment protection, Energy consumption and Human rights.

REFERENCES

1. Alex Nicholls, (2006), Social Entrepreneurship: New Models of Sustainable Social Change, New York: Oxford University Press.
2. David Bornstein, (2007). How to Change the World: Social Entrepreneurs and the Power of New Ideas, New York: Oxford University Press.
3. Fred Setterberg, Kary Schulman (1985), Beyond Profit: Complete Guide to Managing the Non Profit Organizations, New York: Harper & Row.
4. Gregory Dees, Jed Emerson, Peter Economy (2002), Enterprising Non Profits – A Toolkit for Social Entrepreneurs, New York: John Wiley and Sons.
5. Peter Drucker (1990), Managing the Non Profits Organizations: Practices and Principles, New York: HarperCollins.

EE 303	**Business Plan Preparation for Small Business**	**100**	**4**	**0**	**0**	**3**

OBJECTIVE: To explain relevance of business plans while taking business decisions for small business.

UNIT - I

Business Plan - Meaning- The why of business plan - Basic parameters - Timing of decision undertaken Project parameters - the common considerations - Factors of successful business - capital management- financial control -anticipating change and adaptability.

UNIT – II

Business plan process - sources of information - Internet, government sources and statistics - offline research resources - library - SBDC'S -Trade and industries associations - sources of market research - evaluating data- benefits of market study -coverage of market study - information sources.

UNIT - III

Business plan components - The Executive summary - company description - Industry analysis and trends - Target market - Competition - strategic position and risk assessment - Marketing plan and sales strategy - operations - Technology plan -management and organization.

UNIT – IV

Starting the Venture - Generating business idea – Source of new ideas - Methods of generating ideas - Steps in setting up a small business enterprise,

UNIT V:

Concept of Project Appraisal - Environmental scanning - Competitor and industry analysis - Feasibility study – Market feasibility, Technical / operational feasibility - Financial Feasibility - Managerial competence. Functional plans - Marketing plan – Financial plan.

Suggested Readings:

1. Entrepreneurship (6th Edition) – Robert D Hisrich, Tata McGraw Hill
2. Entrepreneurship: A Contemporary Approach – Kuratko, Thomson Learning Books
3. Small Scale Industries and Entrepreneurship (2003) – Vasant Desai, Himalaya Publishing House
4. Entrepreneurial Development – S.S. Khanka, S. Chand & Co

EE 304	Entrepreneurial Marketing	100	4	0	0	3

OBJECTIVE:
To explain start-ups, early growth stage and more mature companies have used entrepreneurial marketing as an essential competitive weapon to grow their business.

UNIT – I
Entrepreneurial marketing and Venture Opportunities: Introduction – Definitions - Methods, Channel of Marketing - Marketing Institutions and Assistance for Entrepreneurs - Customer and competitor analysis.

UNIT – II
New Tools of Entrepreneurial Marketing: Introduction - Demand-based Pricing - Entrepreneurial market opportunity analysis - Entrepreneurial marketing strategies - The entrepreneurial marketing plan – Objectives and importance of entrepreneurial marketing plan.

UNIT - III
Entrepreneurial pricing and distribution – Pricing strategies for distribution companies in India - Entrepreneurial promotion - Entrepreneurial products and services development

UNIT – IV
Entrepreneurial Tools to establish a Competitive Advantage: Branding, Pricing, Positioning, and Targeting – Entrepreneurial Advertising – Entrepreneurial sales promotion

UNIT V:
Entrepreneurial social marketing- Meaning – Application - Advantages and limitations – Experimental Marketing - Sales growth strategies.

Suggested Readings:

1. Entrepreneurship (6th Edition) – Robert D Hisrich, Tata McGraw Hill
2. Entrepreneurship: A Contemporary Approach – Kuratko, Thomson Learning Books
3. Small Scale Industries and Entrepreneurship (2003) – Vasant Desai, Himalaya Publishing House
4. Entrepreneurial Development – S.S. Khanka, S. Chand & Co

EE 305	Planning, Structuring and Financing Small Business	100	4	0	0	3

Objectives:
To enable the students to know the importance of small scale business in a developing economy like India and motivate the students to start small scale business.

Unit I:
Basics of Small Business Enterprise: – Definition – Features – Role of Small Business in Economic Development – Reasons for Establishing Small Business – Quality of Small Businessmen – Advantages and Disadvantages of Small Business – Reasons for Failures of Small Business – Characteristics of Successful Small Businessmen – Different Stages of Small business – Steps in Setting up a Small Business – Crisis Management in Business – Relationships between Small and Large Units – Small Sector in India – A note on Family Business.

Unit II:
Dynamics of Small Business Concepts and Definitions of Small Scale Industries (SSIs) – Role of SSIs – Government Policy and Development of SSIs – Growth and Performance – SSI Sector and Committee Report – Reservation of items for SSI – Problems of SSI – Sickness of SSI: Causes, Symptoms and Cures – Prospects of SSI in free Economy.

Unit III:
Institutions Supporting Small Business Central, State and Other Institutional Support for SSI – Technological Upgradation and Institutional facility for SSI – Incentives and Subsidies for SSI.

Unit IV:
Management of Small Business Production Management – Financial Management – Marketing Management – Strategic Management – Personal Management – and Office Management in Small Business Enterprises.

Unit V:
Global Opportunities for Small Business Small Enterprises in International Business – Export Documents and Procedures for Small Enterprises – E-commerce and Small Enterprises – Exposure and Observation Visit: Poultry, Sericulture, Courier, Cell Phone Sales and Service, Dairy, Mushroom Cultivation, Ornamental Pottery, Dying Unit, Power loom and Handloom, Blood Bank, Rice Mill and Food and Fruit Processing Unit – Role of Women SHGs in Micro Enterprises.

Suggested Readings:
1. Barrow C. The Essence of Small Business, Prentice Hall of India, New Delhi, 1997.
2. Bedapatai Mohanty, Economics of Small Scale Industries, Ashish, New Delhi, 1986
3. Charantimath P.M., Entrepreneurship Development and Small Business Enterprises, Pearson Education, New Delhi, 2006.
4. Cormon J and Lussier R.N., Small Business Management: A Planning Approach, IRWIN, London, 1996
5. Datt, Ruddar and Sundharam K.P.M., Indian Economy, S.Chand, New Delhi, 2006.
6. Desai S.S.M., Industrial Economy of India, Himalaya Publishers, New Delhi, 1968.
7. Development Commissioner, Small Scale Industries, Ministry of ID and IT, Government of India, New Delhi, 1985.
8. Dhanulinga Nadar, Small Scale Industry Interrelationship with Large Scale Industry, Rainbow, Coimbatore, 1985.
9. Francis Cherunilam, Industrial Economics : Indian Perspectives, Himalaya, Delhi, 1989.
10. Ganapathy Iyer, E.V., Indian Industrial Development Problems, Ganapathy Trans – West,

Madras, 1983.

EE-401	Marketing for Small Business	100	4	0	0	3

Unit I

Introduction to Marketing for small business – Nature and Characteristics – Distinction between corporate marketing and marketing for small business – small business Marketing: Concept and Scope – Nature – Characteristics, Taxonomy – Composition of Small Business Market – small business Requirements – Consumer Durables and Non-Durables – Problems of Small Business Marketing – Attractiveness of Market – Factors affecting for Small business Marketing – Value Addition to Small Business Marketing - Characteristics of Successful Small Businessmen – Different Stages of Small business – Crisis Management in Business.

Unit II

Small Business Market Environment: Factors in Small Business Market Environment: Social, Economic, Ethical, Political, Physical, Technological, and Demographic – Occupational Pattern – Income Generation – Expenditure Pattern – Small Business Market Infrastructure - Dynamics of Small Business Concepts and Definitions of Small Scale Industries (SSIs) – Role of SSIs – Government Policy and Development of SSIs – Growth and Performance – SSI Sector and Committee Report – Reservation of items for SSI.

Unit III

Small Business Marketing Channels Small Business Marketing Channels – Old Set-up – New Players – New Approaches – Marketing and Distribution Trends, New Dynamics – Marketing Channels for Food grains: Oil Seeds – Egg – Live Poultry – Social Marketing - Opportunity for Retail Trading.

Unit IV

Small Business Marketing Promotional Strategies: Small Business Market Segmentation – Targeting – Selection of Segments – Coverage of Segments – Positioning – Product, Pricing, Distribution and Promotional Strategies - Global Opportunities for Small Business Small Enterprises in International Business – Export Documents and Procedures for Small Enterprises – E-commerce and Small Enterprises.

Unit V Marketing of Small Business Inputs and Outputs: Small Business Inputs: Market Mechanism of inputs for agriculture and Allied industries - Small Business Outputs: Marketing of agricultural produces – concepts of marketable and marketed surplus – market mechanism: unregulated and regulated – Marketing of Small Business industrial products – Mechanism, opportunities and challenges.

Reference

1. Shukla M.B. Entrepreneurship and Small Business Management, Kitab Mahal, 2003, Agra.
2. Ashis Gupta Indian Entrepreneurial Culture, Wishwa Prakashan Ltd., Surrey, UK.,1994.
3. Colombo Plan Entrepreneurship Development, Staff College Tata McGraw-Hill, New Delhi, 1998 for Technician Education.
4. Malli D.D. Training for Entrepreneurship and Self-Employment. Mittal, New Delhi, 1999
5. Khanka S.S. Entrepreneurial Development, S Chand & Co., New Delhi
6. Bedi R.V. and Bedi N.V., Rural Marketing, Himalaya, Mumbai, 2006
7. Datt, Ruddar and Sundharam K.P.M., Indian Economy, S.Chand, New Delhi, 2006.
8. Krishnamacharyulu C.S.G. and Lalitha Ramakrishnan, Rural Marketing : Texts and Cases, Pearson Education, New Delhi, 2006.
9. Barrow C. The Essence of Small Business, Prentice Hall of India, New Delhi, 1997.
10. Bedapatai Mohanty, Economics of Small Scale Industries, Ashish, New Delhi, 1986
11. Charantimath P.M., Entrepreneurship Development and Small Business Enterprises, Pearson Education, New Delhi, 2006.
12. Cormon J and Lussier R.N., Small Business Management: A Planning Approach, IRWIN,

London, 1996

EE-402	Finance and Accounting for Small Business	100	4	0	0	3

Unit – I

Accounts - Accounting Process - Accounting Concepts & Conventions - Accounting equation - Basic Accounting Procedure - Single Entry System : an admixture - Double Entry System - Accounting Elements - Classification of Accounts - Golden Rules - Journal - Classification of Journal - Ledger : Principal Books of Accounts - Cash Book - Vouchers-The documents to the transactions - Trial Balance - Depreciation - Preparation of Final Accounts and Balance Sheet - Techniques of Preparation of Final Accounts -The Balance Sheet

Unit – II

Finance: Understanding Balance Sheet – It's Use - Profit and Loss Account (P/L A/c) - Understanding Financial Statement - Ratio Analysis - Cash Flow Statements - Cash Budget - Working Capital : Determination & Calculation - Operating Cycle - Computation of Working Capital - Framework for Regulation of Bank Credit - Long-Term Source of Finance - Retained Earnings - Equity Capital / Equity Share - Debenture - Preference Shares.

Unit III

Costing: Introduction - Classification Cost - Use of Cost Data - Marginal Costing - Cost-Volume Profit Relationship - Mathematical Relationship between Cost-Volume Profit - Margin of Safety -BEP Analysis : Graphical Analysis - Use of Marginal costing in decision making- pricing decision, make or buy etc.

Unit IV

Taxation: Income Tax - Definitions - Residential Status - How to Compute Total Income - Profit and Gains of Business or Profession - Deduction Under Chapter VIA - Central Sales Tax Act, 1956 - Preliminary - Formulation of Principles for Determining when a Sale or Purchase of Goods Taken Place in the Course of Inter-state Trade or Commerce or Outside a State or in the Course of Import or Export - Inter-State Sales Tax - Goods of Special Importance in Inter-State Trade or Commerce - Liability in Special Cases - Central Excises Act, 1944 - Preliminary - Levy and Collection of Duty -Powers and Duties of Officers and Landholders - Transport by Sea - Adjudication of Confiscations and Penalties - Appeals - Presumption as to Documents - Supplemental Provisions.

Unit V

Goods and Services Tax (GST): – concept and status – Genesis - GST and Centre-State Financial Relations - Constitution (One Hundred and First) Amendment Act, 2016 - Goods and Services Tax Council (GSTC) - Salient Features of GST - Benefits of GST - Goods and Services Tax Network – GST Registration process of business enterprises – GST HSN – SAC Cods and tax rates.

References:

1. Dhanesh K Khatri, Financial Accounting, Mc Graw Hill.
2. Asish K. Bhattacharyya, Financial Accounting for Business Managers, 3rd Edition, PHI, Eastern Economy Edition.
3. Dr. V K Goyal, Financial Accounting, 3rd Edition, EB (Excel Books).
4. S N Maheswari, Suneel K Maheshwari and Sharad K Maheshwari, Financial Accounting, 5th Edition, Vikas Publications.
5. Horngren, Sundem, Stratton, Burgstahler and Schatzberg, Introduction to Management Accounting, 14th Edition, Pearson Hall.
6. Charities An Exhaustive Treatise for Tax and Other....by S Rajaratnam , M. Natarajan , C.P. Thangaraj
7. Laws of Trade Tax Central Sales Tax and Tax on Ent....by O S Vatsa
8. Trade Tax, Central Sales Tax & Tax on Entry of Goo.... by Arvind Agarwal , Adarsh K Gupta

9. GST official website: https://www.gst.gov.in

EE-403	**Technology Appreciation and Intellectual Property Rights**	**100**	**4**	**0**	**0**	**3**

UNIT I

Introduction , Definitions, Role and importance , Technology developments, implications of Technology Management, Technology change, TLC, Diffusion and Growth of Technologies - Technological Transformation alternatives, Technology Policy and Planning, Technology development-Options & Strategies, Socio-Economic planning, production functions & Technological Change, Macro effects of Technology change.

UNIT II

Technology Transfer - Models, Modes, Technology search strategy, Dimensions of Technology Transfer, Features & Routes of Technology Transfer, Technology absorption capabilities, Pricing of Technology Transfer agreements, Code of conduct for Technology transfer , Government initiative, Technology transfer and absorption process at unit level.

Unit III

Technology cycles, innovation streams, Managing through cycles of technological change - Planned innovation, planned innovation systems, Market driven innovation: Commercialization of Intellectual Property: Traditional IP and Evolving IP - Assignment – Licensing – Cross License – Patent Pool – Negotiations – Defensive Publications – Technical Disclosures – Patent Pooling – Patent Trolling - Brand Management- Brand and Pricing Strategies – Patent Mining – Patent Landscaping and Patent Mapping

Unit IV

Strategic Management of Intellectual Property: Defensive & Offensive Strategies – Intellectual Asset Management - Intellectual Property Audit – Identification & Grouping of Intangible Assets into Bundles - Intangible Asset Management Plan – Value Maximization Strategies – Value Extraction Strategies – Licensing Process and Management

Unit V

Valuation of Intellectual Property: Need for IP Valuation – Approaches of IP Valuation – Cost Approach – Income Approach – Market Approach – Methods of IP Valuation – "25% Rule" Method - Industry Standards Methods - Ranking Method - Surrogate Methods - Disaggregation Methods - Monte Carlo Method - Real Options Methods - The CAV Method - Market Value Method -Collateralization of IPA

References:

1. Sunita K. Sreedhararn , An Introduction to Intellectual Asset Management.
2. Patrick H. Sullivan, Profiting from Intellectual Capital: Extracting Value from Innovation 3. Tulika Rastogi, IP Audit: Your Way to Healthy Organisation
3. Gordon V. Smith and Russell L. Parr, Valuation of Intellectual Property and Intangible Assets, 3rd Edition
4. Bruce Berman, From Assets to Profits: Competing for IP Value and Return (Intellectual Property-General, Law, Accounting & Finance, Management, Licensing, Special Topics).
5. Loganathan, E.T. "IPR" (IPRS), TPIPS Agreement and Indian Laws.
6. Dasgupta. S: Technology and Creativity & Creativity, Oxford University Press, New York, 1996.
7. Proctor. T: The Essence of Management Creativity, Prentice - Hall, New Delhi, 1997.
8. Richards. T: Creativity and Problem Solving Network, Gower, Hampshire, 1997.
9. Ceserani. J & Greatwood. P: Innovation & Creativity, Kogan Page, London, 1995.
10. Ziman. J: Technological Innovation as an Evolutionary Process, Cambridge University Press, Cambridge, 2000

EE-404	Innovation Technology Management	100	4	0	0	3

Unit – I

Analyzing the Current Business Scenario, Innovation and Creativity - An Introduction, Innovation in Current Environment, Types of Innovation , School of Innovation. Challenges of Innovation, Steps of Innovation Management, Idea Management System, Divergent Vs Convergent Thinking, Levers of Idea Management. Experimentation in Innovation Management, Idea Championship,Participation for Innovation, Co-creation for Innovation , Proto typing to Incubation.

Unit – II

Marketing of Innovation, Technology Innovation Process, Technological Innovation Management Planning, Technological Innovation Management Strategies, Technology Forecasting.

Unit – III

Introduction to Technology Management:Concept and Meaning of Technology and Technology Management- Technology; Technology management, Evolution and Growth of Technology, Role and Significance of Technology Management, Impact of Technology on Society and Business- Technology and competition; Key issues in managing technological innovation, Forms of Technology- Process technology; Product technology

Unit –IV

Technology Acquisition*:* Technology Acquisition, Alternatives for Acquiring New Technologies, Reasons Compelling a Company for Obtaining a New Technology, Management of Acquired Technology, Measures of Scale and Mechanisms for Acquiring Technologies- Economy of scale or Scale economy; Levels of scale; The measurement of scale; Factors affecting the choice of scale

Unit - V

Technology Forecasting*:*Concept of Technology Forecasting- Characteristics of technology forecasting ; Technology forecast method; Principles of technology forecasting, Technology Forecasting Process, Need and Role of Technology Forecasting, Forecasting Methods and Techniques, Planning and Forecasting, *Technology Strategy and Competitiveness:*Technology Strategy-Technology strategy and management; Elements of an accessible technology strategy, Innovation Management, Competitive Advantage- Components of competitive advantage; Creating competitive advantage using value chain, Technology Management Evaluation or Assessment

References:

1. Industry, Innovation and Infrastructure: Leal Filho, W. (Ed), Azul, A. M. (Ed), Brandli, L. (Ed), Lange Salvia, A. (Ed), Wall, T. (Ed) *(2021)*
2. Innovation Management in the Intelligent World: Daim, T. U. (Ed), Meissner, D. (Ed) *(2021)*
3. *Technological Innovation and International Competitiveness for Business Growth: Ferreira, J. J. M. (Ed), Teixeira, S. J. (Ed), Rammal, H. G. (Ed)* (2020)
4. Entrepreneurship, Technology Commercialization, and Innovation Policy in Africa: Daniels, C. U. (Ed), Dosso, M. S. (Ed), Amadi-Echendu, J. (Ed) *(2020)*
5. *Business innovation with new ICT in the Asia-Pacific: Case studies: Kosaka, M. (Ed), Wu, J. (Ed), Xing, K. (Ed), Zhang, S. (Ed)* (2021)

EE-405	Venture Valuation and Accounting	100	4	0	0	3

Unit I

Joint Ventures: Concept and Meaning of Joint Ventures, Features, Need, growth and Types of Joint Ventures, Structures, process and Legal aspects – Advantages and Problems faced in Joint Ventures, Prospects of Joint Ventures and Strategic Alliance - Relevant case study of successful and failed joint ventures.

Unit II

Mergers and Acquisitions: Introduction to mergers, types of mergers, theories of mergers & acquisitions; Cross-border mergers and acquisitions, issues and challenges in cross border M&A. Handling cross-culture and taxations issues in cross-brder M&A. Analysis of Post-Merger Performance. Demerger, types of demerger, reverse merger, buyback of shares, leverage buy-out strategy, merger strategy - growth, synergy, operating synergy, financial synergy, diversification. Takeover and its types, takeover strategy, takeover bids, legal framework for mergers and acquisitions, leverages and buyouts.

Unit III

Deal Valuation and Evaluation: Factors affecting valuation basics, methods of valuation, cash flow approaches, economic value added (EVA), sensitivity analysis, valuation under takeover regulation, valuation for slump sale, cost-benefit analysis and swap ratio determination

Unit IV

Post-Merger Evaluation: Financial Evaluation of Mergers & Acquisitions, Impact on shareholders‘ Wealth; Methods of payment and financing options in mergers & acquisitions, financing decision, Merger, Acquisition and Competition law 2002, SEBI (Securities & Exchange Board of India) Takeover Code 2011 and criteria for negotiating friendly takeover.

Unit V

Consignment Accounts: Important terms; Accounting records; Valuation of unsold stock; Conversion of consignment into branch Joint Venture Accounts: Meaning of joint venture; Joint venture and partnership; Accounting records Branch Accounts: Partnership Accounts Essential characteristics of partnership; Partnership Deed; Final Accounts; Adjustment after closing the accounts; Fixed and fluctuating capital; Goodwill; Joint Life Policy; Change in Profit Sharing Ratio Reconstitution of a partnership firm- Admission of a partner, Retirement of a partner’ Death of a partner; Amalgamation of partnership firms; Dissolution of a partnership firm;- Modes of dissolution of a firm; Accounting entries; Insolvency of Partners;

References

1. Gupta. R.L.and Radhaswamy. M: Financial Accounting; Sultan Chand and Sons, New Delhi.
2. Monga J.R., Ahuja Girish, and Sehgal Ashok: Financial Accounting; Mayur Paper Nokia.
3. Shukla. M.C., Grewal T.S., and Gupta, S.C.: Advanced Accounts: S. Chand & Co. New Delhi.
4. .Weston, Fred; Chung, Kwang S. &Siu, Jon A.: Takeovers, Restructuring and Corporate Governance, (2nd ed.). Pearson Education
5. Gupta, Manju (2010): Contemporary Issues in Mergers and Acquisitions. Himalaya Publishing House.
6. Sundarsanam (2006); Creating Value from Mergers and Acquisitions, (1st ed.) Pearson Education.
7. Ramanujan. S. (1999); Mergers: The New Dimensions for Corporate Restructuring, McGraw Hill
8. Narayankar, Ravi, (2013): Merger and Acquisitions Corporate Restructuring, Strategy