

NATIONAL ENGINEERING COLLEGE

(An Autonomous Institution Affiliated to Anna University Chennai & Accredited by NAAC)

K.R.NAGAR, KOVILPATTI – 628 503

www.nec.edu.in

REGULATIONS – 2015 CURRICULUM & SYLLABUS

B. Tech. – INFORMATION TECHNOLOGY
Accredited by NBA

DEPARTMENT OF INFORMATION TECHNOLOGY

VISION

To produce technically competent and value based IT Professionals to meet the current challenges of the modern IT industry.

MISSION

The IT department will achieve its vision by

- Imparting quality education with innovative components in teaching learning process.
- Conducting student centric programme to enhance communication, team spirit, leadership skills and self learning.
- Motivating the students to realize the need of ethics and human values.
- Developing a conducive environment for collaborative research.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

Programme Educational Objectives are broad statements that describe the career and professional accomplishments that the program is preparing graduates to achieve:

1. Excel in IT, ITES industries and higher education by applying the principles and practices of computing.
2. Maintain professionalism and adapt to emerging technologies.

PROGRAM OUTCOMES (POs)

At the time of graduation, our IT graduates are expected to have:

1. Apply knowledge of mathematics, physics, chemistry, biological sciences, Engineering fundamentals and Software Development Fundamentals, Information Management and Security, Networking and web Systems to the solution of complex engineering problems in Information Technology.
2. Identify, formulate, research literature and analyze complex Information Technology problems in Software Engineering, Data Mining, Mobility Engineering, Analytic Computing, Network Management and security, reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
3. Design solutions for complex Information Management and Security, Networking and web System problems and design systems, components or processes that meet specified needs with appropriate considerations for environment, culture, society, public health and safety.
4. Conduct investigations of complex Information Management and Security, Networking and web System problems using research based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.
5. Create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering problems in Emerging technologies, Networking and web Systems with an understanding of the limitations.

6. Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice in Healthcare and Banking and solutions to complex engineering problems in Networking and Web Systems and Emerging Technologies.
7. Understand and evaluate the sustainability and impact of professional engineering work in the solution of complex Information Technology problems in societal and environmental contexts.
8. Apply ethical principles and commit to professional ethics and responsibilities and norms of Computer Ethics in engineering practice.
9. Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.
10. Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. Demonstrate knowledge and understanding of engineering management principles and economic decision making and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments
12. Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

PREAMBLE OF THE CURRICULUM & SYLLABI

The Curriculum and Syllabi under Regulations 2015 is designed keeping in mind the Outcome Based Education (OBE) and Choice Based Credit System (CBCS). The course content of each course shall be fixed in accordance with the Program Educational Objectives (PEOs), Program Outcomes (POs) and Course Outcomes (COs).

The CBCS enables the students to earn credits across programmes and provides flexibility for slow and fast learners in registering the required number of credits in a semester. The CBCS facilitates transfer of credits earned in different departments / Centers of other recognized / accredited universities or institutions of higher education in India and abroad either by studying directly or by online method.

The curriculum of **IT programme** is designed with total number of credits **168 (125 for Lateral entry)** and shall have the following category of courses in the curriculum.

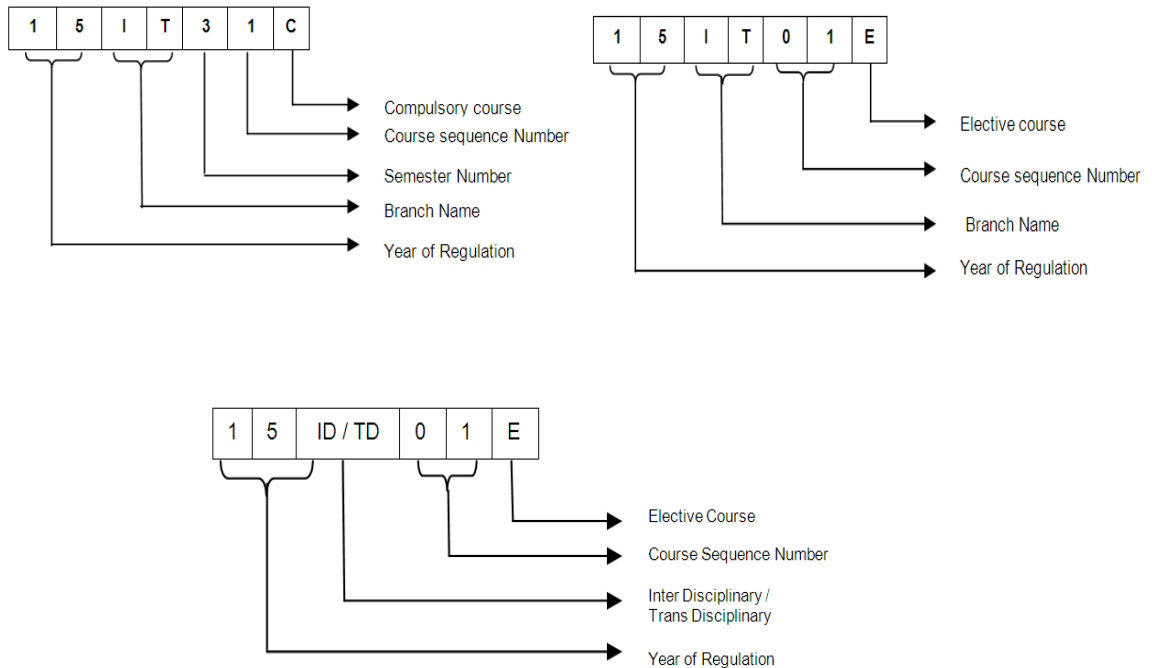
1. **Foundation courses**
 - a. **Common Foundation Courses (CFC)** include Mathematics, Basic Sciences, Engineering Sciences and Skill Based Courses.
 - b. **Specific Foundation Courses (SFC)** include the basic courses specific to a programme of study.
2. **Programme Core Courses (PCC)** include the core courses relevant to the chosen programme of study and the Employability Enhancement courses such as Project, Seminar and Inplant training/ Internship.
3. **Programme Elective Courses (PEC)** include the elective courses relevant to the chosen programme of study.
4. **Open Elective Courses (OEC)** include Inter-disciplinary and Trans-disciplinary courses. The students shall study Inter-disciplinary courses offered in other Engineering/Technology Programmes through regular mode and Trans-disciplinary courses through self study mode.
5. **Mandatory courses (MAC)** include the courses recommended by the regulatory bodies such as AICTE, UGC etc as given below:
 - a. Technical English / Professional English
 - b. Professional Ethics and Human Values
 - c. Environmental Science and Engineering
 - d. Communication Skills Laboratory
6. Every student shall undergo one Interdisciplinary and one Transdisciplinary course.

Performance in each course of study shall be evaluated based on Continuous Assessment throughout the semester and end semester examination at the end of the programme. Keeping in mind the content of the courses and delivery methods, different question paper patterns are suggested.

QP - Question Pattern

Question pattern	1 mark	2 marks	4 marks	10 marks	12 marks	16 marks	20 marks	Total
A	--	--	--	--	--	--	1 Qn Compulsory & 4 Qns (either or type)	100
B	--	10	--	--	--	1 Qn Compulsory & 4 Qns (either or type)	--	100
C	10	--	10 out of 12	1 Qn Compulsory & 4 Qns (either or type)	--	--	--	100
D	10	10	5 out of 6	1 Qn Compulsory & 4 Qns (either or type)	--	--	--	100
E	--	10	5 out of 6	--	1 Qn Compulsory & 4 Qns (either or type)	--	--	100
F	--	--	--	--	--	--	5 out of 8	100
G	--	5	--	2 Qns (either or type)	--	--	--	30

FORMAT FOR COURSE CODE



B.Tech. – INFORMATION TECHNOLOGY

REGULATIONS – 2015

CURRICULUM AND SYLLABUS

SEMESTER – I

S. No	Course Category	Course Code	COURSE TITLE	L	T	P	C	QP
THEORY								
1.	MAC	15SH11C	Technical English*	3	0	0	3	B
2.	CFC	15SH12C	Mathematical Foundations for Engineers*	3	2	0	4	B
3.	CFC	15SH13C	Engineering Physics*	3	0	0	3	B
4.	CFC	15SH14C	Engineering Chemistry*	3	0	0	3	B
5.	CFC	15SH15C	Introduction to Engineering*	2	0	0	2	A
6.	CFC	15SH16C	Engineering Graphics*	2	0	2	3	A
PRACTICAL								
7.	CFC	15SH17C	Engineering Physics and Engineering Chemistry Laboratory*	0	0	2	1	
8.	CFC	15SH18C	Engineering Practice Laboratory*	0	0	2	1	
TOTAL				16	2	6	20	

SEMESTER – II

S. No	Course Category	Course Code	COURSE TITLE	L	T	P	C	QP
THEORY								
1.	MAC	15IT21C	Professional English*	3	0	0	3	B
2.	SFC	15IT22C	Probability and Statistics ^{\$}	3	2	0	4	B
3.	SFC	15IT23C	Physics of Solid State Devices ^{\$}	3	0	0	3	B
4.	SFC	15IT24C	Digital Systems	3	2	0	4	B
5.	CFC	15IT25C	C Programming for Engineers*	3	0	0	3	B
6.	MAC	15IT26C	Environmental Science and Engineering*	3	0	0	3	A
PRACTICAL								
7.	SFC	15IT27C	Applied Physics and Environmental Chemistry Laboratory ^{\$}	0	0	2	1	
8.	CFC	15IT28C	C Programming Laboratory*	0	0	2	1	
9.	SFC	15IT29C	Digital Laboratory	0	0	2	1	
TOTAL				18	4	6	23	

MAC - Mandatory Course, CFC - Common Foundation Course, SFC - Specific Foundation Course,
PCC – Programme Core Course, XEC - X Stands for P or O (PEC – Programme Elective Course,
OEC – Open Elective Course) *Common to all B.E. / B.Tech., Programmes, \$Common to CSE and IT

SEMESTER – III

S. No	Course Category	Course Code	COURSE TITLE	L	T	P	C	QP
THEORY								
1.	SFC	15IT31C	Discrete Mathematics	3	2	0	4	B
2.	PCC	15IT32C	Data Structures and Algorithms	3	0	0	3	E
3.	PCC	15IT33C	Object Oriented Programming	3	0	0	3	C
4.	SFC	15IT34C	Principles of Data Communication	3	0	0	3	B
5.	PCC	15IT35C	Computer Architecture	3	0	0	3	C
6.	MAC	15IT36C	Professional Ethics and Human Values*	3	0	0	3	A
PRACTICAL								
7.	PCC	15IT37C	Object Oriented Programming Laboratory	0	0	2	1	
8.	PCC	15IT38C	Data Structures Laboratory	0	0	2	1	
9.	MAC	15IT39C	Communication Skills Laboratory*	0	0	2	1	
TOTAL				18	2	6	22	

SEMESTER – IV

S. No	Course Category	Course Code	COURSE TITLE	L	T	P	C	QP
THEORY								
1.	SFC	15IT41C	Applied Mathematics for Information Technology	2	2	0	3	B
2.	PCC	15IT42C	C# and .Net framework	3	0	0	3	E
3.	PCC	15IT43C	Operating Systems	3	0	0	3	C
4.	PCC	15IT44C	Database Management Systems	3	0	0	3	C
5.	PCC	15IT45C	Software Engineering	3	0	0	3	B
6.	MAC	15IT46C	Green IT	3	0	0	3	B
PRACTICAL								
7.	PCC	15IT47C	Operating Systems Laboratory	0	0	2	1	
8.	PCC	15IT48C	Database Management Systems Laboratory	0	0	2	1	
9.	PCC	15IT49C	C# and .Net framework Laboratory	0	0	2	1	
TOTAL				17	2	6	21	

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SEMESTER – V

S. No	Course Category	Course Code	COURSE TITLE	L	T	P	C	QP
THEORY								
1.	SFC	15IT51C	Embedded Systems	3	0	0	3	B
2.	PCC	15IT52C	Internet and Web Technology	3	0	0	3	E
3.	PCC	15IT53C	Computer Networks	3	0	0	3	E
4.	PCC	15IT54C	Multimedia Computing	3	0	0	3	B
5.	MAC	15IT55C	Project Management and Finance*	3	0	0	3	B
6.	XEC		Elective-I	3	0	0	3	B
PRACTICAL								
7.	PCC	15IT56C	Internet and Web Technology Laboratory	0	0	2	1	
8.	PCC	15IT57C	Networking Laboratory	0	0	2	1	
9.	PCC	15IT58C	Multimedia Laboratory	0	0	2	1	
TOTAL				18	0	6	21	

SEMESTER – VI

S. No	Course Category	Course Code	COURSE TITLE	L	T	P	C	QP
THEORY								
1.	PCC	15IT61C	Software Project Management	3	0	0	3	B
2.	PCC	15IT62C	Enterprise Mobility	3	0	0	3	E
3.	PCC	15IT63C	Data Analytics and Business Intelligence	3	0	0	3	B
4.	PCC	15IT64C	Cryptography and Network Security	3	2	0	4	B
5.	PCC	15IT65C	Cloud Computing	3	2	0	4	B
6.	XEC		Elective-II	3	0	0	3	B
PRACTICAL								
7.	PCC	15IT66C	Data Analytics Laboratory	0	0	2	1	
8.	PCC	15IT67C	Mobile Technologies Laboratory	0	0	2	1	
9.	PCC	15IT68C	Product Development Laboratory*	0	0	4	2	
TOTAL				18	4	8	24	

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SEMESTER – VII

S. No	Course Category	Course Code	COURSE TITLE	L	T	P	C	QP
THEORY								
1.	XEC		Elective-III	3	0	0	3	B
2.	XEC		Elective-IV	3	0	0	3	B
3.	XEC		Elective-V	3	0	0	3	B
4.	XEC		Elective-VI	3	0	0	3	B
5.	XEC		Elective-VII	3	0	0	3	B
PRACTICAL								
6.	XEC		Elective Laboratory	0	0	2	1	
7.	PCC	15IT71C	Mini Project	0	0	8	4	
8.	PCC	15IT72C	Research Paper and Patent Review – Seminar	0	0	2	1	
9.	PCC	15IT73C	Comprehension	0	0	2	1	
TOTAL				15	0	14	22	

SEMESTER – VIII

S. No	Course Category	Course Code	COURSE TITLE	L	T	P	C	QP
THEORY								
1.	XEC		Elective-VIII	3	0	0	3	B
PRACTICAL								
2.	PCC	15IT81C	Project Work	0	0	20	10	
3.	PCC	15IT82C	Internship / Inplant Training	0	0	4	2	
TOTAL				3	0	24	15	

MAC - Mandatory Course, CFC - Common Foundation Course, SFC - Specific Foundation Course, PCC – Programme Core Course, XEC - X Stands for P or O (PEC – Programme Elective Course, OEC – Open Elective Course) *Common to all B.E. / B.Tech., Programmes, \$Common to CSE and IT

PROGRAMME ELECTIVE COURSES (PEC)

S. No	Course Category	Course Code	COURSE TITLE	L	T	P	C	QP
INFORMATION MANAGEMENT AND SECURITY								
1.	PEC	15IT01E	Distributed Databases	3	0	0	3	B
2.	PEC	15IT02E	Advanced database systems	3	0	0	3	B
3.	PEC	15IT03E	Knowledge Management	3	0	0	3	B
4.	PEC	15IT04E	Information Storage and Management	3	0	0	3	B
5.	PEC	15IT05E	Biometrics	3	0	0	3	B
6.	PEC	15IT06E	Bio informatics	3	0	0	3	B
7.	PEC	15IT07E	Analytic Computing	3	0	0	3	B
8.	PEC	15IT08E	Information Security	3	0	0	3	B
9.	PEC	15IT09E	Big data Analytics	3	0	0	3	B
10.	PEC	15IT10E	Cyber Forensics	3	0	0	3	B
11.	PEC	15IT11E	Digital Signal Processing	3	0	0	3	B
SOFTWARE DEVELOPMENT FUNDAMENTALS								
12.	PEC	15IT12E	Software Testing	3	0	0	3	B
13.	PEC	15IT13E	Advanced Java	3	0	0	3	B
14.	PEC	15IT14E	Software Quality Assurance	3	0	0	3	B
15.	PEC	15IT15E	Internet of Things	3	0	0	3	B
16.	PEC	15IT16E	Natural Language Processing	3	0	0	3	B
17.	PEC	15IT17E	Embedded and Real Time Systems	3	0	0	3	B
NETWORKING AND WEB SYSTEMS								
18.	PEC	15IT18E	Network Management	3	0	0	3	B
19.	PEC	15IT19E	Game Programming	3	0	0	3	B
20.	PEC	15IT20E	High Performance Networks	3	0	0	3	B
21.	PEC	15IT21E	Social Networking	3	0	0	3	B
22.	PEC	15IT22E	Service Oriented Architecture	3	0	0	3	B
23.	PEC	15IT23E	M-Commerce	3	0	0	3	B
24.	PEC	15IT24E	Digital Communication	3	0	0	3	B
ELECTIVE LABORATORY								
25.	PEC	15IT25E	Big data Analytics Laboratory	0	0	2	1	
26.	PEC	15IT26E	Software Testing Laboratory	0	0	2	1	
27.	PEC	15IT27E	Advanced Java Laboratory	0	0	2	1	
28.	PEC	15IT28E	Case Tools Laboratory	0	0	2	1	

Open Elective Course (OEC)
Group – I (Inter-disciplinary courses)

S. No	Course Category	Course Code	COURSE TITLE	L	T	P	C	QP
Any one of the following course is compulsory								
1.	OEC	15ID01E	Product Design and Development	3	0	0	3	A
2.	OEC	15ID02E	Disaster Management	3	0	0	3	A
3.	OEC	15ID03E	Energy Engineering	3	0	0	3	A
4.	OEC	--	Other Programme Courses	3	0	0	3	As specified for the Chosen Course

Group-II (Trans-disciplinary courses) - Self Study Course

S. No	Course Category	Course Code	COURSE TITLE	L	T	P	C	QP
Any one of the following course is compulsory								
1.	OEC	15TD01E	Indian Business Laws	0	0	0	3	F
2.	OEC	15TD02E	Leadership and Personality Development	0	0	0	3	F
3.	OEC	15TD03E	International Business Management	0	0	0	3	F
4.	OEC	15TD04E	Basics of Marketing	0	0	0	3	F
5.	OEC	15TD05E	Retailing and Distribution management	0	0	0	3	F
6.	OEC	15TD06E	International Economics	0	0	0	3	F
7.	OEC	15TD07E	Indian Economy	0	0	0	3	F
8.	OEC	15TD08E	Rural Economics	0	0	0	3	F
9.	OEC	15TD09E	International Trade	0	0	0	3	F
10.	OEC	15TD10E	Global Challenges and issues	0	0	0	3	F
11.	OEC	15TD11E	Indian Culture and Heritage	0	0	0	3	F
12.	OEC	15TD12E	Indian History	0	0	0	3	F
13.	OEC	15TD13E	Sustainable Development and Practices	0	0	0	3	F
14.	OEC	15TD14E	Women in Indian Society	0	0	0	3	F
15.	OEC	15TD15E	Indian Constitution	0	0	0	3	F
16.	OEC	15TD16E	Bio Mechanics in Sports	0	0	0	3	F

15SH11C

TECHNICAL ENGLISH
(Common to all B.E. / B.Tech. Degree Programmes)

L T P C
3 0 0 3

COURSE OUTCOMES

Upon completion of this course, the students will be able to

CO1: acquire the basics of English communication skills. (K3)

CO2: apply the basic language skills to understand various aspects of technical writing. (K3)

CO3: understand main ideas, specific details and implied meaning while listening and develop the factual & imaginative information. (S4)

CO4: coordinate and communicate in a wide range of situation. (S4)

CO5: integrate and apply the acquired skills in real life situation. (S4)

UNIT I

9

Parts of Speech - Sentence Structure (SV/SVO/SVC/SVIODO)- Identifying the kinds of sentences (Statement, Interrogative, Imperative, Exclamatory & Negative) - Informal writing (Diary writing & letter to friend / parent / siblings) - Self Introduction -Listening for general information.

UNIT II

9

Transformation of words into different grammatical forms- Converting one kind of sentence into another sentence (Statement, Interrogative, Imperative, Exclamatory & Negative) - Technical Vocabulary - Tense Usage (Present tense- Past tense - Future tense - Writing passages in all tenses) -Letter writing (Permission letter & Requisition letter) - Listening for specific information.

UNIT III

9

Personality Adjective - Concord - Letter Writing: Invitation / Acceptance letters - Itinerary Writing (with valued points/ situation) - Phonetics (Vowels - Consonants - Diphthongs) - Listening and filling up the information - Process Description (with valued points).

UNIT IV

9

IF Conditionals - British & American Vocabulary - Letter Writing (Declining / Thanking letters) - Email writing (with valued points) - Instruction Writing - Listening and giving opinion on the pictures.

UNIT V

9

Reading comprehension - Error Spotting (Article, Preposition, Modals and Concord) - Presenting article based on newspaper reading- Situational Conversation - Listening and writing dialogues – Checklists.

L: 45 TOTAL: 45 PERIODS

Suggested Activity: Each student should read the suggested fiction for oral assignment

TEXT BOOKS

1. Rizvi. M. Ashraf, "Effective Technical Communication", 1st Edition, The Mc Graw Hill Education Private Limited, New Delhi, 2005.
2. Dutt P. K., Rajeevan G. and Prakash C.L.N., "A Course in Communication Skills", 1st Edition, Cambridge University Press, India, 2007.

REFERENCES

1. John Sinclair, "Collins Cobuild English Grammar", 3rd Edition, Collins Publishers, London, 2011.
2. Jan Svartvik, Sidney Greenbaum, Geoffery Leech, Randolph Quirk "A Comprehensive Grammar of the English Language", 2nd Edition, Longman Inc., Newyork, 2014.
3. Micheael Vince, Peter Sunderland, "Advanced Language Practice with Key", 3rd Edition, Macmillan Publishers Limited, Italy, 2003.

Listening files: Audio files from net sources,
Softwares: ODLL, Globarena.

15SH12C MATHEMATICAL FOUNDATIONS FOR ENGINEERS

(Common to all B.E. / B.Tech. Degree Programmes) **L T P C**
3 2 0 4

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO 1: make use of orthogonal transformation. (K3)
- CO 2: use the basic concepts of three dimensional geometry in engineering. (K2)
- CO 3: obtain maxima and minima of real valued functions. (K3)
- CO 4: solve ordinary differential equations. (K3)
- CO 5: solve partial differential equations. (K3)

UNIT I MATRICES

15

Characteristic equation – Eigen values and Eigen vectors of a real matrix
– Independency and dependency of Eigen vectors – Properties of Eigen values and Eigen vectors (excluding proofs) - Diagonalisation of a matrix by orthogonal transformation- Quadratic forms – Reduction of quadratic form to canonical form by orthogonal transformation and its nature.

UNIT II THREE DIMENSIONAL ANALYTICAL GEOMETRY 15

Direction cosines and Direction ratios- Planes and Lines - Equations of plane and line - Intersection of two planes - Shortest distance between two lines - Equation of a sphere - Plane section of a sphere - Tangent Plane - Orthogonal spheres.

UNIT III FUNCTIONS OF SEVERAL VARIABLE 15

Euler's theorem on homogeneous functions of two variables - Taylor's Series - Jacobians - Maxima and Minima - Constrained Maxima and Minima by the method of Lagrange multipliers.

UNIT IV ORDINARY DIFFERENTIAL EQUATIONS 15

Solutions of higher order linear differential equations with constant coefficients - Cauchy's and Legendre's linear equations - Solutions of simultaneous first order linear equations with constant coefficients - Method of variation of parameters.

UNIT V PARTIAL DIFFERENTIAL EQUATIONS 15

Formation of partial differential equations - Lagrange's linear equations - Solutions of standard types of first order partial differential equations - Solutions of homogeneous linear partial differential equations of second and higher order with constant coefficients.

L: 45 T: 30 TOTAL: 75 PERIODS

TEXT BOOKS

1. Grewal.B.S. "Higher Engineering Mathematics", 42nd Edition, Khanna Publications, Delhi, 2012.
2. Erwin Kreyszig, "Advanced Engineering Mathematics", 10th Edition, Wiley India, 2011.

REFERENCES

1. Bali.N.P. and Manish Goyal, "A Text book of Engineering Mathematics", 8th Edition, Laxmi Publications Private Limited, 2011.
2. George B.Thomas, Jr. Ross L.Finney, "Calculus and Analytic Geometry", 9th Edition, Dorling Kindersley Private Limited, 2010.
3. Sharma.G.S and Sarna.I.J.S, "Engineering Mathematics", 10th Edition, CBS Publishers and Distributors, New Delhi, 2005.
4. James C. Robinson, "An Introduction to Ordinary Differential Equations", Cambridge University Press, 2004.
5. Anthony Croft, Robert Davison, Martin Hargreaves James Flint, "Engineering Mathematics: A Foundation for Electronic, Electrical, Communications and System Engineers", 4th Edition, Pearson Education Private Limited, 2013.

15SH13C

ENGINEERING PHYSICS
(Common to all B.E. / B.Tech. Degree Programmes)

L T P C
3 0 0 3

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO 1: summarize the properties and structures of solids. (K2)
- CO 2: define the principles of acoustics and ultrasonics and apply the ultrasonic methods for industrial and medical field. (K2)
- CO 3: choose the appropriate Laser technique for industrial and medical applications. (K3)
- CO 4: describe the different types, fabrication, losses of optical fibers and their applications in communication and instrumentation. (K2)
- CO 5: explain the physical properties of photons & electrons and their applications in different electron microscopes. (K3)

UNIT I PROPERTIES OF MATTER AND CRYSTAL PHYSICS 9

Hooke's law - Types of moduli of elasticity - Determination of Rigidity modulus and Young's modulus - I shaped Girders.
Miller indices – d spacing - Characteristics of SC, BCC, FCC and HCP structures.

UNIT II ACOUSTICS AND ULTRASONICS 9

Acoustics: Weber-Fechner law - Sabine's formula - Absorption Coefficient and its determination - factors affecting acoustics of buildings and their remedies.

Ultrasonics: Production - magnetostriction generator - piezoelectric generator, Properties - Cavitations - Velocity measurement - acoustic grating, Industrial applications - Medical application - Sonograms.

UNIT III LASER SYSTEM AND APPLICATIONS 9

Einstein's A and B coefficients – Types and working of Lasers - CO₂ Laser, Nd-YAG Laser, Semiconductor Laser (Homojunction), Determination of wavelength of Laser and Particle size - Industrial applications - Medical applications-Holography.

UNIT IV FIBER OPTICS AND ITS APPLICATIONS 9

Numerical aperture and Acceptance angle - Types of optical fibers - Double crucible technique – Splicing - Loss in optical fiber - Fiber optical communication system - Applications - Fiber optic sensors - Endoscope.

UNIT V QUANTUM PHYSICS 9

Photo electric effect - Matter Waves - Davisson and Germer experiment - Heisenberg's Uncertainty principle - Schrodinger's wave equation - particle in one dimensional box - Electron microscope - Scanning electron microscope - Transmission electron microscope.

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

1. David Halliday, Robert Resnick, Jearl Walker, "Fundamentals of Physics", 10th Edition, John Wiley & Sons Inc.USA, 2014.
2. Arthur Beiser, "Concepts of Modern Physics", 6th Edition, McGraw Hill Publications Private Limited, 2008.

REFERENCES

1. Richard P.Feynmann, Robert B Leighton and Mathew Sands, "Feynmann's Lectures on Physics", 4th Edition, Addison Wesley Publication USA, 2010.
2. Yoav Peleg, Reuven Pnini, Elvahu Zaarur, Eugene Hecht, "Schaum's Outline of Quantum Mechanics", 2nd Edition, McGraw Hill Companions Limited, USA, 2010.
3. William T.Silfvast, "Laser Fundamentals", 2nd Edition, Cambridge University Press, NewYork, 2008.

15SH14C ENGINEERING CHEMISTRY L T P C
 (Common to all B.E. / B.Tech. Degree Programmes) **3 0 0 3**

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO 1: identify suitable water treatment techniques for industrial and domestic purpose.(K3)
- CO 2: explain the type of corrosion and corrosion control methods. (K3)
- CO 3: select the polymer for specific application. (K2)
- CO 4: explain the preparation, properties and applications of nano materials. (K2)
- CO 5: outline the principle and instrumentation of various analytical techniques. (K2)

UNIT I WATER TREATMENT 9

Types of water - hardness - estimation of hardness of water – disadvantages of using hard water in boiler – oils and silica in water; water softening – internal conditioning – external conditioning – domestic water treatment – desalination.

UNIT II CORROSION AND ITS CONTROL 9

Chemical corrosion – electrochemical corrosion – mechanism – different types of electrochemical corrosion – factors influencing corrosion – corrosion control methods.

UNIT III ENGINEERING POLYMERS 9

Polymers – polymerization – free radical mechanism – plastics – thermo plastics and thermosetting plastics – processing and moulding of plastics – special polymers: fire retardant, conducting, photonic and electro luminescent polymer; composites – polymer matrix composites.

UNIT IV NANO MATERIALS 9

Nanoparticles – synthesis of CNT – precipitation, thermolysis, hydrothermal, solvothermal, electrodeposition, chemical vapour deposition, laser ablation – toxic effect of nano materials- properties and applications.

UNIT V ANALYTICAL TECHNIQUES 9

Principle, instrumentation and applications of UV-Visible and IR spectroscopy; chromatography: instrumentation and working of gas chromatography and HPLC; conductivity measurements – pH measurements – applications.

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

1. Jain P.C. and Jain. M., “Engineering Chemistry”, 16th Edition, Dhanpat Rai Publishing Company, New Delhi, Reprint 2013.
2. Dara S.S. and Umare S.S., “A text book of Engineering Chemistry”, S.Chand and Company Limited, New Delhi, 2013.
3. Chawla.S, “A text book of Engineering Chemistry”, 16th Edition, Dhanpat Rai Publishing Company, New Delhi, Reprint 2015.

REFERENCES

1. Ahmed Z., “Principles of corrosion engineering and corrosion control”, Butterworth Heinemann, 2006.
2. Ebeuele R.O., “Polymer science and Technology”, CFC Press, Newyork, 2000.
3. Charless P. P. and Frank O. J, ,”Introduction to nano technology” John Wiley & Sons, 2008
4. Skoog D.A., James H. F. and Crouch S.R., “Instrumental Analysis”, Cengage Learning India Private Limited, New Delhi, 2011

5. Mc Cash E.M. and Banwell C.N., "Fundamentals of molecular spectroscopy", 5th Edition, McGraw Hill Education (India) Private Limited, 2013.

15SH15C INTRODUCTION TO ENGINEERING L T P C
(Common to all B.E./B.Tech. Degree Programmes) 2 0 0 2

COURSE OUTCOMES

Upon Completion of this course, the students will be able to

- CO 1: recognize the history of engineering through various engineering wonders in past and identify the engineering profession. (K2)
- CO 2: recognize and analyse various engineering career paths and preparing for an engineering career. (K3)
- CO 3: understand the profile of engineers in various fields. (K3)
- CO 4: to understand the OBE concepts and its components. (K2)
- CO 5: understand learning components and creativity. (K3)

UNIT I HISTORY OF ENGINEERING AND INTRODUCTION 7
TO ENGINEERING PROFESSION

History of Engineering: Definition of Engineering, The Beginnings of Engineering, Overview of ancient Engineering, Traveling through the Ages, A case study of two historic Engineers – Lionardo da Vincy, Gutenberg.

Introduction to Engineering Profession: Engineering work is all around you - Engineering as a profession and common traits of Good Engineers – History of Engineering Disciplines – Functions of Engineering.

UNIT II CAREER PATHS OF ENGINEER AND PREPARING 8
FOR AN ENGINEERING CAREER

Career Paths for Engineers: The corporate ladder, The independent entrepreneur, Employment Opportunities in Government, The military, Engineering and social service abroad, The Engineering Professor, Graduate work outside of engineering, A mix of two or more of the first six options.

Preparing for an Engineering Career: Making the Transition from High School to College - Budgeting Your Time - Daily Studying and Preparation - Getting Involved with an Engineering Organization - Your Graduation Plan - Other Considerations.

UNIT III PROFILES OF ENGINEERS 4

Initial Career Profiles of Civil, Mechanical, Electrical, Electronics, Instrumentation, Communication, Information Technology, Computer Engineering Graduates.

UNIT IV OVERVIEW OF OBE AND CBCS 4

Graduate attributes of Washington Accord – Programme Specific Criteria (PSC) – Programme Educational Objectives (PEOs) – Programme Outcomes (POs) – Course Outcomes (COs) – CBCS : Course categories - Scheme of instruction, Assessment and Evaluation.

UNIT V LEARNING AND CREATIVE THOUGHT 7

Introduction: The successful engineering student - the engineering curriculum - curriculum planning and management - adapting to the college classroom.

The learning process: the nature of learning - information processing and memory - determinants of efficient learning - practical suggestions for learning.

Differences in the way people think: The four-quadrant model of thinking - hindrances to problem solving.

On Creativity: What is creativity? - the nature of creativity - characteristics of creative people - the creative process - overcoming obstacles to creative thinking.

L: 30 TOTAL: 30 PERIODS

REFERENCES

1. Paul H. Wright, "Introduction to Engineering", School of Civil and Environmental Engineering, 3rd Edition, John Wiley & Sons, Inc, 2002.
2. Saeed Moaveni, "Engineering Fundamentals an Introduction to Engineering", 4th Edition, Cengage Learning, USA, 2011.
3. William C. Oakes, Les L. Leone and Craig J. Gunn, "Engineering Your Future – A Comprehensive Introduction to Engineering", Oxford University Press, USA, 2010.
4. Philip Kosky, George Wise, Robert Balmer and William Keat, "Exploring Engineering An Introduction to Engineering and Design", Academic Press, Elsevier, USA, 2010.

WEB RESOURCES

www.ieagrements.org/IEA-Grad-Attr-Prof-Competencies.pdf

15SH16C ENGINEERING GRAPHICS L T P C
(Common to all B.E./B.Tech. Degree Programmes) 2 0 2 3

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO 1: use the drawing instruments effectively. (K2, S4, A3)
- CO 2: draw the projections of points, straight lines, planes. (K2, S3, A3)
- CO3: construct the projections of various solids in different positions. (K3, S3, A3)
- CO 4: draw the sectional views of various solids and construct the true shape of the section. (K3, S3, A3)
- CO 5: identify and draw the surface areas of simple solids. (K3, S3, A3)
- CO 6: draw perspective views of simple solids and draw the orthographic views of simple objects. (K3, S3, A3)

UNIT I PROJECTION OF POINTS, LINES AND PLANE SURFACES 12

Drawing Instruments- IS specifications on lines- drawing sheets- Printing letters and dimensioning- scales - First angle projection. (Not for examination).

Projections of points and straight lines located in the first quadrant- Determination of true lengths and true inclinations. Projections of regular polygonal surfaces and circular lamina inclined to both reference planes

UNIT II PROJECTION OF SOLIDS 12

Projections of simple solids - axis inclined to one reference plane - change of position method.

UNIT III SECTION OF SOLIDS 12

Sectioning of simple solids - cutting planes inclined to one reference plane and perpendicular to the other.

UNIT IV DEVELOPMENT OF SURFACES AND ISOMETRIC PROJECTIONS 12

Development of lateral surfaces of simple and truncated solids - Principles of isometric projection and view of simple solids - truncated prism and pyramids.

UNIT V PERSPECTIVE PROJECTIONS AND ORTHOGRAPHIC PROJECTIONS 12

Perspective projection of cube, prisms and pyramids by visual ray method and vanishing point method. Orthographic projection – simple objects with straight and curved surfaces.

L: 30 P: 30 TOTAL: 60 PERIODS

TEXT BOOKS

1. Bhatt N.D, "Engineering Drawing", 53rd Edition, Charotar Publishing House, 2014.
2. Natrajan K.V, "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2009.

REFERENCES

1. Kumar M.S, "Engineering Graphics", D.D. Publications, 2007.
2. Venugopal K and Prabhu Raja V, "Engineering Graphics", New Age International Private Limited, 2008.
3. Shah M.B and Rana B.C, "Engineering Drawing", Pearson Education, 2005.
4. Gopalakrishna K.R, "Engineering Drawing", 32nd Edition, Subhas Publications, 2005.
5. Dhananjay Jolhe A, "Engineering Drawing with an Introduction to AutoCAD", Tata McGraw Hill Publishing Company Limited, 2008.
6. Basant Agarwal and Agarwal C.M, "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.

15SH17C ENGINEERING PHYSICS AND ENGINEERING CHEMISTRY LABORATORY L T P C
(Common to all B.E./B.Tech. Degree Programmes) **0 0 2 1**

PART A – ENGINEERING PHYSICS LABORATORY

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO1: demonstrate the properties of light waves. (K3, S3)
- CO2: interpret the production of ultrasounds and how the velocity of ultrasounds varies with respect to medium.(K3, S3)
- CO3: illustrate the mechanical and electrical properties of materials. (K3, S3)

LIST OF EXPERIMENTS

1. Determination of thickness of a thin wire – Air wedge method.
2. Determination of velocity of sound and compressibility of the liquid – Ultrasonic Interferometer.
3. Determination of Dispersive power of a prism using Spectrometer.
4. Determination of Young's modulus – Uniform bending method.
5. Torsional pendulum – Determination of Moment of Inertia of the disc and Rigidity modulus of the material of the wire.
6. Determination of specific resistance of a given coil of wire – Carey Foster's Bridge.
7. Calibration of voltmeter / ammeter using potentiometer.
8. Determination of Frequency of A.C. mains using Sonometer.
9. Determination of the angular divergence of a laser beam using He-Ne laser or diode laser.
10. Determination of temperature coefficient of resistance.

P:15 TOTAL: 15 PERIODS

PART B - ENGINEERING CHEMISTRY LABORATORY

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO 1: estimate the amount of hardness of the water sample (K5, S3)
- CO 2: determine the rate of corrosion (K5, S3)
- CO 3: synthesize a polymer and to determine molecular weight of the polymer (K6, S3)
- CO 4: synthesize silver nano particles (K6,S3)
- CO 5: quantify different ions by different analytical techniques (K5,S3)

LIST OF EXPERIMENTS

1. Estimation of hardness of water sample by EDTA method
2. Rate of corrosion- weight loss method
3. Synthesis of urea-formaldehyde resin
4. Determination of molecular weight of a polymer – Oswald's viscometer
5. Synthesis and characterization of silver nano particles.
6. Estimation of iron (Fe^{2+}) in water sample by dichrometry
7. Estimation of hydrochloric acid by conductometric method
8. Estimation of mixture of acids by conductometric method
9. Determination of purity of simple organic compounds using HPLC- (Demo).

P: 15 TOTAL: 15 PERIODS

REFERENCES

1. Ramesh Babu V, "Engineering Practices Laboratory Manual", Revised Edition, VRB Publishers Private Limited, Chennai, 2014.
2. Jeyachandran K, Natarajan S. and Balasubramanian S, "A Primer on Engineering Practices Laboratory", Anuradha Publications, 2007.
3. Jeyapoovan T, Saravanapandian M. and Pranitha S, "Engineering Practices Lab Manual", Vikas Publishing House Private Limited, 2006.
4. Rajendra Prasad A and Sarma PMMS, "Workshop Practice", Sree Sai Publication, 2002
5. Kannaiah P and Narayana KL, "Manual on Workshop Practice", Scitech Publications, 1999.

PART – B ELECTRICAL AND ELECTRONICS LABORATORY

COURSE OUTCOMES

Upon completion of this course, the students will be able to,

CO 1: develop simple residential wiring circuits. (K6)

CO 2: calculate the basic electrical quantities. (K4)

CO 3: identify the value of resistance using appropriate methods. (K4, A4)

CO 4: realize the fundamentals of Boolean algebra using digital logic gates. (A4)

CO 5: practice soldering to design PCB for electronic circuits. (A5)

I. ELECTRICAL ENGINEERING PRACTICE 8

1. Residential house wiring using switches, fuse, indicator, lamp and energy meter.
2. Fluorescent lamp wiring.
3. Stair-case wiring.
4. Measurement of electrical quantities – voltage, current, power & power factor in RLC circuit.
5. Measurement of energy using single phase energy meter.
6. Measurement of resistance to earth of electrical equipment.

II. ELECTRONICS ENGINEERING PRACTICE 7

1. Study of Electronic components and equipments – Resistor, colour coding, measurement of AC signal parameters (peak-peak, rms period, frequency) using CRO
2. Study of logic gates AND, OR, XOR and NOT.
3. Generation of Clock Signal.

4. Soldering practice – Components, Devices and Circuits – Using general purpose PCB.
5. Measurement of ripple factor of HWR and FWR.

P: 15 TOTAL: 15 PERIODS

REFERENCES

1. Jeyachandran K, Natarajan S and Balasubramanian S, "A Primer on Engineering Practices Laboratory", Anuradha Publications, 2007.
2. Jeyapooan T, Saravanapandian M and Pranitha S, "Engineering Practices Lab Manual", Vikas Publishing House Private Limited, 2006.
3. Bawa H.S, "Workshop Practice", Tata McGraw Hill Publishing Company Limited, 2007.
4. Rajendra Prasad A and Sarma P.M.M.S., "Workshop Practice", Sree Sai Publication, 2002.
5. Kannaiah P and Narayana K.L, "Manual on Workshop Practice", Scitech Publications, 1999.

15IT21C

PROFESSIONAL ENGLISH
(Common to all B.E. / B.Tech. Degree Programmes)

L T P C
3 0 0 3

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO 1: contribute the lingual power to frame sentences in different context. (A2)
- CO 2: write effectively in any Professional context. (A2)
- CO 3: acquire the skills related to Group discussion. (A2)
- CO 4: communicate and respond in different social and professional contexts. (A3)
- CO 5: recall the acquired skills in solving competitive exam. (K3)

UNIT I

9

Phrasal Verbs (Based on root words: call, come, get, look, put, run, and take) - Foreign Words and Phrases (from the given list) - Listening to audio files and finding the technical words and framing different sentences - Channel conversion- Descriptive writing on various charts.

UNIT II

9

Idioms and Phrases (with animal names from the given list) - Report writing (types-structure- stages in report writing- model report) - Job Application Letter with curriculum vitae.

UNIT III **9**

One word substitution (from the list given) Group Discussion (Why is GD a part of selection process? - Structure of GD – Strategies in GD – Team Work - Body Language - Video Samples-GD).

UNIT IV **9**

Choosing a suitable connotation (from the given list) - Note making – Preparing Circular and Minutes of meeting – Listening to TED Talks – Giving opinion on the given TED Talks and interviewing the TED talkers.

UNIT V **9**

Error Spotting (Tense, Relative Pronouns, Conjunctions, Sentence Structure, Adverb Placement) Sentence Completion - Reading comprehension.

L: 45 TOTAL: 45 PERIODS

Activity: Each student should read the suggested fiction for oral assignment.

TEXT BOOK

1. Tyagi Kavita and Padma Misra, “Advanced Technical Communication”, 1st Edition, PHI Learning Private Limited, New Delhi, 2011.

REFERENCES

1. Smith-Worthington, Darlene & Sue Jefferson. “Technical Writing for Success”, 1st Edition, Cengage Mason, USA, 2007.
2. Bovee, Courtland L., John V.Thill. “Business Communication Today”, 12th Edition, Pearson Education, New Delhi, 2013.
3. Anderson, Paul V. “Technical Communication: A Reader - Centered Approach”, 8th Edition, Cengage, New Delhi, 2013.

Listening files: Audio files from net sources and softwares: ODLL, Globerena.

15IT22C

PROBABILITY AND STATISTICS
(Common to CSE and IT)

L T P C
3 2 0 4

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO 1: grasp the basic concepts of probability and random variables. (K2)
- CO 2: find the correlation and regression of two dimensional random variables. (K2)
- CO 3: characterize the phenomena which evolve with respect to time in a probabilistic manner. (K2)
- CO 4: calculate the various measures of dispersion. (K3)
- CO 5: apply the concepts of estimation and hypothesis testing. (K3)

UNIT I PROBABILITY AND RANDOM VARIABLES 15

Permutations and Combinations (Simple Problems)-Basics of Probability- Rules of Probability-Conditional probability- Discrete and continuous random variables – Binomial, Poisson, Uniform and Normal distributions.

UNIT II TWO DIMENSIONAL RANDOM VARIABLES 15

Joint distributions - Marginal and conditional distributions – Covariance - Correlation and regression-Central Limit Theorem.

UNIT III RANDOM PROCESSES 15

Definitions and Classifications - Markov Process and Markov Chain - Counting Processes - Poisson and Renewal Processes.

UNIT IV STATISTICS 15

Mean – Median- Mode - Moments- Skewness- Kurtosis – Correlation - Single and bivariate frequency distributions - Regression lines.

UNIT V SAMPLING THEORY 15

Large samples - Tests on means and proportions for large samples - Test for single variance and equality of variances - Small samples- t- test- F- test - Chi square test.

L: 45 T: 30 TOTAL: 75 PERIODS

TEXT BOOKS

1. Oliver C. Ibe, "Markov Processes for Stochastic Modeling", 2nd Edition, Elsevier, Reprint 2013.
2. Gupta S.C. and Kapoor V.K., "Fundamentals of Mathematical Statistics: A Modern approach", 10th Edition, Sultan Chand & Sons, Delhi.

REFERENCES

1. Richard Arnold Johnson, Irwin Miller, John E Freund, "Miller and Freund's Probability and Statistics for Engineers", 8th Edition, Pearson Education Private Limited, 2013.
2. Ronald E.Walpole, Raymond H.Myres, Sharon L.Myres, Keying E. Ye, "Probability and Statistics for Engineers and Scientists", 9th Edition, Pearson Education Private Limited, 2011.
3. Robert V.Hogg, Joseph W.Mckean, Allen Thornton Craig, "Introduction to Mathematical Statistics", 6th Edition, Pearson Education Private Limited, 2005.

15IT23C	PHYSICS OF SOLID STATE DEVICES	L T P C
	(Common to CSE and IT)	3 0 0 3

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO 1: infer the electrical properties of conducting and superconducting materials. (K2)
- CO 2: explain the basics of semiconductors. (K2)
- CO 3: describe the operation and characteristics of semiconductor diodes. (K2)
- CO 4: express the properties and applications of the optical materials. (K2)
- CO 5: classify the magnetic materials and demonstrate their applications in storage devices. (K2)

UNIT I CONDUCTING MATERIALS AND SUPERCONDUCTORS 9

Conductors:

Band theory of solids - Classical free electron theory of metals – Electrical and thermal conductivity – Wiedemann Franz law, Quantum free electron theory– Fermi distribution function – Effect of temperature on Fermi Function – Density of energy states – carrier concentration in metals.

Superconductors:

BCS Theory, Properties - Meissner effect – Isotopic effect, Types of superconductors – Type I and Type II superconductors; Applications of superconductors – Cryotron, SQUID, Magnetic levitation.

UNIT II SEMICONDUCTORS 9

Intrinsic semiconductor – carrier concentration – determination of bandgap energy - Extrinsic semiconductors – carrier concentration - Hall effect.

UNIT III SEMICONDUCTOR DIODES 9

Theory of PN junction diode - Energy Band Structure - Biasing of PN Junction - Forward bias and Reverse bias - current equation - Space charge and diffusion capacitances – effect of temperature and breakdown

mechanism, Zener diode and its characteristics, Applications – Half wave and Full wave rectifiers.

UNIT IV OPTICAL MATERIALS 9

Optical properties of metals, insulators and semiconductors - Liquid crystal display – LED – Thermography - Solar cell.

UNIT V MAGNETIC MATERIALS AND STORAGE DEVICES 9

Types and Properties of magnetic materials - Domain theory of ferro magnetic materials – Ferrites - structure and applications, magnetic recording and readout – storage of magnetic data – tapes, floppy, Hard disk, HD DVD and Flash memory.

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

1. Charles Kittel, "Introduction to Solid State Physics", 7th Edition, John Wiley and Sons, Singapore, 2007.
2. David A. Bell, "Fundamentals of Electronic Devices and Circuits", 5th Edition, Oxford University Press, 2009.

REFERENCES

1. Donald A. Neamen, "Semiconductor Physics and Devices", 4th Edition, Tata McGraw Hill Publication, New Delhi, 2012.
2. Salivahanan S, Suresh kumar N and Vallavaraj A, "Electronic Devices and Circuits", 2nd Edition, Tata McGraw Hill, 2011.
3. Robert T. Paynter, "Introductory Electronic Devices and Circuits", 7th Edition, Pearson Education, 2009.
4. Calister, "Material Science and Engineering: An Introduction", 7th Edition, John Wiley and Sons, 2006.

**15IT24C DIGITAL SYSTEMS L T P C
3 2 0 4**

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO 1: define the basics of Boolean algebra and illustrate the Boolean functions by logic gates. (K1,S2,A1)
- CO 2: explain and design different types of combinational circuits. (K2,S3)
- CO 3: illustrate the basics of synchronous sequential logic and Registers. (K1,S2)
- CO 4: analyze and design asynchronous sequential logic circuits. (K4,S2,A2)
- CO 5: classify and explain different types of memories. (K1,S1,A1)

UNIT I BOOLEAN ALGEBRA AND LOGIC GATES 15

Review of binary number systems - Binary arithmetic - Binary codes - Boolean algebra and theorems - Boolean functions - Simplifications of

Boolean functions using Karnaugh map and tabulation methods - Logic gates.

UNIT II COMBINATIONAL LOGIC 15

Design procedure, Half adder, Full Adder, Half subtractor, Full subtractor
Parallel binary adder, parallel binary Subtractor, Fast Adder, Carry Look
Ahead adder, Serial Adder/Subtractor, BCD adder, Binary Multiplier,
Binary Divider, Introduction to Hardware Description Language (HDL).

UNIT III SYNCHRONOUS SEQUENTIAL LOGIC 15

Sequential circuits - Latches – Flip-Flops - Analysis of Clocked Sequential
Circuits – State Reduction and Assignment – Design Procedure.
Registers – Shift Registers – Ripple counters – Synchronous Counters.

UNIT IV ASYNCHRONOUS SEQUENTIAL LOGIC 15

Introduction – Analysis Procedure – Circuit with Latches – Design Procedure
– Reduction of State and Flow Tables – Race-Free state Assignment –
Hazards.

UNIT V MEMORY AND PROGRAMMABLE LOGIC 15

Memory – Introduction – Random-Access Memory – Memory Decoding –
Read only memory.
Programmable Logic Array – Programmable Array Logic - Sequential
Programmable Devices.

L: 45 T: 30 TOTAL: 75 PERIODS

TEXT BOOKS

1. Morris Mano M., "Digital Design", 3rd Edition, Pearson Education, 2007.
2. Salivahanan S. and Arivazhagan S., "Digital Circuits and Design", 3rd Edition, Vikas Publishing House Private Limited, New Delhi, 2006.

REFERENCES

1. Thomas L. Floyd, "Digital Fundamentals", 10th Edition, Prentice Hall, 2008.
2. Donald P Leach, Albert Paul Malvino, Goutam Saha, "Digital Principles and Applications", 6th Edition, Tata McGraw Hill, 2008.
3. Jr. Charles H. Roth and Larry L Kinney, "Fundamentals of Logic Design" (with Companion CD-ROM), 6th Edition, Thomson Learning, 2009.
4. Raj Kamal, "Digital Systems: Principles and Design", 1st Edition, Prentice Hall, 2009

15IT25C **C PROGRAMMING FOR ENGINEERS** **L T P C**
(Common to all B.E. / B.Tech. Degree Programmes) **3 0 0 3**

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO 1: recognize the system fundamentals and the role of hardware components of the Computer. (K3)
- CO 2: apply the basic concepts and solve simple problems by analyzing the logics of conditional statements and looping constructs. (K3)
- CO 3: handle similar types of data using array and utilize their functionality. (K3)
- CO 4: appreciate the call by value and call by reference features in functions. (K5)
- CO 5: design programs involving their own derived data types, pointers, memory allocation concepts. (K4)
- CO 6: handle the file contents with access permissions. (K3)

UNIT I COMPUTER FUNDAMENTALS 10

Introduction – Characteristics of Computers – Evolution of Computers – Computer Generations – Classification of Computers – Basic Computer organization – Number Systems – Problem Analysis – Algorithms – Flow charts – Computer Software – Types of Software.

UNIT II BASIC C PROGRAMMING 9

Overview of C Program – Constants, Variables and Data Types – Operators and Expressions – Managing Input and Output operations – Decision Making and Branching – Decision making and Looping.

UNIT III ARRAYS AND FUNCTIONS 9

Arrays: One dimensional arrays – Two dimensional arrays – Multi dimensional arrays. Character arrays and Strings: Declaring and initializing String Variables – Comparison of two strings – String handling functions. User defined Functions: Definition – Declaration – Function calls – Category of Functions – Recursion - Storage Classes.

UNIT IV STRUCTURES AND POINTERS 9

Structures and Unions: Definition – Declaration – Accessing structures – Initialization of structures – Arrays of structures – Arrays within Structure – Structures within Structures -Structures and functions - Unions. Pointers: Initialization – Pointers and arrays- Array of pointers – Pointers as function arguments – Pointers to functions – Pointers and Structure.

UNIT V FILES AND DYNAMIC MEMORY ALLOCATION 8

File management in C – Defining and opening a file – closing a file - Input and Output operations on file – Error handling during IO operations – Random access to files – Command line Arguments. Dynamic memory allocation: Allocating a block of memory - Allocating a multiple block of memory – Releasing the used space – Altering the size of a block.

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

1. Ashok.N.Kamthane, "Computer Programming", Pearson Education, India, 2008.
2. E. Balagurusamy, "Programming in ANSI C", 6th Edition Multicolor, 2013.

REFERENCES

1. Pradip Dey, Manas Ghosh, "Fundamentals of Computing and Programming in C", 1st Edition, Oxford University Press, 2009
2. Stephen G.Kochan, "Programming in C", 3rd Edition, Pearson Education, India, 2005.
3. Brian W.Kernighan and Dennis M.Ritchie, "The C Programming Language", Pearson Education Inc., 2005.

15IT26C ENVIRONMENTAL SCIENCE AND ENGINEERING L T P C

(Common to all B.E. / B.Tech. Degree Programmes)

3 0 0 3

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO 1: explain the structure and function of ecosystem. (K2)
- CO 2: recognize the values of biodiversity and natural resources and the ways to protect the biodiversity of his /her locality. (K2)
- CO 3: explain the causes and effects of pollution. (K2)
- CO 4: describe social issues related to the environment and the environment act. (K2)
- CO 5: identify the nutrients in food and impact of metals on human health. (K2)

UNIT I ENVIRONMENT AND ECOSYSTEMS 9

Scope and importance of environment – need for public awareness – ecosystem – structure and function of an ecosystem – energy flow in the ecosystem – forest and aquatic ecosystems – Field study of simple ecosystems – pond and forest.

UNIT II BIODIVERSITY AND NATURAL RESOURCES 9

Biodiversity: genetic, species and ecosystem diversity – threats to biodiversity – endangered and endemic species in India – conservation of biodiversity; forest resources: use and over-exploitation – deforestation - dams and their effects on forests and tribal people – water resources: use and overutilization of surface and ground water – role of an individual in conservation of natural resources.

UNIT III ENVIRONMENTAL POLLUTION 9

Causes, effects and control measures of air pollution, water pollution, soil pollution, noise pollution and nuclear hazards – solid waste management – e-waste – toxic substances in e-waste – risks related to toxic substances – role of an individual in prevention of pollution.

UNIT IV SOCIAL ISSUES, HUMAN POPULATION AND ENVIRONMENTAL LAW 9

Water conservation – rain water harvesting – climate change – global warming, acid rain, ozone layer depletion – population growth – population explosion – family welfare programme; environment laws: the water (prevention and control pollution) act, 1974-the air (prevention and control of pollution) act, 1981-environmental (protection) act, 1986-the wild life (protection) act 1972.

UNIT V FOOD AND HUMAN HEALTH 9

Carbohydrates, amino acids, proteins, lipids and vitamins in balanced diet food; disease caused by deficiency of carbohydrates, amino acids, proteins, lipids and vitamins - food adulteration - simple test for food adulterants; environmental toxicology: metals in environment- impacts of lead, arsenic, cadmium, mercury and chromium on human health.

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

1. Miller G. and Spoolman S, "Environmental Science", 14th Edition, Brooks/Cole Publishing Co., 2012.
2. Maczulak A.E., "Environmental Engineering", Facts on file Inc., 2009
3. Han D, "Concise Environmental Engineering", PhD & Ventus Publishing ApS, 2012

REFERENCES

1. Weller K. "Environmental Science and Biological Engineering", 1st Edition, WIT Press, 2015
2. Strange C. "Environmental Science and production" Nason Trest Publisher, 2010

15IT27C APPLIED PHYSICS AND ENVIRONMENTAL CHEMISTRY LABORATORY **L T P C**
0 0 2 1
(Common to CSE and IT)

PART A – APPLIED PHYSICS LABORATORY

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO 1: demonstrate the properties of optical materials.(K2, S3)
- CO 2: analyze the characteristics of semiconducting materials and diodes and their applications. (K3, S3)
- CO 3: analyze the thermal properties of materials. (K3,S3)

LIST OF EXPERIMENTS

1. (a) Determination of wave length of Laser source.
(b) Particle size determination using Diode Laser.
(c) Determination of Numerical aperture and acceptance angle of an optical fiber.
2. Determination of Band Gap of a semiconductor material.
3. Determination of thermal conductivity of a bad conductor – Lee's Disc method.
4. V - I Characteristics of PN junction diode.
5. Half Wave and Full Wave Rectifiers.
6. V - I Characteristics of Zener diode.
7. Zener diode as Voltage Regulator.
8. Characteristics of LED/LCD.

P:15 TOTAL: 15 PERIODS

PART – B ENVIRONMENTAL CHEMISTRY LABORATORY

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO 1: quantify the amount of acidity, alkalinity, DO and COD present in water sample. (K5,S3)
- CO 2: analyse the ions present in the soil. (K4, S3)
- CO 3: quantify the amount of chloride ion in water sample. (K5, S3)
- CO 4: identify the adulteration in food samples. (K1, S3)
- CO 5: estimate the amount of metal ions in water sample. (K5, S3)

LIST OF EXPERIMENTS

1. Estimation of acidity of Water sample.
2. Estimation of alkalinity of Water sample.
3. Determination of Dissolved Oxygen (DO) in water sample (Winkler's method).

4. Determination of COD in water sample.
5. Soil Analysis: Determination of pH, nitrate, phosphate, chloride and sulphate ions.
6. Soil analysis: Estimation of Na/K/Ca in soil.
7. Estimation of chloride ion in water sample by argentometric method.
8. Simple adulteration test in food samples.
9. Estimation of copper in water sample by EDTA method.
10. Estimation of nickel in water sample.

P:15 TOTAL: 15 PERIODS

- A minimum of FIVE experiments shall be offered.
- Laboratory classes on alternate weeks for Physics and Chemistry.

REFERENCES

1. Harris D.C. "Quantitative Chemical Analysis: International Edition", 8th Edition, W.H.Freeman, 2010.
2. Mendham J. "Vogel's Quantitative Chemical Analysis", 6th Edition, Pearson Publisher, 2009.
3. Vogel A.I., "Vogel's Textbook of Quantitative Chemical Analysis", 5th Edition, Longman scientific & Technical, 1989.

15IT28C

C PROGRAMMING LABORATORY

L T P C

(Common to all B.E. / B.Tech. Degree Programmes)

0 0 2 1

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO 1: solve the given problem using the syntactical structures of C language. (K3)
- CO 2: develop, execute and document computerized solution for various logic based problems using the flow control features of C language. (K3)
- CO 3: enhance the programming skills in C by discriminating constants, variables and arrays and the functionality. (K3)
- CO 4: learn about the connection between function return values and variables. (K5)
- CO 5: develop programs using string manipulation and file manipulation functions. (K3)

Simple programs

1. Solve problems such as temperature conversion, student grading, interest calculation.
2. Solving the roots of a quadratic equation
3. Designing a simple arithmetic calculator. (Use switch statement)
4. Given distance traveled by a vehicle as $d = ut + \frac{1}{2}at^2$, where 'u' and 'a' are the initial velocity and acceleration. Calculate the distance traveled for different time intervals

Programs using different control structures

5. Performing the following operations:
 - a. Generate Pascal's triangle.
 - b. Construct a Pyramid of numbers.
6. Generation of the first 'n' terms of the Fibonacci sequence and prime sequence.
7. Computing Sine series and Cosine series.
8. Finding the 2's complement of a binary number.

Programs using arrays

9. Performing the following operations:
 - a. Matrix addition.
 - b. Transpose of a matrix.
 - c. Matrix multiplication by checking compatibility.

Programs using string manipulation

10. Performing the following operations to a string:
 - a. To insert a sub-string into main string at a given position.
 - b. To delete 'n' characters from a given position in a string.
 - c. To replace a character of string either from beginning or ending or at a specified location.

Programs using functions

11. Performing the following operations: (Use recursive functions)
 - a. To find the factorial of a given integer.
 - b. To find the GCD (Greatest Common Divisor) of two given integers.
 - c. To solve Towers of Hanoi problem.

Programs using files

12. Performing the Student Information Processing using Structures and File handling concepts.

P: 30 TOTAL: 30 PERIODS

15IT29C

DIGITAL LABORATORY

L T P C
0 0 2 1

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO 1: design and implement various applications using gates.
- CO 2: simulate various combinational circuits using VHDL/PSPICE.

LIST OF EXPERIMENTS

1. Verification of Boolean theorems using digital logic gates.
2. Design and implementation of combinational circuits using basic gates for arbitrary functions, code converters, etc.
3. Design and implementation of 4-bit binary adder / subtractor using basic gates and MSI devices.
4. Design and implementation of parity generator / checker using basic gates and MSI devices
5. Design and implementation of magnitude comparator.
6. Design and implementation of application using multiplexers/Demultiplexers.
7. Design and implementation of Shift registers.
8. Design and implementation of Synchronous and Asynchronous counters.
9. Simulation of combinational circuits using Hardware Description Language (VHDL/ Verilog HDL software required).
10. Simulation Experiments using PSPICE Software.

P: 30 TOTAL: 30 PERIODS

15IT31C

DISCRETE MATHEMATICS

L T P C
3 2 0 4

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO 1: check the validity of the arguments. (K2)
- CO 2: understand the concepts of Sets, Relations and Functions. (K2)
- CO 3: perform the principles of counting and solve recurrence relations. (K3)
- CO 4: interpret the basic concepts of graphs. (K2)
- CO 5: find the Minimum Spanning Tree and Shortest Distance of a graph. (K3)

UNIT I LOGIC AND PROOFS 18
Propositional Logic – Equivalences and Implications – Normal forms-
Predicates and Quantifiers – Nested Quantifiers – Rules of inference –
Proof methods and Strategy.

UNIT II SETS, RELATIONS AND FUNCTIONS 15
Basic Definitions-Set operations –Laws of set theory-Partitions-Relations
–Properties of relations-Matrices of relations-Closure of relations –Partial
order relation- Functions-Compositions of functions – Bijective functions.

UNIT III COMBINATORICS 15
Mathematical induction- Strong induction and well ordering-The basics of
counting –The pigeonhole principle-Permutations and combinations –
Recurrence relations-Solving Linear recurrence relations –Generating
functions-Inclusion and exclusion principle.

UNIT IV GRAPH THEORY 15
Graphs and graph models-Graph terminology and special types of graphs
– Matrix representation of graphs and graph isomorphism-connectivity-
Euler and Hamiltonian graphs.

UNIT V ALGORITHMS IN GRAPHS 12
Basic definition of Trees – Spanning Trees - Dijkstra’s and Floyd’s
algorithms – Prim’s algorithms and Kruskal’s algorithms

L: 45 T: 30 TOTAL: 75 PERIODS

TEXT BOOKS

1. Kenneth H.Rosen, “Discrete Mathematics and its Applications (with Combinatorics and Graph Theory)”, Sixth Edition, Special Indian Edition, Tata McGraw-Hill Publishing Company Limited, New Delhi (Fifth Edition Reprint, 2008).
2. Narsingh Deo, “Graph Theory with Applications to Engineering and Computer Science”, PHI Learning Publishers, 2014.
3. Santanu Saha Ray, “Graph Theory with Algorithms and its Applications in Applied Science and Technology”, Springer India 2013.

REFERENCES

1. Ralph. P. Grimaldi, “Discrete and Combinatorial Mathematics: An Applied Introduction”, Fourth Edition, Pearson Education Asia, Delhi, 2002.

2. Trembly J.P and Manohar. R. "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw-Hill Pub. Company Limited, New Delhi, Thirty Fifth Edition Reprint 2008.
3. J.A.Bondy U.S.R.Murty,"Graph Theory",Springer 2008.

15IT32C DATA STRUCTURES AND ALGORITHMS L T P C
3 0 0 3

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO 1: analyze the asymptotic performance of algorithms. (K3)
- CO 2: explain linear data structures for solving computing problems. (K2)
- CO 3: choose the concepts and algorithms of tree structure for solving problems.(K2)
- CO 4: implement algorithms of various sorting and hashing techniques. (K3)
- CO 5: solve computing problems using graph data structures. (K3)

UNIT I ANALYSIS OF ALGORITHMS 9

Introduction – Fundamentals of the Analysis of Algorithm Efficiency – Exhaustive Search – Strassen's Matrix Multiplication – Dynamic Programming – Greedy Technique – Backtracking – Branch and Bound.

UNIT II LINEAR DATA STRUCTURES 9

Introduction – Abstract Data Types (ADTs) – Array ADT – Singly linked list – Doubly linked list – Stack ADT – Queue ADT – Circular Queue – Applications of linear data structures.

UNIT III TREES 9

Tree Terminologies – Binary trees – Expression tree – Binary Search tree – Threaded binary tree - AVL tree – Splay tree – B Tree – Binary Heap - Applications of Binary Heap.

UNIT IV HASHING AND SORTING 9

Hashing – Separate chaining – Open Addressing – Rehashing – Insertion sort – Selection sort – Shell sort – Heap sort – Merge Sort – Quick sort - Applications.

UNIT V GRAPHS 9

Graph terminologies – Topological sort –traversal – Shortest path algorithms – Network flow problems – Minimum spanning tree – Biconnectivity.

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Second Edition, Pearson Education, 2012.
2. Anany Levitin, "Introduction to the Design & Analysis of Algorithms", Third Edition, Pearson Education, 2012.

REFERENCES

1. D. Samanta, "Classic Data Structures", Second Edition, Prentice Hall, 2012.
2. A.K. Sharma, "Data Structures using C", Second Edition, Pearson, 2013.
3. Alfred V. Aho, John E. Hopcroft, Jeffrey D.Ullman, "Data Structures and Algorithms", Pearson Education, 2012.
4. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction to Algorithms", Third Edition, MIT Press, 2009.
5. R Krishnamoorthy, "Data Structures Using C", Tata McGraw-Hill Education, 2010.
6. Richard Gilberg, Behrouz Forouzan, "Data Structures: A Pseudocode Approach with C", Second Edition, Cengage Learning, 2004.

15IT33C	OBJECT ORIENTED PROGRAMMING	L T P C
		3 0 0 3

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO 1: describe the concepts of oop using C++. (K2)
- CO 2: demonstrate the principles of oop using C++. (K3)
- CO 3: explain expressions, branching and looping statements in java. (K2)
- CO 4: develop class and object for real time applications. (K3)
- CO 5: illustrate exception handling, threading and file handling. (K4)

UNIT I	OOP USING C++	9
OOP concepts: Class and Objects – Data encapsulation and abstraction – Inheritance – Polymorphism - C++ fundamentals: Tokens – Expressions – Control Structures – Arrays – Functions		
UNIT II	PROGRAMMING IN C++	9
Classes and objects – Constructors and Destructors - Operator overloading – Inheritance - Virtual functions – Polymorphism - Templates		
UNIT III	JAVA INTRODUCTION	9
Overview of java - Constants - Data types - Variables – Operators – Expressions – Branching and Looping statements – simple programs		

UNIT IV PROGRAMMING IN JAVA 9
Class, Objects and Methods – Arrays – Strings – Vectors - case study:
Stack class and queue class.

UNIT V FEATURES OF JAVA 9
Interfaces: Multiple inheritance – Packages – Multithreaded Programming
– Managing Errors and Exceptions – Managing Input / output Files in java

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

1. Balagurusamy.E., "Object Oriented Programming with C++", Sixth Edition, TMH, 2013.
2. Balagurusamy.E., "Programming with Java", Fourth Edition, TMH,2009.

REFERENCES

1. K.R.Venugopal, Rajkumar Buyya, T.Ravishankar, "Mastering C++", TMH, 2003.
2. Herbert Schildt, "Java the Complete Reference" Ninth Edition, Oracle Press, TMG Education, 2014.

15IT34C PRINCIPLES OF DATA COMMUNICATION L T P C
3 0 0 3

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO 1: describe the basic concepts of Analog Communications. (K1)
- CO 2: analyze and compare various digital modulation schemes. (K4)
- CO 3: describe the concepts of data communications standards and connectionless protocols. (K1)
- CO 4: illustrates and list the data communication codes mechanisms. (K2)
- CO 5: illustrates the design considerations for access and multiple Spectrum techniques. (K2)

UNIT I FUNDAMENTALS OF ANALOG COMMUNICATION 9
Principles of amplitude modulation, AM envelope, frequency spectrum and bandwidth, modulation index and percent modulation, AM Voltage distribution, AM power distribution, Angle modulation - FM and PM waveforms, phase deviation and modulation index, frequency deviation and percent modulation, Frequency analysis of angle modulated waves. Bandwidth requirements for Angle modulated waves.

UNIT II DIGITAL COMMUNICATION 9
Introduction, Shannon limit for information capacity, digital amplitude modulation, frequency shift keying, FSK bit rate and baud, FSK transmitter, BW consideration of FSK, FSK receiver, phase shift keying -

binary phase shift keying - QPSK, Quadrature Amplitude modulation, bandwidth efficiency, carrier recovery - squaring loop, Costas loop, DPSK.

UNIT III INTRODUCTION TO DATA COMMUNICATION 9

Introduction – History of Data communications, Standards Organizations for data communication – Layered Network architecture- data communication circuits – Serial and Parallel Data Transmission –Data Communication Network.

UNIT IV DATA COMMUNICATION CODES 9

Introduction –Data communication codes, Bar codes – Error control – Error Detection – Error correction-Data Communication Hardware- Line control Unit – serial Interface –Data Communication modems.

UNIT V SPREAD SPECTRUM AND MULTIPLE ACCESS TECHNIQUES 9

Introduction, Pseudo-noise sequence, DS spread spectrum with coherent binary PSK, processing gain, FH spread spectrum, multiple access techniques – wireless communication, TDMA and CDMA in wireless communication systems, source coding of speech for wireless communications.

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

1. Wayne Tomasi, "Advanced Electronic Communication Systems", Sixth Edition, Pearson Education, 2007.
2. Simon Haykin, "Communication Systems", Fourth Edition, John Wiley & Sons. 2001.

REFERENCES

1. H.Taub, D L Schilling, G Saha, "Principles of Communication", Third Edition, 2007.
2. B.P.Lathi, "Modern Analog And Digital Communication systems", Third Edition, Oxford University Press, 2007
3. B.Sklar, "Digital Communication Fundamentals and Applications", Second Edition, Pearson Education, 2007.
4. Blake, "Electronic Communication Systems", Thomson Delmar Publications, 2002.
5. Martin S.Roden, "Analog and Digital Communication System", Third Edition, PHI, 2002.

15IT35C COMPUTER ARCHITECTURE

**L T P C
3 0 0 3**

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO1: discuss the internal structure and operation of digital computer. (K2)
- CO2: apply pipelining technique to improve the performance. (K3)

CO3: classify various types of memory. (K2)

CO4: explain different input and output mechanisms. (K1)

UNIT I BASIC STRUCTURE OF COMPUTER AND INSTRUCTIONS 9

Computer Types -Functional units – Basic operational concepts – Bus structures – Software- Performance –Memory location and addressing- Instructions and instruction sequencing – Addressing modes–Assembly language-Basic I/O Operation.

UNIT II BASIC PROCESSING AND ARITHMETIC UNIT 9

Fundamental concepts – Execution of a complete instruction – Multiple bus organization – Hardwired control – Micro programmed control – Addition and subtraction of signed numbers – design of fast adders – Multiplication of positive numbers – signed operand multiplication – Integer division.

UNIT III PIPELINING 9

Basic concepts – Data hazards – Instruction hazards – Influence on instruction sets – Data path and control considerations –Super scalar operation- Performance considerations.

UNIT IV MEMORY SYSTEM 9

Basic concepts – Semiconductor RAM – ROM – Speed – Size and cost – Cache memories – Improving cache performance – Virtual memory – Memory management requirements – Secondary storage devices.

UNIT V I/O ORGANIZATION 9

Accessing I/O devices – Interrupts – Direct Memory Access – Buses – Interface circuits – Standard I/O Interfaces (PCI, SCSI, USB), I/O devices and processors.

L: 45 TOTAL: 45 PERIODS

TEXT BOOK

1. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, "Computer Organization", Fifth Edition, Tata McGraw Hill, 2011.

REFERENCES

1. David A. Patterson and John L. Hennessy, "Computer Organization and Design: The Hardware/Software interface", Third Edition, Elsevier, 2005.
2. William Stallings, "Computer Organization and Architecture – Designing for Performance", Sixth Edition, Pearson Education, 2003.
3. John P. Hayes, "Computer Architecture and Organization", Third Edition, Tata McGraw- Hill, 1998.
4. V.P. Heuring, H.F. Jordan, "Computer Systems Design and Architecture", Second Edition, Pearson Education, 2004.

15IT36C	PROFESSIONAL ETHICS AND HUMAN	L	T	P	C
	VALUES	3	0	0	3
	(Common to all Programmes)				

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO1: Recognize the core human values that shape the ethical behavior of an engineer. (K2)
- CO2: Expose awareness on professional ethics. (K2)
- CO3: Analyze the engineering ethical breach from past study. (K2)
- CO4: Distinguish and apply safety, responsibility and rights in workplaces. (K2)
- CO5: Discuss about the global issues with regard to ethics. (K2)

UNIT I HUMAN VALUES 9

Morals, Values and Ethics - Integrity - Work Ethics - Service Learning - Civic Virtue - Respect for Others - Living Peacefully - Caring - Sharing - Honesty - Courage - Valuing Time - Co-operation - Commitment - Empathy - Self-Confidence - Character – Spirituality.

UNIT II ENGINEERING ETHICS 9

Senses of 'Engineering Ethics' - variety of moral issued - types of inquiry - moral dilemmas - moral autonomy - Kohlberg's theory - Gilligan's theory - consensus and controversy - Models of Professional Roles - theories about right action - Self-interest - customs and religion - uses of ethical theories.

UNIT III ENGINEERING AS SOCIAL EXPERIMENTATION 9

Engineering as experimentation - engineers as responsible experimenters - codes of ethics - a balanced outlook on law - the challenger case study.

UNIT IV SAFETY, RESPONSIBILITIES AND RIGHTS 9

Safety and risk - assessment of safety and risk - risk benefit analysis and reducing risk - the three mile island and chernobyl case studies. Collegiality and loyalty - respect for authority - collective bargaining - confidentiality - conflicts of interest - occupational crime - professional rights - employee rights - Intellectual Property Rights (IPR) - discrimination.

UNIT V GLOBAL ISSUES 9

Multinational corporations - Environmental ethics - computer ethics - weapons development - engineers as managers - consulting engineers - engineers as expert witnesses and advisors - Moral leadership - sample code of Ethics like ASME, ASCE, IEEE, Institution of Engineers (India), Indian Institute of Materials Management, Institution of electronics and telecommunication engineers (IETE), India, etc.

L:45; TOTAL:45 PERIODS

TEXT BOOKS

1. Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw-Hill, New York 1996.
2. GovindarajanM, Natarajan S andSenthil Kumar VS, "Engineering Ethics", Prentice Hall of India, New Delhi, 2004.

REFERENCES

1. Charles D and Fleddermann, "Engineering Ethics", Pearson Education / Prentice Hall, New Jersey, 2004 (Indian Reprint)
2. Charles E Harris, Michael S Protchard and Michael J Rabins, "Engineering Ethics - Concepts and Cases", Wadsworth Thompson Learning, United States, 2000 (Indian Reprint now available)
3. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, New Delhi, 2003.
4. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, Oxford 2001.

15IT37C OBJECT ORIENTED PROGRAMMING LABORATORY

L T P C
0 0 2 1

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO1: implement object oriented programming features using C++/java. (K3)
CO 2: develop a project using C++/java features. (K6)

LIST OF EXPERIMENTS

C++

1. Programs Using Functions
 - Functions with default arguments
 - Implementation of Call by Value, Call by Address and Call by Reference
2. Simple Classes for understanding objects, member functions and Constructors
 - Classes with primitive data members
 - Classes with arrays as data members
 - Classes with constant data members
 - Classes with static member functions
3. Compile time Polymorphism
 - Operator Overloading including Unary and Binary Operators.
 - Function Overloading
4. Runtime Polymorphism
 - Inheritance
 - Virtual functions
 - Templates

JAVA

5. Simple Java applications
 - for understanding reference to an instance of a class (object), methods
 - Handling Strings in Java
6. Simple Package creation.
 - Developing user defined packages in Java
7. Interfaces
 - Developing user-defined interfaces and implementation
 - Use of predefined interfaces
8. Threading
 - Creation of thread in Java applications
 - Multithreading
9. Exception Handling Mechanism in Java
 - Handling pre-defined exceptions
 - Handling user-defined exceptions
10. Develop a java program for file handling

Mini Project

Employee payroll calculation, Hospital Management, Bank Management, Library Management, Attendance Calculation, Grade sheet Calculation, Railway Reservation System, Electricity Bill generation, Inventory Control System, ATM System etc

P: 30 TOTAL: 30 PERIODS

15IT38C	DATA STRUCTURES LABORATORY	L T P C
		0 0 2 1

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO 1: identify and apply appropriate data structure for solving a given problem. (K3)
- CO 2: develop and implement solutions for application of data structures. (K3)

LIST OF EXPERIMENTS

1. Implement singly and doubly linked lists.
2. Represent a polynomial as a linked list and write functions for polynomial addition.
3. Convert infix to postfix expression using Stack.
4. Implement a double-ended queue (dequeue) where insertion and deletion operations are possible at both the ends.

5. Implement an expression tree. Produce its pre-order, in-order, and post-order traversals.
6. Implement binary search tree.
7. Implement insertion in AVL trees.
8. Implement priority queue using binary heap.
9. Implement hashing with open addressing.
10. Implement sorting algorithms such as Merge sort, Quick sort, and Heap sort and analyze its complexities.
11. Implement Dijkstra's algorithm to find the shortest path.
12. Implement Prim's algorithm and Kruskal's Algorithm using priority queues to find MST of an undirected graph.

P: 30 TOTAL: 30 PERIODS

15IT39C	COMMUNICATION SKILLS LABORATORY	L T P C
	(Common to all B.E. / B.Tech., Programmes)	0 0 2 1

COURSE OUTCOMES:

Upon completion of this course, the students will be able to

CO 1: interpret any passage after listening and interact at different situations fluently (K2)

CO2: excel appropriately in competitive and professional contexts. (K3)

CO3: acquire the sub-skills required for paper presentations and group discussions which will help them to excel in their workplace. (K3)

Unit I

Lab session:

- i) Listening to audio files :
 - Conversations
 - Speech
 - TED Talks

- ii) Listening and responding to any audio files:
 - Drawing the map
 - Picture completing task
 - Transferring data to Graph.

Practice session: On the spot Speaking activities: Just a minute speech, Picture description.

Unit II

Lab session: Read and understand the comprehension passages given in competitive examinations.

Practice session: Giving opinions and suggestions, analyzing a social issue.

Unit III

Lab session: Listening to audio files related to soft skills.

Practice session: Practicing Power point presentation, Group discussion and Interview skills.

P: 30 TOTAL: 30 PERIODS

REFERENCES

1. Rizvi.M.Ashraf, "Effective Technical Communication", First Edition, The MC Graw Hill Education Private Limited, Companies, New Delhi, 2010.
2. Sangeetha Sharma and Binod Mishra, "Communication Skills for Engineers and scientists", PHI Learning Private Limited, Delhi, 2009.

15IT41C APPLIED MATHEMATICS FOR INFORMATION TECHNOLOGY

L T P C
2 2 0 3

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO 1: Acquire the basic concepts of Number theory. (K2)
- CO 2: Apply various theorems on congruences. (K3)
- CO 3: Interpret the basic characteristic features of Markovian queues.(K3)
- CO 4: Utilize the concepts of Non Markovian queues. (K3)
- CO 5: Make use of the concepts of queuing theory in Networks. (K3)

UNIT I FUNDAMENTAL THEOREM OF ARITHMETIC 12

Introduction – Divisibility- Greatest common divisor - Prime numbers - The fundamental theorem of arithmetic - The series of reciprocals of the primes - The Euclidean algorithm - The greatest common divisor of more than two numbers.

UNIT II CONGRUENCES 12

Definition and basic properties of congruences - Residue classes and complete residue systems - Linear congruences - Reduced residue systems and Euler-Fermat theorem - Polynomial congruences modulo p - Chinese remainder theorem - Applications of Chinese remainder theorem.

UNIT III MARKOVIAN QUEUEING MODELS 12

Birth and Death Processes – Single server queuing models (M/M/1)- Multiple server queuing models (M/M/c).

UNIT IV NON - MARKOVIAN QUEUEING MODELS 12
General Service and single server queuing models (M/G/1) - General Service and multiple server queuing models (M/G/c)-General Input (G/M/1, G/M/c).

UNIT V NETWORKS 12
Series Queues-Open Jackson Networks-Closed Jackson Networks - Cyclic Queues.

L : 30 T :30 TOTAL: 60 PERIODS

TEXT BOOKS

1. Tom M. Apostol, "Introduction to Analytic Number Theory", Springer – Verlag, New York, Heidelberg, Berlin, Fifth Edition, 1998.
2. Donald Gross, John F.Shortle, James M.Thompson, Carl M.Harris "Fundamentals of Queueing Theory "Wiley India Pvt. Ltd, Fourth Edition, 2013.

REFERENCES

1. George E Andrews, "Number Theory", Dover Publications, INC. Newyork, 1995.
2. K.S.Trivedi, "Probability and Statistics with reliability, Queueing and Computer Science Applications", John Wiley and Sons, 2nd edition, 2002.

**15IT42C C# AND .NET FRAMEWORK L T P C
3 0 0 3**

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO1: explain the fundamentals of c# and .net. (K2)
- CO2: implement OOPs concepts using c#. (K3)
- CO3: design web Applications using various web based GUI tools. (K3)
- CO4: build Web Applications with ADO.NET. (K3)
- CO5: outline the importance of Web Services. (K2)

UNIT I INTRODUCTION TO C# AND .NET 8
C# and the .NET framework - Basics programming with C# - Arrays, Strings, Structures, Enumerations, Classes, Objects.

UNIT II OBJECT ORIENTED ASPECTS OF C# 10
Inheritance – Polymorphism – Interfaces - Operator Overloading – Delegates – Events - Errors and Exceptions - Assemblies – Appdomains – Reflection - .NET Remoting - .NET Remoting Architecture - .NET Remoting Features.

UNIT III WEB APPLICATION DEVELOPMENT 9
 ASP.NET Introduction - Programming Web applications with Web Forms -
 Web Controls – Master Pages - State management: Session data –
 Cookies - ASP.NET AJAX.

UNIT IV ADO.NET 9
 ADO.NET Architecture – ADO.NET Connected and Disconnected Models
 – XML and ADO.NET – Simple and Complex Data Binding – Data Grid
 View Class.

UNIT V WEB SERVICE AND .NET COMPACT FRAMEWORK 9
 Web Services with ASP.NET – SOAP, WSDL, Web Services, .NET
 Compact Framework – Compact Edition Data Stores.

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

1. E.Balagurusamy, "Programming in C#", Third Edition, Tata McGraw-Hill Education, 2010.
2. Jesse Liberty, Donald Xie, "Programming in C# 3.0", Fifth Edition, O'Reilly, 2007.

REFERENCES

1. Christian Nagel et al, "Professional C# 2005 with .NET 3.0", Wiley India, 2007.
2. Andy Wigley, Daniel Moth, Peter Foot, "Mobile Development Handbook", Microsoft Press, 2007.
3. S.Thamarai Selvi and R.Murugesan, "A Textbook on C#", Pearson Education, 2003.
4. Andrew Troelsen, "Pro C# 2010 and the .NET 4 Platform", Fifth Edition, A Press, 2010.

15IT43C	OPERATING SYSTEMS	L T P C
		3 0 0 3

COURSE OUTCOMES

- Upon completion of this course, the students will be able to
- CO 1: explain the history of operating systems and inter process communication methods. (K1)
 - CO 2: evaluate various scheduling algorithms and methods of deadlock handling. (K2)
 - CO 3: compare various memory management techniques. (K1)
 - CO 4: describe various file and I/O access methods. (K3)
 - CO 5: discuss about various protection and security methods. (K1)

UNIT I PROCESSES AND THREADS 9

Introduction to operating systems – Windows Installation - operating system structures – system calls – system programs. Process Management: Processes. Threads: Multi-threading models – Threading issues. Case Study: IPC in Linux.

UNIT II PROCESS SCHEDULING AND SYNCHRONIZATION 9

CPU Scheduling: Scheduling algorithms. Process Synchronization: The critical-section problem – Semaphores – Classic problems of synchronization. Deadlock: System model – Deadlock characterization – Methods for handling deadlocks – Case study: Process scheduling in Linux.

UNIT III MEMORY MANAGEMENT 9

Main Memory - Virtual Memory: Demand paging – Page replacement – Thrashing - ASLR-Hypervisor types. Case Study: Intel 32 and 64-bit Architectures.

UNIT IV STORAGE MANAGEMENT 9

Mass Storage Structure: Disk Structure, Disk Scheduling, and Disk Management –swap space management – File System Interface: File concept, Access methods, Directory Structure.

UNIT V PROTECTION AND SECURITY 9

Principles of protection – Access matrix – Implementation of Access matrix – Access Control – Revocation of access rights – Program threats – System and network threats – User authentication- Firewalling to Protect Systems and Networks. Case Study: Tripwire file system.

L: 45 TOTAL: 45 PERIODS

TEXT BOOK

1. Silberschatz, Galvin, and Gagne, "Operating System Concepts", Ninth Edition, Wiley India Pvt Ltd, 2013.

REFERENCES

1. Andrew S. Tanenbaum, "Modern Operating Systems", Fourth Edition, Pearson Education, 2014.
2. Gary Nutt, "Operating Systems", Third Edition, Pearson Education, 2004.
3. Harvey M. Deital, "Operating Systems", Third Edition, Pearson Education, 2004.

15IT44C DATABASE MANAGEMENT SYSTEMS L T P C
3 0 0 3

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO1: explain the role of data, files and databases in information systems. (K1)
- CO2: design databases and pose complex SQL queries of relational databases. (K3)
- CO3: describe normalization and its role in the database design process. (K1)
- CO4: illustrate the fundamental concepts of transaction processing, concurrency control techniques and recovery procedure. (K2)
- CO5: discuss the internal storage structures using different file and indexing techniques. (K1)

UNIT I INTRODUCTION 9

Purpose of Database System - Views of data - Data Models - Database Languages - Database Architecture - Database users and Administrator – Entity Relationship model - E-R Diagrams - Introduction to relational databases.

UNIT II RELATIONAL MODEL 9

Structure of Relational Databases-The relational Model - Keys - Relational Query Languages -Relational Algebra - Domain Relational Calculus - Tuple Relational Calculus - SQL fundamentals - Integrity - Triggers - Security - Views – Introduction to Distributed Databases and Client/Server Databases.

UNIT III RELATIONAL DATABASE DESIGN 9

Features of Good Relational Designs - Functional Dependencies - First, Second, Third Normal Forms, Dependency Preservation - Boyce/Codd Normal Form- Multi-valued Dependencies and Fourth Normal Form - Join Dependencies and Fifth Normal Form.

UNIT IV TRANSACTION MANAGEMENT 9

Transaction Concepts - ACID Properties - A Simple Transaction Model – Serializability - Two Phase Commit - Concurrency - Need for Concurrency - Locking Protocols - Two Phase Locking – Transaction Recovery - Deadlock.

UNIT V DATA STORAGE AND QUERYING 9

Overview of Physical Storage Media - RAID - File Organization - Indexing and Hashing - B+ tree Index Files - B tree Index Files - Query Processing Overview - Catalog Information for Cost Estimation - Selection Operation - Sorting - Join Operation-Query Optimization –Transformation of Relational expressions.

L: 45 TOTAL: 45 PERIODS

TEXT BOOK

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", Sixth Edition, Tata McGraw Hill, 2010.

REFERENCES

1. Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", Sixth Edition, Pearson / Addison Wesley, 2011.
2. Raghu Ramakrishnan, "Database Management Systems", Fourth Edition, Tata McGraw-Hill, 2006.
3. S.K.Singh, "Database Systems Concepts, Design and Applications", Second Edition, Pearson Education, 2011.
4. C.J.Date, A.Kannan, S.Swamynathan, "An Introduction to Database Systems", Eighth Edition, Pearson Education, 2006.

15IT45C

SOFTWARE ENGINEERING

L T P C
3 0 0 3

COURSE OUTCOMES

Upon completion of the course the students will be able to

- CO1: explain the principles of software development process (K1)
- CO2: outline the importance of requirements in software development process (K2)
- CO3: construct design patterns using UML (K3)
- CO4: apply structured coding techniques to produce quality code (K3)
- CO5: evaluate the principal approaches to software testing and maintenance (K4)

UNIT I INTRODUCTION

9

Software Engineering - Software Process - Generic process model - Prescriptive process model - specialized, unified process - Agile development - Agile Process - Extreme Programming - Other agile Process models - Software engineering Knowledge - core principles - Principles that guide each framework Activity.

UNIT II REQUIREMENTS

9

Requirements Engineering - Establishing the Groundwork - Eliciting Requirements - Developing use cases -Building the requirements model - Negotiating, validating Requirements - Requirements Analysis - Requirements Modeling Strategies

UNIT III DESIGN

9

MODELING WITH UML: UML Diagrams - Design concepts - Object Oriented Design Concepts, Design Classes - Design Model: Data, Architectural, Interface, Component, Deployment Level Design Elements.

UNIT IV SOFTWARE IMPLEMENTATION 9

Structured coding Techniques - Coding Styles - Standards and Guidelines - Documentation Guidelines - Modern Programming Language Features: Type checking - User defined data types - Data Abstraction - Exception Handling - Concurrency Mechanism.

UNIT V TESTING AND MAINTENANCE 9

TESTING: Software Quality - Software Quality Dilemma- Achieving Software Quality - Strategic Approach to software Testing - Strategic Issues - Strategies for Conventional Software, Object oriented software, Web Apps - Validating Testing - System Testing - Art of Debugging. MAINTENANCE: Software Maintenance - Software Supportability - Reengineering - Business Process Reengineering - Software Reengineering - Reverse Engineering – Restructuring - Forward Engineering - Economics of Reengineering.

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

1. Roger S Pressman, “Software Engineering – A Practitioner’s Approach”, Seventh Edition, Tata Mc Graw Hill Education, 2014.
2. Ian Sommerville, “Software Engineering”, Ninth Edition, Pearson Education, 2010.

REFERENCES

1. Richard Fairley, “Software Engineering Concepts”, Tata Mc Graw Hill Education, 2008.
2. Hans Van Vliet, “Software Engineering: Principles and Practices”, Third Edition, John Wiley and Sons, 2008.

15IT46C

GREEN IT

**L T P C
3 0 0 3**

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO 1: explain various issues in Green Computing. (K2)
- CO 2: enumerate the importance of IT components that conform to low-power computation. (K2)
- CO 3: discuss the ways to make computing greener and more efficient. (K1)
- CO 4: explain the design and redesign of datacenter. (K2)
- CO 5: describe different real time application of Green Computing. (K1)

UNIT I OVERVIEW AND INITIATIVES 9

Reasons & Issues to go green: Toxins – Power consumption – Equipment Disposals – Cost Savings: Power saving – Hardware saving – Current initiatives – Global initiatives – Asia Standards.

UNIT II	CONSUMPTION ISSUES	9
Minimizing power usage: Power problems – Monitoring power usage – Reducing power usage – Low power computers and components – Cooling costs: Reducing cooling costs – Optimizing airflow- Adding Cooling.		
UNIT III	GREEN COMPUTING ARCHITECTURE	9
Rethinking of behavior – paperless communication – Recycling – Hardware considerations.		
UNIT IV	GREEN COMPUTING PLATFORMS	9
Greening process: Datacenter design and redesign – Virtualization – Savings.		
UNIT V	GREEN COMPUTING APPLICATIONS AND CASE STUDIES	9
Technological Businesses – Other Organizations – Applying Green IT Strategies and Applications to a Hospital – Packaging Industry and Telecom Sector.		

L: 45 TOTAL: 45 PERIODS

TEXT BOOK

1. Toby J.Velte, Anthony T.Velte and Robert Elsenpeter, “ Green IT Reduce your Information System’s Environmental impact while Adding to the Bottom Line”, Tata McGraw-Hill, 2008.

REFERENCES

1. Wu Chun Feng, “Green Computing: Large-Scale Energy Efficiency”, CRC Press INC, 2013
2. BhuvanUnhelkar, “Green IT Strategies and Applications - Using Environmental Intelligence”, CRC Press, June 2011.
3. Jason Harris, “ Green Computing and Green IT Best Practices on Regulations and Industry Initiatives, Virtualization, Power Management, Materials Recycling and Telecommuting”, Lulu Publishers, 2008.

15IT47C OPERATING SYSTEMS LABORATORY L T P C
0 0 2 1

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO 1: use various system calls in UNIX operating system. (K3)
- CO 2: implement various process scheduling algorithms. (K5)

- CO 3: develop inter-process communication models (K2)
- CO 4: simulate the producer - consumer problem for process synchronization. (K3)
- CO 5: illustrate memory management and file allocation techniques. (K4)

LIST OF EXPERIMENTS

(Implement the following on LINUX or other UNIX like platform. Use C for high level language implementation)

1. Write programs using the following system calls of UNIX operating system: fork, exec, getpid, exit, wait, close, stat, opendir, readdir
2. Write programs using the I/O system calls of UNIX operating system (open, read, write, etc)
3. Write C programs to simulate UNIX commands like ls, grep, etc.
4. Given the list of processes, their CPU burst times and arrival times, display/print the Gantt chart for FCFS and SJF. For each of the scheduling policies, compute and print the average waiting time and average turnaround time.
5. Given the list of processes, their CPU burst times and arrival times, display/print the Gantt chart for Priority and Round robin. For each of the scheduling policies, compute and print the average waiting time and average turnaround time
6. Develop application using Inter Process communication (using shared memory, pipes or message queues)
7. Implement the Producer – Consumer problem using semaphores (using UNIX system calls).
8. Implement various memory management schemes.
9. Implement any file allocation technique (Linked, Indexed or Contiguous)

P: 30 TOTAL: 30 PERIODS

15IT48C DATABASE MANAGEMENT SYSTEMS LABORATORY
L T P C
0 0 2 1

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO1: address a broad range of data management issues including data integrity and security. (K3)
- CO2: design databases and pose complex SQL queries of relational databases. (K3)
- CO3: develop a set of queries in PL/SQL to handle typical user inquiries for information extraction from the database. (K3)

CO 4: gain a working knowledge of developing and maintaining a small-scale database project. (K3)

LIST OF EXPERIMENTS

1. Creation and Modification of relations
2. Integrity constraint enforcement
3. Nested Queries & Join Queries
4. Creation and Updation of Views
5. Exercises using PL/SQL
6. Nosql
7. High level programming language extensions (Control structures, Procedures and Functions).
8. Creation of Triggers
9. Cursor management
10. Menu Design
11. Database Design and implementation (Mini Project).

REFERENCE

1. Ivan Bayross, Commercial Application Development Using ORACLE Developer 2000, BPB Publications, 2000.

LAB EQUIPMENTS

Hardware and Software required for a batch of 30 students:

Hardware:

- 30 Personal Computers

Software:

- Front end: VB/C#/JAVA
- Back end: Oracle 11g, my SQL, DB2
- Platform: Windows 7
- Oracle server could be loaded and can be connected from individual PCs.

P: 30 TOTAL: 30 PERIODS

15IT49C C# AND .NET FRAMEWORK LABORATORY L T P C
0 0 2 1

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO1: demonstrate the fundamental concepts of C# and .Net. (K2)
CO2: experiment and examine runtime errors using exception handling. (K4)
CO3: develop a simple application using ASP.Net controls. (K6)
CO4: manipulate Database using ADO.Net. (K3)
CO5: model web form based applications. (K6)
CO6: design various real time applications using ASP.NET with ADO.NET. (K6)

EXPERIMENTS

1. Simple Console Application
2. Array, string and structures using C#
3. OO programming concepts
4. Exception Handling Mechanism
5. Simple web application using ASP.net Controls
6. Simple ASP.Net program using web controls
7. Session tracking using user authentication
8. Connected and Disconnected model of ADO.Net
9. Real time application using web services
10. Simple mobile application using .Net compact framework
11. Mini Project

P: 30 TOTAL: 30 PERIODS

15IT51C	EMBEDDED SYSTEMS	L T P C
		3 0 0 3

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO 1: explain the basic ARM processor functionalities and architecture. (K2)
- CO 2: discuss the Memory and interrupt handling in ARM processor. (K1)
- CO 3: outline the importance of Multi tasking in embedded systems. (K2)
- CO 4: develop basic programs using embedded c and embedded tools.(K3)
- CO 5: describe the working principle of various embedded systems. (K2)

UNIT I INTRODUCTION 9

Introduction to microprocessors – Features of 8085 – Architecture - Challenges of Embedded Systems – Embedded system design process - Embedded processors – 8051 Microcontroller, ARM processor – Architecture, Instruction sets.

UNIT II MEMORY AND INTERRUPT HANDLING 9

Programming Input and Output – Memory system mechanisms – Memory and I/O devices and interfacing – Design Examples: Cell Phones –Digital Still cameras.

UNIT III MULTIPROCESS AND PERFORMANCE POLICIES 9

Multiple tasks and processes – Context switching – Scheduling policies – Interprocess communication mechanisms – Design Examples: Compact Discs and DVDs.

UNIT IV EMBEDDED PROGRAMMING AND TOOLS 9

Programming embedded systems in assembly and C – Meeting real time constraints – Object-oriented programming with C- Multi-state systems and function sequences - Embedded software development tools – Emulators and debuggers.

UNIT V CASE STUDY 9
Design issues and techniques – Case studies – Complete design of example embedded systems.

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

1. Marilyn Wolf, "Computers as Components: Principles of Embedded Computing System Design", Third Edition, Elsevier, 2012.
2. Michael J. Pont, "Embedded C", Pearson Education, 2008.

REFERENCES

1. Jean J.Labrosse, "Embedded system building blocks", CMP books, Second Edition, 1999.
2. Arnold berger, "Embedded system design", CMP books, First Edition, 2001.
3. Narayan and gong, "Specifications and design of embedded systems", Pearson education, Second Edition, 1999.

15IT52C INTERNET AND WEB TECHNOLOGY L T P C
3 0 0 3

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO1: design and validate web pages using HTML and scripting languages. (K3)
- CO2: design dynamic web pages using server side programming. (K3)
- CO3: design Web Pages using Java framework (K3)
- CO4: develop the Enterprise Applications and Web services. (K3)

UNIT I INTRODUCTION 9
Client/Server concepts - World Wide Web – HTML 4 – HTML5- CSS-Case study- Website on Education

UNIT II SCRIPTING LANGUAGES 9
JavaScript –Angular.JS – JQuery - JSON.

UNIT III SERVER SIDE TECHNOLOGIES 9
Servlet - JSP –Database connectivity- Case study: Book Exchange-MVC paradigm

UNIT IV JAVA FRAMEWORK 9
Strut- Spring- Hibernate

UNIT V WEB SERVICES 9
Web service – SOAP – WSDL – Case study: Airline reservation

L: 45 TOTAL: 45 PERIODS

TEXT BOOK

1. Jeffrey C. Jackson, "Web Technologies - A Computer Science Perspective", Pearson Education, 2011.

REFERENCES

1. Paul J. Deitel, Harvey M. Deitel, Abbey Deitel, "Internet & World Wide Web How to Program", Fifth Edition, Pearson Education, 2011.
2. Ravi Kant Soni, Learning Spring Application Development, Packt Publishing, 2015
3. Dane Cameron, A Software Engineer Learns HTML5, JavaScript and jQuery: A guide to standards-based web applications Kindle Edition, 2013
4. James Holmes, Struts: The Complete Reference, 2nd Edition, Mcgraw Hill Education, 2006
5. Andrew Grant, Beginning AngularJS, Apress, 2015
6. Robert. W. Sebesta, "Programming the World Wide Web", 7/E, Pearson Education, 2013.

15IT53C	COMPUTER NETWORKS	L T P C
		3 0 0 3

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO 1: describe the fundamentals of data communication and networking. (K1)
- CO 2: analyze the principles of data link layer concepts and issues(K4)
- CO 3: identify the design issues of network layer and apply suitable techniques to solve them. (K3)
- CO 4: implement client-server applications using TCP and UDP (K5)
- CO 5: elaborate the functions of various traditional and modern wireless technologies. (K2)

UNIT I DATA COMMUNICATION AND NETWORKING 9

Introduction – Data Communication & Networking Model – Topology – Transmission Media – OSI Model – TCP/IP Protocol suite – Internet Architecture

UNIT II DATA LINK CONTROL PROTOCOLS 9

Flow Control: Stop and Wait – Sliding Window – Error Detection & Control Mechanism – HDLC – Medium access: CSMA – Ethernet – Token ring – FDDI

UNIT III NETWORK LAYER 9
Circuit Switching – Packet Switching – Principles of Internetworking – Internet Protocols – Routing Metrics – Routing Algorithms – Multicast Routing – IP Addressing – Subnetting.

UNIT IV TRANSPORT AND APPLICATION LAYER 9
Duties of Transport layer – TCP – UDP – Congestion Control – Congestion Avoidance – Quality of Service – Socket Basics – WWW – Email– HTTP – FTP – DNS.

UNIT V ADVANCED TECHNOLOGY 9
Traditional wireless technology: GSM, GPRS, UMTS, CDMA – Modern wireless technology: Bluetooth, Wi-Fi, WiMax, IMS, LTE and Li-Fi.

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

1. William Stallings, “Data and Computer Communications”, Pearson Education, Tenth Edition, 2013.
2. Larry L. Peterson, Bruce S. Davie, “Computer Networks: A systems approach”, Morgan Kaufmann Publishers, Fifth Edition, 2011.

REFERENCES

1. Behrouz A. Forouzan, “Data communication and Networking”, Tata McGraw – Hill, Fifth Edition, 2012.
2. Andrew S.Tanenbaum, David J.Wetherall, “Computer Networks”, Pearson Education, Fifth Edition, 2014.
3. James F. Kurose, Keith W. Ross, “Computer Networking: A Top-Down Approach, Pearson Education, Fifth Edition, 2012.

15IT54C MULTIMEDIA COMPUTING L T P C
3 0 0 3

COURSE OUTCOMES

- Upon Completion of this course, the students will be able to
- CO1: describe 2D graphics and clipping algorithms. (K1)
 - CO2: explain computer graphic algorithms for clippings, hidden line and surface removal, shading and rendering. (K2)
 - CO3: implement OpenGL programming concepts to create interactive computer graphics. (K3)
 - CO4: apply the concept of Multimedia Compression techniques in Audio & Video. (K4)
 - CO5: develop the Multimedia presentation using databases. (K4)

UNIT I	2D PRIMITIVES	9
Overview of Graphics Systems – Output Primitives - Line, Circle and Ellipse drawing algorithms – Attributes of output primitives - Two dimensional Geometric transformation - Pivot Point Rotation – Homogenous Coordinates – Two dimensional viewing – Clipping and Windowing-Line clipping algorithms (Cohen- Sutherland, Liang-Barsky, Nicholl–Lee).		
UNIT II	3D PROJECTIONS AND VIEWING	9
Parallel and Perspective projections - Three dimensional object representation – Polygons, Curved lines, Splines, Quadric Surfaces- Visualization of data sets - Three-Dimensional Geometric and Modeling Transformations – Three-Dimensional Viewing -Visible surface identification- Depth Buffer Method – Wire frame Method - Hidden surface and line elimination.		
UNIT III	COLOR MODELS & OPENGL PROGRAMMING	9
Color Models – RGB, YIQ, CMY, HSV – Animations – General Computer Animation, Raster, Keyframe - Graphics programming using OPENGL – Basic graphics primitives – Drawing three dimensional objects - Drawing three dimensional scenes - Introduction to Shading models – Flat and Smooth shading – Adding texture to faces –Fractals and Self similarity-Mandelbrot sets – Julia Sets.		
UNIT IV	MULTIMEDIA COMPRESSION	9
Multimedia-Media and data Streams- Medium and Traditional Data streams-sound and audio-MIDI Concepts-Image and Graphics-Video and animation-Computer based animation-JPEG compression-H.261-DVI.		
UNIT V	MULTIMEDIA SYSTEMS AND APPLICATIONS	9
Optical Storage Systems-Multimedia Communication Systems-Database System - Synchronization issues – Presentation requirements – Applications – Video conferencing – Virtual reality – Interactive Video.		

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

1. Donald Hearn, M.Pauline Baker, "Computer Graphics – C Version", Pearson Education, Second Edition, 2004
2. F.S. Hill Jr, Stephen Kelley, "Computer Graphics using OPENGL", Prentice Hall Education, Third Edition, 2007.
3. Ralf Steinmetz, Klara Steinmetz, "Multimedia Computing, Communications & Applications", Pearson education, 2009.

REFERENCES

1. James D. Foley, Andries Van Dam, Steven K. Feiner, John F. Hughes, "Computer Graphics- Principles and practice", Pearson Education, Second Edition, 2007.
2. Tay Vaughan, "Multimedia Making It Work", McGraw Hill, Seventh Edition, 2008

15IT55C	PROJECT MANAGEMENT AND FINANCE	L	T	P	C
	(Common to all Programmes)	3	0	0	3

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO1: Explain the concept of operational and project management. (K2)
- CO2: Define the scope of a project and develop the project plan. (K2)
- CO3: Evaluate the technical, business and social environment related to the project. (K3)
- CO4: Formulate and manage project team successfully. (K5)
- CO5: Monitor and control projects using tools and techniques. (K3)

UNIT I BASIC CONCEPT 9

Concept and categories of project - Project development cycle - Concept, tools and techniques of project management - Logistics and supply chain management - Forms of project organizations.

UNIT II PROJECT FORMULATION 9

Project identification, formulation and preparation. Market and demand estimation - Market survey techniques - Demand forecasting. Materials management - Analysis of materials input, technology, production, plant capacity, location and site, civil works, charts, layouts and work schedule. Cost of project - Means of financing, estimates of cost - Financial projections.

UNIT III PROCESS OF PROJECT APPRAISAL 9

Technical, Economic, Financial, Legal and Social appraisal of the Industrial Projects. Problems due to rate of discount, wage-rate, exchange rates, treatment of taxes, social cost-benefits - treatment of risk and uncertainty - sensitivity analysis and probability approach - Single as well as multiple projects - Big data analytics - PLM and SLM.

UNIT IV PROJECT TEAM FORMULATION AND MAXIMIZING PARTICIPATION 9

Project Team frame works - Project Team cultures - Barriers and challenges - Selecting Team Members - Key skills of effective project leaders - Giving / receiving feedback from different members of the project.

UNIT V IMPLEMENTATION, MONITORING AND CONTROL OF PROJECTS 9

Project scheduling, network techniques for resource, cost budgeting and scheduling - project management teams and coordination - Monitoring and post implementation, evaluation of the project - ERP - Project financing.

L:45; TOTAL:45 PERIODS

TEXT BOOKS

1. Gopalakrishnan P and Ramamoorthy VE "Textbook of Project Management", Macmillan Publications, 2014.
2. Maylor "Project Management", 3rd Edition, Pearson, 2010.

REFERENCES

1. Gido, "Effective project management", 3rd Edition, Cengage Learning, 2008.
2. Gray and Larson, "Project Management: The Managerial Process", 3rd Edition, TMH, 2010.
3. Choudhury S, "Project Management", 1st Edition, Tata Mc Graw Hill Publishing Co., 2007.

15IT56C INTERNET AND WEB TECHNOLOGY LABORATORY

L T P C
0 0 2 1

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO1: design and validate the web applications using scripting languages. (K3)
- CO2: design the dynamic web applications using server side programming and web services (K3)
- CO3: design the web applications using Java framework. (K3)

List of Experiments

1. Create the web pages using HTML
2. Create the web pages with all types of Cascading style sheets.
3. Form validation using JavaScript, JQuery and AngularJS
4. Write a servlet program to invoke servlets from HTML forms
5. Develop the database web applications using servlet.
6. Develop the database web applications using JSP
7. Create an application using strut
8. Create an application in spring
9. Develop an application for Integrating Hibernate with the Spring Framework
10. Develop web service applications

Mini project

P: 30 TOTAL: 30 PERIODS

15IT57C

NETWORKING LABORATORY

L T P C
0 0 2 1

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO 1: identify and describe the functions of common networking devices. (K2)
- CO 2: analyze the structure and organization of networks topology. (K3)
- CO 3: develop and implement solutions for application of computer networks. (K3)

LIST OF EXPERIMENTS

1. Study of networking devices and troubleshooting commands.
2. Study of switching (L2) and Routing (L3) concepts
3. Create LAN with computers and internetworking devices.
4. Configure a network topology using CISCO Packet Tracer.
5. Sending & Receiving packets with unicast, broadcast and multicast mechanism.
6. Implement ARP/RARP protocol in routing.
7. Configure a network topology using distance vector routing protocols (eg. RIP).
8. Implement link state routing protocols (eg.OSPF) in a network.
9. Sniff and analyse packet capture & network traffic with Wireshark and tcpdump
10. Configure DHCP in an Enterprise Branch Network using CISCO Packet Tracer.
11. Configure Standard Access Control Lists in a Medium-Size Enterprise Branch Office Network using CISCO Packet Tracer.
12. Configure Virtual LANs on the switches in a converged network topology.
13. Configuring Point-to-point protocol authentication using PAP and CHAP.
14. Create & send different type of data control traffic using PackETH (Linux Opensource packet generator)
15. Configure spanning tree protocol using CISCO Packet Tracer

P: 30 TOTAL: 30 PERIODS

15IT58C

MULTIMEDIA LABORATORY

L T P C
0 0 2 1

COURSE OUTCOMES

Upon Completion of this course, the students will be able to

- CO1: enhance their perspective of modern computer system with modeling, analysis and interpretation of 2D and 3D visual information. (K3)
- CO2: create and evaluate graphic design projects using computer graphics software. (K4)

LIST OF EXPERIMENTS

1. To implement Bresenham's algorithms for line, circle and ellipse drawing.
2. To perform 2D Transformations such as translation, rotation, scaling, reflection and shearing of objects.
3. To implement Cohen-Sutherland 2D clipping and window view port mapping
4. To perform 3D Transformations such as translation, rotation and scaling.
5. To implement Composite 3D transformations.
6. To draw 3D objects and scenes using OPENGL.
7. To convert between color models (RGB, YIQ, CMY & HSV)
8. Implementation of text compression algorithm using RLE and Static Huffman.
9. To implement image compression using Huffman algorithm.
10. To perform animation using any Animation software (Macromedia Flash,Blender,CreaToon etc)
11. To perform basic operations on image using Photoshop /GIMP /any equivalent Image manipulation software

Software:

1. C/C++/Java
2. OpenGL 3.7 (precompiled GLUT libraries 3.7 – Open source)
3. Any open source software like GIMP 2.6 / Flash 8.0 / Adobe Photoshop / Blender 2.5

P: 30 TOTAL: 30 PERIODS

15IT61C SOFTWARE PROJECT MANAGEMENT L T P C
3 0 0 3

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO 1: explain various activities of project management. (K2)
- CO 2: discuss various evaluation techniques. (K3)
- CO 3: plan various activities in the project development. (K1)
- CO 4: describe the software effort estimation techniques. (K1)
- CO 5: analyze the problem and identify suitable team members. (K1)

UNIT I INTRODUCTION 9

Project Definition – Software projects versus other types of project – Activities Covered by Software Project Management – Plans, methods and methodologies – Stakeholders – Project success and failure

UNIT II PROJECT MANAGEMENT 9

Project portfolio management - Evaluation of individual projects – Cost Benefit Evaluation Techniques – Risk Evaluation- Program management - Strategic program management - Benefits management

UNIT III ACTIVITY PLANNING 9

Objectives – Project Schedule – Sequencing and Scheduling Activities – Network Planning Models – Forward Pass – Backward Pass – Activity Float – Shortening Project Duration – Activity on Arrow Networks – Risk Management.

UNIT IV SOFTWARE EFFORT ESTIMATION 10

Problems with over and under estimate - The basis for software estimation - software estimation Techniques. Bottom-up estimating - The top-down approach and parametric models - Expert judgments, Estimation by analogy, Function point –COCOMO: a parametric model.

UNIT V PEOPLE MANAGEMENT AND TEAM ORGANIZATION 8

Organizational behavior – Selecting the right person for the job- Instruction in the best methods – Motivation – The Oldham–Hackman job characteristics model – Stress – Health and safety - Becoming a team – Decision making – Organizational Structure – Leadership.

L: 45 TOTAL: 45 PERIODS

TEXT BOOK

1. Bob Hughes, Mikecatterell, “Software Project Management”, Fifth Edition, Tata McGraw Hill, New Delhi, 2011.

REFERENCES

1. Kelkar Sa, "Software Project Management", Third Edition, PHI Learning, New Delhi, 2012.
2. Gopaldaswamy Ramesh, "Managing Global Software Projects", Tata McGraw Hill, New Delhi, 2006.
3. Roger S Pressman, "Software Engineering, A Practitioner's Approach", Sixth Edition, Tata McGraw Hill, New Delhi, 2009.
4. Kamna Malik, Praveen Choudary, "Software Quality, a practitioner's Approach", Tata McGraw Hill, New Delhi, 2009.

15IT62C**ENTERPRISE MOBILITY****L T P C****3 0 0 3****COURSE OUTCOMES**

Upon completion of this course, the students will be able to

- CO1: use various scripting technologies. (K1)
 CO2: explain the devices, platform, and layers in Mobile Architecture. (K1)
 CO3: develop simple mobile applications using mobile platforms. (K3)
 CO4: describe advanced technologies in mobility. (K1)

UNIT I INTRODUCTION**9**

Development in Web Standards - HTML5 – Java script - Event programming in Java

UNIT II ENTERPRISE MOBILITY ARCHITECTURE**9**

Innovations in Mobile Device platforms-Enterprise mobility landscape-Enterprise mobility layer-Mobility solution architecture

UNIT III MOBILE PLATFORMS AND DESIGN**9**

Mobile platforms- Mobile application designing

UNIT IV MOBILE PROGRAMMING**9**

Mobile programming: Android – iPhone - Windows Phone - Windows mobile - Case study: Mobility solutions for healthcare

UNIT V TECHNOLOGIES IN MOBILITY**9**

Mobile security- Mobile NFC - Device capabilities in App location – Mobile cloud computing.

L: 45 TOTAL: 45 PERIODS**TEXT BOOK**

1. Jithesh Sathyan, Anoop N, Navin Narayan, Shibu Kizhakke Vallathai, "A Comprehensive Guide to Enterprise Mobility", CRC Press, 2013.

REFERENCES

1. Zak Ruvalcaba and Anne Boehm, "Murachs HTML5 & CSS3 ", Mike Murach & Associates Inc, Third edition , 2015.
2. Nicholas C. Zakas, "Professional Javascript For Web Developers", Third Edition, Wiley India Pvt Ltd, 2012.
3. Greg Shackles, "Mobile Development with C#: Building Native IOS, Android, and Windows Phone Applications (Paperback)", O'Reilly Media Publishers, 2012.
4. Sumi Helal, Raja Bose, Wengdong Li, "Mobile Platforms and Development Environments (Paperback)", Morgan & Claypool Publishers, 2012.

15IT63C

DATA ANALYTICS AND BUSINESS INTELLIGENCE

L T P C
3 0 0 3

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO1: apply linear and logistic regression models for analyzing the data. (K3)
- CO2: illustrate the casual inference using regression models. (K2)
- CO3: describe multilevel regression models. (K1)
- CO4: explain data collection and variance analysis. (K2)

UNIT I LINEAR REGRESSION

9

Introduction to data analysis – Statistical processes – statistical models – statistical inference – review of random variables and probability distributions – linear regression – one predictor – multiple predictors - prediction and validation – linear transformations – centering and standardizing – correlation – logarithmic transformations – other transformations – building regression models – fitting a series of regressions

UNIT II LOGISTIC AND GENERALIZED LINEAR MODELS

9

Logistic regression – logistic regression coefficients – latent - data formulation – building a logistic regression model – logistic regression with interactions – evaluating, checking, and comparing fitted logistic regressions – identifiability and separation – Poisson regression – logistic – binomial model - Probit regression – multinomial regression – robust regression using t model – building complex generalized linear models – constructive choice models

UNIT III SIMULATION AND CAUSAL INFERENCE

9

Simulation of probability models – summarizing linear regressions – simulation of non – linear predictions – predictive simulation for generalized linear models – fake - data simulation – simulating and comparing to actual data – predictive simulation to check the fit of a time series model – causal inference randomized experiments – observational

studies – causal inference using advanced models – matching - instrumental variables

UNIT IV MULTILEVEL REGRESSION 9

Multilevel structures – clustered data – multilevel linear models – partial pooling – group – level predictors – model building and statistical significance – varying intercepts and slopes – scaled inverse - Wishart distribution – non-nested models – multi-level logistic regression – multi-level generalized linear models

UNIT V DATA COLLECTION AND MODEL UNDERSTANDING 9

Design of data collection – classical power calculations – multilevel power calculations – power calculation using fake - data simulation – understanding and summarizing fitted models – uncertainty and variability – variances – R² and explained variance – multiple comparisons and statistical significance – analysis of variance – ANOVA and multilevel linear and general linear models – missing data imputation.

L: 45 TOTAL: 45 PERIODS

TEXT BOOK

1. Andrew Gelman and Jennifer Hill, "Data Analysis using Regression and multilevel / Hierarchical Models", Cambridge University Press, 2007.

REFERENCES

1. Philipp K. Janert, "Data Analysis with Open Source Tools", O'Reilley, 2010.
2. Wes McKinney, "Python for Data Analysis", O'Reilley, 2012.
3. Robert Nisbelt, John Elder, and Gary Miner, "Handbook of statistical analysis and data mining applications", Academic Press, 2009.
4. Business Intelligence and Analytic Trends for Today's Businesses", Wiley, 2013.
5. David Ruppert, "Statistics and Data Analysis for Financial Engineering", Springer, 2011.

15IT64C CRYPTOGRAPHY AND NETWORK SECURITY

**L T P C
3 2 0 4**

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO 1: apply conventional encryption techniques for solving problems.(K3)
- CO 2: explain the concepts and algorithms of symmetric and asymmetric key encryption. (K2)
- CO 3: construct a message digest and digital signature for securing a system. (K6)

CO 4: describe the various authentication and internet security protocols. (K1)

CO 5: outline the importance of security in wireless networks. (K1)

UNIT I ELEMENTARY CRYPTOGRAPHY 15

Security Goals – Attacks, Services and mechanisms - Substitution Ciphers, Transposition Ciphers - Stream and Block Ciphers - Mathematics for Cryptography – Applied Cryptography

UNIT II SYMMETRIC AND ASYMMETRIC ALGORITHMS 15

Data Encryption Standards - Advanced Encryption Standard – RC5 - Asymmetric key algorithms - Diffie Hellman Key Exchange - RSA Cryptosystem – Case Study: Key Exchange in Sensor Networks

UNIT III DATA INTEGRITY TECHNIQUES 15

Message Authentication Code – MD5 – Hash Functions – SHA 512 – Whirlpool - HMAC – Digital Signatures: DSS – Fast one time signature (Lamport).

UNIT IV AUTHENTICATION PROTOCOLS 15

Protocols for Internet Security – SSH (Remote Login Protocol) – Kerberos – SSL – TLS - PKI

UNIT V WIRELESS NETWORK SECURITY 15

Wired Equivalent privacy - Wireless Network Threats – Measures – Mobile Device Security – Security in Wireless networks – WAP Security

L: 45 T: 30 TOTAL: 75 PERIODS

TEXT BOOK

1. William Stallings, "Cryptography and Network Security - Principles and Practices", Pearson Education, Sixth Edition, 2014.

REFERENCES

1. Behrouz A. Foruzan and Debdeep Mukhopadhyay, "Cryptography and Network Security", Tata McGraw-Hill, Second Edition, 2010.
2. Atul Kahate, "Cryptography and Network Security", Tata McGraw-Hill, Eighth Edition, 2006.
3. Abhijit Das, C.E.Veni Madhavan, "Public Key Cryptography, Theory and Practice", Pearson Education, 2009.
4. Wenbo Mao, "Modern Cryptography: Theory and Practice", Pearson Education, 2007.

6. Implement an application that creates an alert upon receiving a message.
7. Write a mobile application that creates alarm clock
8. Mini project

Software

- ADT bundle
- XCODE

P: 30 TOTAL: 30 PERIODS

15IT68C	PRODUCT DEVELOPMENT LABORATORY	L T P C
		0 0 4 2

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO 1: understand the integration of customer requirements in product design.
- CO 2: Apply structural approach to concept generation, selection and testing.
- CO 3: Understand various aspects of design such as industrial design, design for manufacture.

The objective of this course is to make the students learn methodologies for identifying customer needs, developing new product concepts, prototype development, estimation of manufacturing costs, and developing business plans to support the development and marketing of these products. A student or a team of students shall develop their own products based on the users need, build simple prototypes of their design, and write development plans for the products.

P: 60 TOTAL: 60 PERIODS

15IT72C	RESEARCH PAPER AND PATENT REVIEW – SEMINAR	L T P C
		0 0 2 1

The Students will make a technical presentation on current topics related to the specialization. The same will be assessed by a committee appointed by the department. The students are expected to submit a report at the end of semester covering the various aspects of his/her presentation.

P: 30 TOTAL: 30 PERIODS

15IT73C

COMPREHENSION

L T P C
0 0 2 1

COURSE OUTCOMES

Upon Successful completion of this course, the students will be able to

CO 1: Recall and Debug programs in various languages. (K2)

CO 2: Improve the technical skills to face competitive exams. (K3)

Guidelines

- A group of three students may be assigned to discuss a particular subject in each hour. The cycle should be repeated throughout the semester.
- Periodic review, Assignments, case study should be filed properly and it will be reviewed by the subject experts. During the end of semester it should be evaluated by Examiners.

S. No	Subject Area	Responsible	Internal (50 Marks)		External (50 Marks)
			Weight age	Assessment Methods	
1.	OOP using Java	DEG-1 CC-2	20	Objective test, Assignments, Minute paper, Seminars & case study	A panel of two members will be evaluating the students. Written – 30 Oral(VV) – 20
2.	C# and .NET Framework				
3.	Data Structures				
4.	Database Management Systems				
5.	Computer Architecture	DEG-1 CC-2	15		
6.	Digital Systems				
7.	Embedded Systems				
8.	Operating Systems				
9.	Computer Networks				
10.	Principles of Data Communication				
11.	Software Engineering				
12.	Internet and Web Technology	DEG-1 CC-2	15		

(DEG – Domain Expert Group, CC – Course Coordinator)

P: 30 TOTAL: 30 PERIODS

15IT81C

PROJECT WORK

L T P C
0 0 20 10**GUIDELINES**

- Maximum of three students can be formed as a team
- The project must be a discovery of new facts or techniques or correlation of facts already known which may be of analytical, experimental, hardware oriented projects.
- Periodical review will be conducted

Internal Evaluation				
Evaluation	Contents	Evaluation committee	Weightage	Duration
Review1	<ul style="list-style-type: none"> • Problem identification in emerging technologies (Social/E-Governance/ etc) • Literature review 	<ul style="list-style-type: none"> • A panel of 3 internal expert members (depends upon the Domain Expert Group) review the oral presentation 	20	4 months (VII Sem)
Review2	<ul style="list-style-type: none"> • Technology feasibility • Proposed methodology • 50% of implementation 	<ul style="list-style-type: none"> • A panel of 3 internal expert members (depends upon the Domain Expert Group) review the oral presentation • Implementation will be reviewed by respective guides 	30	2 Months (VIII Sem)
Review3	<ul style="list-style-type: none"> • 100 % of implementation • Report preparation • Conference/Journal submission 	<ul style="list-style-type: none"> • A panel of 3 internal expert members (depends upon the Domain Expert Group) review the oral presentation • Implementation and report preparation will be reviewed by the respective guides and internal expert members 	50	2 Months (VIII Sem)
External Evaluation				
External Examiner reviews the oral presentation of the students.				

15IT01E

DISTRIBUTED DATABASES

L T P C
3 0 0 3

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO1: explain the features of distributed database. (K2)
- CO2: apply query optimization principles for optimizing query performance (K3)
- CO3: interpret distributed transaction and concurrency control principles in distributed database applications. (K3)
- CO4: apply reliability and distributed database administration principles for managing distributed database. (K3)
- CO5: describe the query processing and transaction management in Object DBMS. (K2)

UNIT I INTRODUCTION TO DISTRIBUTED DATABASES 9

Features of Distributed versus Centralized Databases - Principles of Distributed Databases - Levels of Distribution Transparency - Reference Architecture for Distributed Databases - Types of Data Fragmentation - Integrity Constraints in Distributed Databases.

UNIT II DISTRIBUTED QUERY PROCESSING AND OPTIMIZATION 9

Translation of Global Queries to Fragment Queries - Equivalence Transformations for Queries - Transforming Global Queries into Fragment Queries - Distributed Grouping and Aggregate Function Evaluation - Parametric Queries - Optimization of Access Strategies - A Framework for Query Optimization - Join Queries - General Queries.

UNIT III TRANSACTIONS AND CONCURRENCY CONTROL 9

The Management of Distributed Transactions - A Framework for Transaction Management, Supporting Atomicity of Distributed Transactions - Concurrency Control for Distributed Transactions – Foundations of Distributed Concurrency Control - Distributed Deadlocks - Concurrency Control based on Timestamps - Optimistic Methods for Distributed Concurrency Control.

UNIT IV RELIABILITY 9

Reliability - Nonblocking Commitment Protocols - Reliability and concurrency Control - Determining a Consistent View of the Network - Detection and Resolution of Inconsistency - Checkpoints and Cold Restart - Distributed Database Administration.

UNIT III WEB DATABASES 9
Web Database Programming Using PHP: Structured, Semi structured and Unstructured Data –PHP – PHP Database Programming – Data Mining - Data Warehousing and OLAP.

UNIT IV EMERGING TECHNOLOGIES 9
Mobile Databases: Mobile Computing Architecture – Multimedia Databases- Geographic Information Systems (GIS).

UNIT V INTELLIGENT DATABASES 9
Active Database concepts – Temporal Database concepts - Spatial Database concepts- Deductive Databases.

L: 45 TOTAL: 45 PERIODS

TEXT BOOK

1. R. Elmasri, S.B. Navathe, “Fundamentals of Database Systems”, Sixth Edition, Pearson Education/Addison Wesley, 2010.

REFERENCES

1. Henry F Korth, Abraham Silberschatz and S. Sudharshan, “Database System Concepts”, Sixth Edition, McGraw Hill, 2011.
2. C.J.Date, A.Kannan and S.Swamynathan, “An Introduction to Database Systems”, Eighth Edition, Pearson Education, 2006.
3. Thomas Cannolly and Carolyn Begg, “Database Systems, A Practical Approach to Design, Implementation and Management”, Third Edition, Pearson Education, 2007.

15IT03E KNOWLEDGE MANAGEMENT L T P C
3 0 0 3

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO1: summarize the fundamental concepts in knowledge management (K1)
- CO2: outline the Knowledge creation and Knowledge Architecture (K1)
- CO3: describe the Knowledge Capturing Techniques (K1)
- CO4: differentiate various knowledge testing approaches (K2)
- CO5: explain the knowledge management manifestation in business and industry (K2)

UNIT I BASICS OF KNOWLEDGE MANAGEMENT 9
KM Myths – KM Life Cycle – Understanding Knowledge – Cognitive Psychology – Types of Knowledge – Expert Knowledge – Human Thinking and Learning.

UNIT II KNOWLEDGE MANAGEMENT SYSTEM LIFECYCLE 9

Challenges in Building KM Systems – Conventional Vs KM System Life Cycle (KMSLS) – Knowledge Creation and Knowledge Architecture – Nonaka’s Model of Knowledge Creation and Transformation - Knowledge Architecture - Choo Sense-making KM Model.

UNIT III CAPTURING THE TACIT KNOWLEDGE 9

Evaluating the Expert – Developing Relationship with Experts – Fuzzy Reasoning and the Quality of Knowledge – Knowledge Capturing Techniques, Brain Storming – Protocol Analysis – Consensus Decision Making – Repertory Grid- Concept Mapping – Blackboarding.

UNIT IV KNOWLEDGE CODIFICATION 9

Modes of Knowledge Conversion – Codification Tools and Procedures – Knowledge Developer’s Skill Sets – System Testing and Deployment – Knowledge Testing – Approaches to Logical Testing, User Acceptance Testing – KM System Deployment Issues – User Training – Post implementation.

UNIT V KNOWLEDGE SHARING AND APPLICATIONS 9

Transfer Methods – Role of the Internet – Knowledge Transfer in e-world – KM System Tools Neural Network – Association Rules – Classification Trees – Data Mining and Business Intelligence – Decision Making Architecture – Application at Individual level – Group level.

L: 45 TOTAL: 45 PERIODS

TEXT BOOK

1. Elias M. Awad, Hassan M. Ghaziri, “Knowledge Management”, Second Edition”, Prentice Hall, ISBN Learning Private Limited, 2010.

REFERENCES

1. Guus Schreiber, Hans Akkermans, AnjoAnjewierden, Robert de Hoog, Nigelhadbolt, Walter Vande Velde and Bob Wielinga, “Knowledge Engineering and Management”, Universities Press, 2005.
2. C.W. Holsapple, “Handbooks on Knowledge Management”, International Handbooks on Information Systems, Vol.1 and 2, 2003.

15IT04E INFORMATION STORAGE AND MANAGEMENT

LT P C
3 0 0 3

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO 1: explain logical and physical components of a storage infrastructure and RAID. (K2)
- CO 2: describe different storage networking technologies. (K2)
- CO 3: illustrate the need of backup, archive and replication. (K4)
- CO 4: discuss cloud computing characteristics and benefits. (K2)
- CO 5: summarize security and monitoring aspects of data center components. (K4)

UNIT I STORAGE SYSTEM 9

Introduction to information storage, virtualization and cloud computing - Key data center elements - Compute, application and storage virtualization -Disk drive & flash drive components and performance – RAID - Intelligent storage system and storage provisioning (including virtual provisioning)

UNIT II STORAGE NETWORKING TECHNOLOGIES AND VIRTUALIZATION 9

Fibre Channel SAN components, FC protocol and operations - Block level storage virtualization - iSCSI and FCIP as an IP-SAN solutions - Converged networking option – FCoE - Network Attached Storage (NAS) - components, protocol and operations - File level storage virtualization - Object based storage and unified storage platform

UNIT III BACKUP, ARCHIVE AND REPLICATION 9

Business continuity terminologies, planning and solutions - Clustering and multi-pathing architecture to avoid single points of failure - Backup and recovery - methods, targets and topologies - Data deduplication and backup in virtualized environment - Fixed content and data archive - Local and Remote replications in classic and virtual environments - Three-site remote replication and continuous data protection

UNIT IV CLOUD COMPUTING CHARACTERISTICS AND BENEFITS 9

Cloud Enabling technologies – Characteristics and benefits of cloud computing - Services and deployment models - Cloud computing infrastructure – cloud challenges - Cloud migration considerations

UNIT V SECURING AND MANAGING STORAGE INFRASTRUCTURE 9

Security threats and counter measures in various domains - Security solutions for FC-SAN, IP-SAN and NAS environments - Security in virtualized and cloud environments - Monitoring and managing various

information infrastructure components in classic and virtual environments -
Information lifecycle management (ILM) and storage tiering

L: 45 TOTAL: 45 PERIODS

TEXT BOOK

1. Somasundaram Gnanasundaram and Alok Shrivastava, "Information Storage and Management: Storing, Managing and Protecting Digital Information in Classic Virtualized, and Cloud Environments", Second Edition, EMC Education Services, Wiley India Pvt. Ltd., March 2012.

REFERENCES

1. Robert spadling, "Storage networks: The complete reference", Second Edition, Tata McGrawhill / Osborne, 2003.
2. Marc Farley, "Building storage networks", Tata McGraw Hill, Second Edition, Tata McGrawhill / Osborne, 2001.

15IT05E

BIOMETRICS

L T P C
3 0 0 3

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO1: explain the fundamentals of biometrics. (K2)
- CO2: discuss the flow of processing in various biometric techniques (K2)
- CO3: describe automated biometric authentication techniques. (K2)
- CO4: describe the biometric standards and privacy risks. (K1)
- CO5: discuss various applications of biometrics. (K2)

UNIT I INTRODUCTION 9

Biometric fundamentals – Biometric technologies – Biometrics Vs traditional techniques – Characteristics of a good biometric system – Benefits of biometrics – Key biometric processes – Performance measures in biometric systems – Basic Biometric System Operations.

UNIT II PHYSIOLOGICAL BIOMETRICS 9

Finger scan – Facial scan – Iris scan – Voice scan – Hand Scan, Retina Scan - components, working principles, competing technologies, strengths and weaknesses.

UNIT III AUTOMATED BIOMETRIC SYSTEM AND BEHAVIOURAL BIOMETRICS 9

Automated fingerprint identification systems – Signature scan – Keystroke scan – components, working principles, strengths and weaknesses.

UNIT IV PRIVACY AND STANDARDS IN BIOMETRICS 9

Assessing the Privacy Risks of Biometrics – Designing Privacy-Sympathetic Biometric Systems – Need for standards – different biometric standards.

UNIT V BIOMETRIC APPLICATIONS 9

Categorizing biometric applications – application areas: criminal and citizen identification, surveillance, PC/network access, e-commerce and retail/ATM – costs to deploy – other issues in deployment

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

1. Samir Nanavati, Michael Thieme, Raj Nanavati, "Biometrics – Identity Verification in a Networked World", Wiley – dream tech India Pvt Ltd, New Delhi, 2002.
2. Paul Reid, "Biometrics for Network Security", Pearson Education, New Delhi, 2004.

REFERENCES

1. John R Vacca, "Biometric Technologies and Verification Systems", Elsevier Inc, 2007.
2. Anil K Jain, Patrick Flynn, Arun A Ross, "Handbook of Biometrics", Springer, 2008.
3. Jain, Anil K.; Ross, Arun A. & Nandakumar, Karthik, "Introduction to Biometrics", Springer, 2011.
4. Eliza Yingzi Du, "Biometrics, From Fiction to Practice", Pan Stanford Publishing, 2013.

15IT06E

BIO INFORMATICS

L T P C

3 0 0 3

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO1: explain the fundamentals of bioinformatics. (K2)
- CO2: describe the organization of databases. (K2)
- CO3: identify the data mining tools for Bioinformatics. (K4)
- CO4: explain various machine learning and prediction algorithms (K2)

UNIT I INTRODUCTION 9

Overview of structural Bioinformatics: Characteristics – Categories - Navigation and information retrieval of Bioinformatics databases.

15IT07E

ANALYTIC COMPUTING

L T P C
3 0 0 3

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO1: explain about descriptive statistics and probability distributions.(K2)
- CO2: describe about machine learning approaches. (K1)
- CO3: illustrate about association rule mining and big data. (K2)
- CO4: explain about clustering analysis for data. (K2)

UNIT I DESCRIPTIVE STATISTICS 9

The Role of Statistics in Engineering - Descriptive Statistics: Sampling Distributions and Point Estimation of Parameters - Statistical Intervals - Tests of Hypotheses.

UNIT II PROBABILITY DISTRIBUTIONS 9

Probability Distributions: Discrete Random Variables- Continuous Random Variables - Joint Probability Distributions – Regression

UNIT III MACHINE LEARNING 11

Introduction to Machine Learning - Supervised Learning - Support Vector Machines --Neural Networks -Deep Learning

UNIT IV ASSOCIATION RULE MINING AND BIG DATA 7

Supervised Learning: Associative Rule Mining - Big Data - Hadoop - HIVE

UNIT V CLUSTERING ANALYSIS AND PRESCRIPTIVE ANALYTICS 9

Clustering Analysis - Introduction to Experimentation and Active Learning - An Introduction to Online Learning - Reinforcement Learning.

L: 45 TOTAL: 45 PERIODS

TEXT BOOK

1. Hastie, Trevor, et al, "The elements of statistical learning", Second Edition, Vol. 2. No. 1. New York: springer, 2009

REFERENCES

1. Montgomery, Douglas C., and George C. Runger, "Applied statistics and probability for engineers", Fifth Edition, John Wiley & Sons, 2010.
2. Edward Capriolo, Dean Wampler, Jason Rutherglen, Programming Hive, O'Reilly - Kindle Edition , 2012
3. Vignesh Prajapati, Big Data Analytics with R and Hadoop, Packt Publishing-Kindle Edition,2013

WEB REFERENCES

1. https://en.wikipedia.org/wiki/Prescriptive_analytics
2. Active and Reinforcement learning: nptel.ac.in/courses/110106064/43

3. Forouzan Mukhopadhyay, "Cryptography and Network Security", Second Edition, Mc Graw Hill, 2010

REFERENCES

1. C K Shyamala, N Harini, Dr T R Padmanabhan, "Cryptography and Network Security", First Edition, Wiley, India
2. Bernard Menezes, "Network Security and Cryptography", First Edition, CENGAGE Learning, 2010.
3. Atul Kahate, "Cryptography and Network Security", Second Edition, Mc Graw Hill, 2007.
4. WM.Arthur Conklin, "Principles of Computer Security", Second Edition, Greg White, TMH, 2008.
5. Neal Krawetz, "Introduction to Network Security", First Edition, CENGAGE Learning, 2007.

15IT09E

BIG DATA ANALYTICS

L T P C
3 0 0 3

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO 1: explain statistical analysis methods in Big Data platform (K2)
- CO 2: discuss the problems appropriate to mining data streams (K2)
- CO 3: apply the knowledge of clustering techniques in data mining (K3)
- CO 4: explain the social networking data analytics (K2)
- CO 5: discuss visualization techniques for Distributed file systems (K2)

UNIT I INTRODUCTION TO BIG DATA 9

Introduction to Big Data Platform – Challenges of conventional systems - Web data – Evolution of Analytic scalability - analytic processes and tools, - Analysis vs reporting - Modern data analytic tools - Statistical concepts: Sampling distributions – resampling - statistical inference - prediction error.

UNIT II MINING DATA STREAMS 9

Introduction to Streams Concepts – Stream data model and architecture - Stream Computing - Sampling data in a stream – Filtering streams – Counting distinct elements in a stream – Estimating moments – Counting oneness in a window – Decaying window – Real time Analytics Platform(RTAP) applications - real time sentiment analysis - stock market predictions.

UNIT III FREQUENT ITEMSETS AND CLUSTERING 9

Mining Frequent item sets - Market based model – Apriori Algorithm – Handling large data sets in Main memory – Limited Pass algorithm –

Counting frequent item sets in a stream – Clustering Techniques – Hierarchical – K- Means – Clustering high dimensional data – CLIQUE and PROCLUS – Frequent pattern based clustering methods – Clustering in Non-Euclidean space – Clustering for streams and Parallelism.

UNIT IV SOCIAL NETWORKING DATA ANALYTICS 9

An introduction to social network data Analytics – Introduction - Online Social Networks: Research Issues - Research Topics in Social Networks. Data mining in social media - Data mining in a Nutshell - Social Media - Motivations for Data Mining in Social Media - Data Mining Methods for Social Media - visualizing social networks - A Taxonomy of Visualizations - The Convergence of Visualization - Interaction and Analytics.

UNIT V FRAMEWORKS AND VISUALIZATION 9

MapReduce – Hadoop, Hive, MapR – Sharding – NoSQL Databases - S3 - Hadoop Distributed file systems – Visualizations - Visual data analysis techniques - interaction techniques; Systems and applications.

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

1. Toby J.Velte, Anthony T.Velte and Robert Elsenpeter, “ Green IT Reduce your Information System’s Environmental impact while Adding to the Bottom Line”, Tata McGraw-Hill, 2008.
2. Anand Rajaraman and Jeffrey David Ullman, “Mining of Massive Datasets”, Cambridge University Press, 2012.

REFERENCES

1. Charu C. Aggarwal, “Social Network Data Analytics”, Springer, 2011.
2. Bill Franks, “Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with advanced analytics”, John Wiley & sons, 2012.
3. Glenn J. Myatt, “Making Sense of Data, John Wiley & Sons, 2007 Pete Warden, Big Data Glossary, O’Reilly, 2011.
4. Jiawei Han, Micheline Kamber “Data Mining Concepts and Techniques”, Second Edition, Elsevier, Reprinted 2008.

15IT10E

CYBER FORENSICS

**L T P C
3 0 0 3**

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO 1: describe the fundamentals of hacking and computer forensics. (K1)
- CO 2: explain the various computer forensics Technologies. (K2)
- CO 3: elaborate the functions of various forensics systems. (K2)
- CO 4: analyze and validate the forensics data. (K4)

CO 5: identify and authenticate evidence of various forensics data. (K3)

UNIT I INTRODUCTION TO HACKING AND COMPUTER FORENSICS 9

Hacking: Introduction – Technologies – Phases – Hacktivism – Types of Hacker Classes – Skills – Ways to conduct Ethical hacking - Computer Forensics Fundamentals.

UNIT II COMPUTER FORENSICS TECHNOLOGY 9

Military Forensics Technology – Law Enforcement – Business – Specialized Forensics technology – Hidden data and how to find it – Spyware and Adware – Encryption methods and vulnerabilities – Protecting data – Security and Wireless technologies – Avoiding pitfalls with firewalls – Biometric security systems

UNIT III COMPUTER FORENSICS SYSTEMS 9

Internet Security - Intrusion Detection - Firewall Security - Storage Area Network security - Network Disaster Recovery - Public Key Infrastructure - Wireless Network Security - Satellite Encryption Security - Instant Messaging System – Net privacy – Identity Management - Identity Theft Biometric Security Systems

UNIT IV COMPUTER FORENSICS EVIDENCE AND CAPTURE 9

Data Recovery – Evidence Collection and Data Seizure – Duplication and Prevention of Digital Evidence – Computer Image Verification and Authentication

UNIT V ANALYSIS AND RECOVERY 9

Electronic document discovery - Identification of Data- Reconstructing Past Events – Recovering Graphics Files - Network Forensics

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

1. John R.Vacca, "Computer Forensics: Computer Crime Scene Investigation", Second Edition, Charles River Media, 2005.
2. Nelson, Phillips, Enfinger, Steuart, "Computer Forensics and Investigations", Cengage Learning, India Edition, 2008.

REFERENCES

1. <http://catalogimages.wiley.com/images/db/pdf/9780782144376.excerpt.pdf>
2. Marjie T.Britz, "Computer Forensics and Cyber Crime": An Introduction", Third Edition, Prentice Hall, 2013.

15IT11E DIGITAL SIGNAL PROCESSING L T P C
3 0 0 3

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO 1: explain the basics of Signals, Systems and Signal Processing. (K1)
- CO 2: summarize the concepts of Frequency Analysis of Signals and Systems. (K2)
- CO 3: illustrate the Design of Digital Filters such as FIR and IIR. (K3)
- CO 4: discuss the Multirate Signal Processing and its applications. (K2)

UNIT I SIGNALS AND SYSTEMS 9

Basic Elements of Digital Signal Processing – Concept of Frequency in Continuous Time and Discrete Time Signals – Sampling Theorem – Discrete Time Signals – Discrete Time Systems – Analysis of Linear Time Invariant Systems – Z-Transform – Convolution and Correlation.

UNIT II FREQUENCY TRANSFORMATIONS 9

Introduction to DFT – Properties of DFT -Efficient Computation of DFT – Linear Filtering Methods Based on DFT– FFT Algorithms – Radix-2 FFT Algorithms. Use of FFT Algorithms in Linear Filtering and Correlation.

UNIT III IIR FILTER DESIGN 9

Structures of IIR systems – Analog filter design – IIR filter design by Impulse Invariance, Bilinear transformation, Approximation of derivatives - Discrete time IIR filter from analog filter - filter design using frequency translation.

UNIT IV FIR FILTER DESIGN 9

Symmetric and Antisymmetric FIR Filters – Design of Linear Phase Filter – Windowing Technique – Rectangular– Kaiser Windows. Design of Linear Phase Filter – Frequency Sampling Techniques – Structure for FIR Systems.

UNIT V MULTIRATE SIGNAL PROCESSING 9

Introduction, Sampling rate conversions–Multistage Implementation of Sampling Rate Conversion– Sampling Rate Conversion by an Arbitrary Factor– Applications of Multirate Signal Processing.

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

1. John G. Proakis & Dimitris G. Manolakis, "Digital Signal Processing – Principles, Algorithms & Applications", Pearson education / Prentice Hall, Fourth Edition, 2007.
2. Sanjit K Mitra, "Digital Signal Processing - A Computer Based Approach", Tata McGraw-Hill Publishing Co. Pvt., Ltd., New Delhi, Fourth Edition, 2013.

REFERENCES

1. Andreas Antoniou, "Digital Signal Processing: Signals, Systems, and Filters", McGraw Hill Education, First Edition, 2005.
2. Monson H.Hayes, "Statistical Digital Signal Processing and Modeling", John Wiley and Sons, Inc., Singapore, 2008.
3. Simon Haykin , "Adaptive Filter Theory", Pearson Education, South Asia, Fourth Edition, 2009.
4. Emmanuel C.Ifeachor, &Barrie.W.Jervis, "Digital Signal Processing", Second Edition, Pearson Education, Prentice Hall, 2002.

15IT12E

SOFTWARE TESTING

L T P C
3 0 0 3

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO 1: recognize the roles and responsibilities of the tester. (K1)
- CO 2: design the test cases using various testing strategies (K2)
- CO 3: analyze various levels of testing methodologies. (K2)
- CO 4: explain various test procedures and test planning. (K2)
- CO 5: describe control and monitoring of testing process. (K1)

UNIT I TESTING FUNDAMENTALS

9

Testing as a Process- Software Testing Principles - The Tester's Role in a Software Development Organization- Origins of Defects - Defect Classes, Defect Repository, Test Design – Defect Examples – Developer/Tester Support for Developing a Defect Repository

UNIT II TEST CASE DESIGN

9

Test Case Design Strategies – Using Black Box Approach to Test Case Design - Random Testing – Equivalence Class Partitioning - Boundary Value Analysis - cause-effect graphing – state transition testing- error guessing- Using White–Box Approach to Test design- Test Adequacy Criteria- Coverage and Control Flow Graphs – Covering Code Logic – Paths and their Role in White–box Based Test Design- Additional White box test design approaches - Evaluating Test Adequacy Criteria

UNIT III LEVELS OF TESTING

9

The Need for Levels of Testing – Unit Test: Functions, Procedures, Classes and Methods - Unit Test Planning –Designing the Unit Tests - The Test Harness – Running the Unit tests and Recording results – Integration tests – Designing Integration Tests – Integration Test Planning – System Testing – Functional Testing - Performance testing –Stress Testing- Configuration testing-Security Testing- Recovery Testing-Regression Testing — Ad-hoc testing - Alpha , Beta Tests – Acceptance Testing.

UNIT IV TESTING PROCEDURES AND ORGANIZATION 9

Test Planning – Test Plan Components – Test Plan Attachments –Locating Test Items - Reporting Test Results – The role of three groups in Test Planning and Policy Development – Introducing the test specialist – Skills needed by a test specialist – Building a Testing Group.

UNIT V TEST CONTROLLING AND MONITORING 9

Measurements and Milestones for Controlling and Monitoring: Testing Status-Tester Productivity- Testing Costs- Error, Faults and Failures- Test Effectiveness- Status Meetings, Reports and Control issues-Criteria for Test Completion- Software Configuration Management-Controlling and Monitoring: Three Critical Views.

L: 45 TOTAL: 45 PERIODS

TEXT BOOK

1. Ilene Burnstein, “Practical Software Testing”, Springer International Edition, 2012.

REFERENCES

1. Srinivasan Desikan and Gopaldaswamy Ramesh, “Software Testing – Principles and Practices”, Pearson education, 2006.
2. Aditya P. Mathur, “Foundations of Software Testing – Fundamental algorithms and techniques”, Dorling Kindersley (India) Pvt. Ltd., Pearson Education, 2008.

**15IT13E ADVANCED JAVA L T P C
3 0 0 3**

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO 1: describe the Swing Components. (K1)
- CO 2: write socket programming using java. (K2)
- CO 3: familiar with the application development using Servlets. (K2)
- CO 4: gain knowledge about server side programming languages using JSP. (K2)
- CO 5: explain about concepts of Enterprise Java Beans. (K1)

UNIT I INTRODUCING SWING 9

Swing – components and containers – the swing packages – Painting in a Swing – Exploring Swing: JLabel and ImageIcon – JTextField – The Swing Buttons – Jtabbed Pane – Jscroll Pane – Jlist – JComboBox – Trees – Jtable.

UNIT II NETWORK PROGRAMMING IN JAVA 9

Sockets – secure sockets – custom sockets – UDP datagrams – multicast sockets – URL classes – Reading Data from the server – writing data –

UNIT I FUNDAMENTALS OF MEASUREMENT THEORY 9

Definition- Operational definition and measurement – Level of measurement – Some basic measures - Reliability and validity – Measurement errors.

UNIT II SOFTWARE DEVELOPMENT MODELS 9

Waterfall development model – The prototyping approach – Spiral model – Iterative development process model – Object oriented development process – Clean room methodology – process maturity framework and quality standards.

UNIT III SOFTWARE QUALITY MANAGEMENT 9

Product quality metrics – In-process quality metrics – metrics for software maintenances – Quality management models: Rayleigh model Framework – Code integration pattern – PTR sub model – PTR Arrival/ Backlog projection model – Reliability Growth model.

UNIT IV SOFTWARE TESTING 9

Software Testing fundamentals- Test case design – White box testing – Basic path testing – Control structure testing – Black box testing - Unit testing – Integration testing – Validation testing - System testing – Debugging.

UNIT V APPLYING QUALITY TOOLS 9

Ishikawas Seven basic tools – Check list – Pareto diagram – Histogram – Run charts – Scatter diagram – Control chart – Cause and effect diagram.

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

1. StepenH.Kan, "Metrics and models in Software quality engineering", Second Edition, Pearson Education, 2012.
2. Roger S.Pressman, Software engineering- A practitioner's Approach, Seventh Edition, McGraw-Hill International Edition, 2010.

REFERENCES

1. Ian Sommerville, "Software engineering", Seventh Edition, Pearson education Asia, 2007.
2. Watts S.Humphrey, "A Discipline for Software Engineering", Pearson Education, 2007.
3. Stephen R.Schach, "Software Engineering", Tata McGraw-Hill Publishing Company Limited, 2007.

15IT15E

INTERNET OF THINGS

L T P C
3 0 0 3

COURSE OUTCOMES

Upon completion of the course, the students will be able to

- CO1: explain new models for market strategic interaction (K1)
- CO2: illustrate various protocols for Internet of Things (K1)
- CO3: describe business intelligence and information security for Web of things (K1)
- CO4: explain the integrated solution of network dynamics (K1)
- CO5: explain the application of Internet of Things (K1)

UNIT I INTRODUCTION

9

Introduction – Architecture - Web 3.0 View of IoT– Ubiquitous IoT Applications – Four Pillars of IoT – DNA of IoT - The Toolkit Approach for End-user Participation in the Internet of Things, Middleware for IoT- IoT Information Security

UNIT II IOT PROTOCOLS

9

Protocol Standardization for IoT – M2M and WSN Protocols – SCADA and RFID Protocols – Issues with IoT Standardization – Unified Data Standards – Protocols – IEEE 802.15.4 – BACNet Protocol – Modbus – KNX – Zigbee Architecture – Network layer – APS layer

UNIT III WEB OF THINGS

9

Web of Things versus Internet of Things – Two Pillars of the Web – Architecture Standardization for WoT– Platform Middleware for WoT – Unified Multitier WoT Architecture – WoT Portals and Business Intelligence. Cloud of Things: Grid/SOA and Cloud Computing – Cloud Middleware – Cloud Standards – Cloud Providers and Systems – Mobile Cloud Computing – The Cloud of Things Architecture

UNIT IV INTEGRATED IOT

9

Integrated Billing Solutions in the Internet of Things - Business Models for the Internet of Things - Network Dynamics: Population Models – Information Cascades - Network Effects - Network Dynamics: Structural Models - Cascading Behavior in Networks - The Small-World Phenomenon

UNIT V APPLICATIONS

9

The Role of the Internet of Things for Increased Autonomy and Agility in Collaborative Production Environments - Resource Management in the Internet of Things: Clustering, Synchronization and Software Agents. Applications - Smart Grid – Electrical Vehicle Charging

L: 45 TOTAL: 45 PERIODS

TEXT BOOK

1. Honbo Zhou, “The Internet of Things in the Cloud: A Middleware Perspective”, CRC Press, 2012.

and Storage – Speech coding - Evaluation of systems – Human Factors and user Acceptability.

UNIT V APPLICATIONS 9

Machine Translation – Transfer Metaphor - Interlingua and Statistical Approaches - Discourse Processing – Dialog and Conversational Agents – Natural Language Generation – Surface Realization and Discourse Planning.

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

1. Daniel Jurafsky and James H. martin, “Speech and Language Processing”, 2000.
2. Ron Cole, J.Mariani, et.al “Survey of the State of the Art in Human Language Technology”, Cambridge University Press, 1997.
3. Michael W. Berry “Survey of Text Mining: Clustering, Classification and Retrieval”, Springer Verlag, 2003.
4. Christopher D.Manning and HinrichSchutze, “Foundations of Statistical Natural Language Processing “, MIT Press, 1999.

REFERENCES

1. James Allen “Natural Language Understanding”, Benjamin, Cummings Publishing Co. 1995.
2. Gerald J. Kowalski and Mark.T. Maybury, “Information Storage and Retrieval systems”, Kluwer academic Publishers, 2000.
3. Tomek Strzalkowski “Natural Language Information Retrieval“, Kluwer academic Publishers, 1999.

15IT17E EMBEDDED AND REAL TIME SYSTEMS L T P C
3 0 0 3

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO 1: discuss LINUX commands for file processing and process control. (K1)
- CO 2: explain scheduling policies and framework in Real Time Operating System. (K2)
- CO 3: outline the importance of Event Registers in I/O concepts. (K2)
- CO 4: emphasize the usage of Interrupt and service routines in Real time memory systems. (K3)
- CO 5: develop, debug and execute embedded programming in LINUX. (K3)

UNIT I INTRODUCTION 9

Introduction to UNIX/LINUX - Overview of Commands - File I/O Process Control.

UNIT II REAL TIME OPERATING SYSTEMS 9

Brief History of OS - Defining RTOS - The Scheduler – Objects – Services - Characteristics of RTOS - Defining a Task - asks States and Scheduling - Task Operations – Structure – Synchronization - Communication and Concurrency. Defining Semaphores - Operations and Use - Defining Message Queue – States – Content – Storage - Operations and Use.

UNIT III OBJECTS, SERVICES AND I/O 9

Objects - Services and I/O Pipes - Event Registers – Signals - Other Building Blocks - Component Configuration - Basic I/O Concepts - I/O Subsystem.

UNIT IV EXCEPTIONS, INTERRUPTS AND TIMERS 9

Interrupt Service routines – Watch dog timers – Flash memory Basic toolset – Host and debugging – Remote debugging – ROM emulators, logic Analyzer, Caches – Computer optimization – Statistical profiling - Serial/parallel port interfacing and drivers, DMA & high speed I/O interfacing, Memory selection for embedded systems.

UNIT V CASE STUDIES OF RTOS 9

RT Linux - MicroC/OS-II - Vx Works - Embedded Linux - Tiny OS and Basic Concepts of Android OS.

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

1. Qing Li, “Real Time Concepts for Embedded Systems”, Elsevier, 2014.
2. Arnold S. Berger, “Embedded System Design”, CMP books, USA, 2002.

REFERENCE

1. Rajkamal, “Embedded Systems- Architecture, Programming and Design”, TMH, 2007.

**15IT18E NETWORK MANAGEMENT L T P C
3 0 0 3**

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO1: explain the network management architectures and protocols.(K2)
- CO2: explain the importance of network management and how it impacts cost, revenue and network availability. (K2)
- CO3: Describe the different phases in the network management functional models. (K2)
- CO4: Explain the network management primitives and protocol message structures. (K2)

CO5: Use metrics to quantify network management value propositions and measure the effectiveness of network management technology. (K3)

UNIT I	INTRODUCTION	9
Data Communication and Network Management – SNMP and Network Management – Network Management Applications.		
UNIT II	NETWORK MANAGEMENT – AN OVERVIEW	9
Setting the Stage – On the Job with a Network Manager- The Basic Ingredients of Network Management		
UNIT III	MANAGEMENT PERSPECTIVES	9
The Dimensions of Management - Management Functions and Reference Models - Network Management Tools, Systems and Engineering.		
UNIT IV	MANAGEMENT BUILDING BLOCKS	9
Management Information - Management Communication Patterns - Common Management Protocols - Management Organization		
UNIT V	APPLIED NETWORK MANAGEMENT	9
Management Integration - Service Level Management - Management Metrics: Assessing Management Impact and Effectiveness.		

L: 45 TOTAL: 45PERIODS

TEXT BOOKS

1. Mani Subrahmanian, “Network Management Principles and Practice”, Second Edition, Pearson Education, 2012.
2. A. Clemm, “Network Management Fundamentals”, Cisco Press, ISBN-13 978-1-58720-137-0.

REFERENCES

1. William Stallings, “SNMP, SNMPv2, SNMPv3 and RMON 1 and 2”, Third Edition, Pearson Edition, 2009.
2. Morris, “Network management”, 1st Edition, Pearson Education, 2008.
3. Mark Burges, “Principles of Network System Administration”, First Edition, Wiley DreamTech, 2008

15IT19E	GAME PROGRAMMING	L T P C
		3 0 0 3

COURSE OUTCOMES

Upon completion of this course, the students will be able to
CO 1: Explain the fundamentals of game theory. (K2)

- CO 2: Outline the importance of Non cooperative games in strategic and dynamic forms. (K2)
- CO 3: Discuss the Cooperative games using Bargaining theory and Coalition approach. (K2)
- CO 4: Describe the evolutionary and auction based approaches in game theory. (K2)
- CO 5: Explain the application of game theory in communication networks. (K2)

UNIT I FUNDAMENTALS OF GAME THEORY 9

Introduction - Game theory: Component of game theory - Nash Equilibrium (games equivalent to the Prisoner's Dilemma, Nash equilibrium and weakly dominated actions, Cournot's duopoly game).

UNIT II NON COOPERATIVE GAMES 9

Non-cooperative games: preliminaries- strategic form- Dynamic non-cooperative games- Special classes of non-cooperative games.

UNIT III COOPERATIVE GAMES 9

Bargaining theory- Coalitional game theory- canonical coalitional games- coalition-formation games- coalitional graph games.

UNIT IV EVOLUTIONARY, AUCTION AND BAYESIAN GAMES 9

Bayesian games- Differential games- Evolutionary games- Auction theory and mechanism design.

UNIT V GAME THEORY APPLICATION IN NETWORKS 9

Internet networks: Combined flow control and routing in communication network- Congestion control in networks with a single service provider- Pricing and revenue sharing for Internet service providers- Cooperative file sharing in peer-to-peer networks.

L: 45 TOTAL: 45 PERIODS

TEXT BOOK

1. Zhu Han, Dusit Niyato, Walid Saad, Tamer Başar, Are Hjorungnes, "Game Theory in Wireless and Communication Networks Theory, Models, and Applications", Cambridge University Press, First Edition, 2012.

REFERENCE

1. Martin J. Osborne, "An Introduction to Game Theory", University of Toronto, 2004.

UNIT V NETWORK DYNAMICS 9

Information Cascade - Networks Effects - The Economy with Network Effects Industries with Network goods - Advanced Materials for Positive Externalities - Power Laws - The Effect of Search Tools and Recommendations.

L: 45 TOTAL: 45 PERIODS

TEXT BOOK

1. David Easley, Jon Kleinberg, "Networks, Crowds, and Markets: Reasoning about a Highly Connected World", First Edition, Cambridge University Press, 2010.

REFERENCE

1. Stanley Wasserman, Katherine Faust, "Social Network Analysis: Methods and Applications", Second Edition, Cambridge University Press, 1999.

15IT22E SERVICE ORIENTED ARCHITECTURE L T P C
3 0 0 3

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO1: Explain about principles of Service Orientation. (K1)
- CO2: Describe about service oriented analysis techniques. (K2)
- CO3: Describe the Service Oriented Design concepts. (K2)
- CO4: Explain the parts of the development and runtime ends of a distributed technology platform for SOA. (K2)
- CO5: Describe about various Web service specification standards. (K1)

UNIT I PRINCIPLES OF SERVICE ORIENTATION 9

Roots of SOA – Characteristics of SOA - Comparing SOA to client-server and distributed internet architectures – Anatomy of SOA - How components in an SOA interrelate - Principles of service orientation.

UNIT II SERVICE ORIENTED ANALYSIS TECHNIQUES 9

Web services – Service descriptions – Messaging with SOAP –Message exchange Patterns – Coordination –Atomic Transactions – Business activities – Orchestration – Choreography - Service layer abstraction – Application Service Layer – Business Service Layer – Orchestration Service Layer

UNIT III SERVICE ORIENTED DESIGN 9

Service oriented analysis – Business-centric SOA – Deriving business services- service modeling - Service Oriented Design – WSDL basics – SOAP basics – SOA composition guidelines – Entity-centric business service design – Application service design – Task-centric business service design

UNIT IV SOA PLATFORM BASICS 9

SOA platform basics – SOA support in J2EE – Java API for XML based web services (JAX-WS) - Java architecture for XML binding (JAXB) – Java API for XML Registries (JAXR) - Java API for XML based RPC (JAX-RPC) - Web Services Interoperability Technologies (WSIT) – SOA support in .NET – Common Language Runtime - ASP.NET web forms – ASP.NET web services – Web Services Enhancements (WSE)

UNIT V WEB SERVICE SPECIFICATION STANDARDS 9

WS-BPEL basics – WS-Coordination overview - WS-Choreography, WS-Policy, WS-Security

L: 45 TOTAL: 45 PERIODS

TEXT BOOK

1. Thomas Erl, “Service-Oriented Architecture: Concepts, Technology and Design”, Pearson Education, 2006.

REFERENCES

1. Thomas Erl, “SOA Principles of Service Design”, The Prentice Hall, 2007
2. Eric Newcomer, Greg Lomow, “Understanding SOA with Web Services”, Pearson Education, 2005.
3. Sandeep Chatterjee, James Webber, “Developing Enterprise Web Services, An Architect’s Guide”, Prentice Hall Professional, 2005.
4. Dan Woods and Thomas Mattern, “Enterprise SOA Designing IT for Business Innovation”, First Edition, O’REILLY, 2006.

15IT23E

M-COMMERCE

**L T P C
3 0 0 3**

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO 1: explain the underlying economic mechanisms and driving forces of E-Commerce. (K1)
- CO 2: examine the infrastructure and services required for wireless m-commerce. (K1)
- CO 3: identify the critical building blocks of M-Commerce and different types of prevailing business models. (K2)
- CO 4: discuss the theory and applications of M-commerce in business domain. (K3)

UNIT I INTRODUCTION TO E-COMMERCE 9

Electronic Commerce Framework – Electronic Commerce and Media Convergence – Anatomy of E-Commerce Applications – Consumer Application – Electronic Commerce organization application.

UNIT II MOBILE COMMERCE 9

Introduction – Infrastructure of M–Commerce – Types Of Mobile Commerce Services – Technologies Of Wireless Business – Benefits And Limitations, Support, Mobile Marketing & Advertisement, Non– Internet Applications In M–Commerce – Wireless/Wired Commerce Comparisons.

UNIT III MOBILE COMMERCE TECHNOLOGY 9

A Framework For The Study Of Mobile Commerce – NTT Docomo's I-Mode – Wireless Devices For Mobile Commerce – Towards A Classification Framework For Mobile Location Based Services – Wireless Personal And Local Area Networks –The Impact Of Technology Advances On Strategy Formulation In Mobile Communications Networks.

UNIT IV MOBILE COMMERCE: THEORY AND APPLICATION 9

The Ecology Of Mobile Commerce – The Wireless Application Protocol – Mobile Business Services – Mobile Portal – Factors Influencing The Adoption of Mobile Gaming Services – Mobile Data Technologies And Small Business Adoption And Diffusion – E–commerce in The Automotive Industry – Location Based Services: Criteria For Adoption And Solution Deployment – The Role of Mobile Advertising In Building A Brand – M–commerce Business Models

UNIT V BUSINESS-TO-BUSINESS MOBILE E-COMMERCE 9

Enterprise Enablement – Email and Messaging – Field Force Automation (Insurance, Real Estate, Maintenance, Healthcare) – Field Sales Support (Content Access, Inventory) – Asset Tracking and Maintenance/Management – Remote IT Support – Customer Retention (B2C Services, Financial, Special Deals) – Warehouse Automation – Security.

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

1. Ravi Kalakota, Andrew B. Whinston, "Frontiers of Electronic Commerce", Pearson Education, Ninth Impression, 2009.
2. Dave Chaffey, "E-Business and E-Commerce Management", Pearson Education, Third Edition, 2009.
3. Brian E. Mennecke, Troy J. Strader, "Mobile Commerce: Technology, Theory and Applications", Idea Group Inc., IRM press, 2003.

REFERENCES

1. P. J. Louis, "M-commerce Crash Course: The Technology and Business of Next Generation Internet", McGraw Hill Education, 2001.

pass receiving filter, Error performance – Coherent detection systems: ASK,FSK,PSK. Introduction to spread spectrum techniques.

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

1. Amitabha Bhattacharya, "Digital Communications", Tata McGraw Hill, First Edition, 2006.
2. Simon Haykins, "Communication Systems", John Wiley, Fifth Edition, 2009.

REFERENCES

1. Simon Haykin, "Digital Communications", John Wiley, Fifth Edition, 2006.
2. John. Proakis, "Fundamentals of Communication Systems", Pearson Education, Fifth Edition, 2006.
3. Michael. B. Purrley, "Introduction to Digital Communication", Pearson Education, 2006.

15IT25E BIG DATA ANALYTICS LABORATORY L T P C
0 0 2 1

COURSE OUTCOMES

Upon completion of this course, the students will be able to
CO1: develop MapReduce programs for parallel tasks. (K3)
CO2: apply the data processing tools for big data. (K3)

List of Experiments

1. Installation of Apache Hadoop and MapReduce.
2. Installation of clustered Hadoop and MapReduce.
3. Develop MapReduce programs.
4. Classification using SVM.
5. Implement data mining clustering algorithms.
6. Big Data processing with Hive.
7. Query Processing using Hive and Beeswax.
8. Data Visualization.
9. Mini Project.

P: 30 TOTAL: 30 PERIODS

15IT26E SOFTWARE TESTING LABORATORY L T P C
0 0 2 1

COURSE OUTCOMES

Upon completion of this course, the students will be able to
CO 1: test a program for finding errors. (K3)
CO 2: use various testing tools and write a test conditions. (K3)

LIST OF EXPERIMENTS

1. Write programs in C Language to demonstrate the working of the following constructs:
i) do...while ii) while....do iii) if...else iv) switch v) for
2. A program written in C language for Matrix Multiplication fails and introspect the causes for its failure and write down the possible reasons for its failure.
3. Take any real time system and study its system specifications and report the various bugs.
4. Write the test cases for any known application.
5. Create a test plan document for any known application.
6. Write and test a program to update 10 student records into table in Excel file.
7. Write and test a program to select the number of students who have scored more than 60 in any one subject (or all subjects).
8. Study of any testing tool (e.g. Win runner)
9. Study of any web testing tool (e.g. Selenium)
10. Using Selenium IDE, Write a test suite containing minimum 4 test cases.

P: 30 TOTAL: 30 PERIODS

15IT27E	ADVANCED JAVA LABORATORY	L T P C
		0 0 2 1

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO1: create application using swing and network programming (K3)
CO2: develop interactive application using servlet, JSP, struct and enterprise java beans. (K3)

LIST OF EXPERIMENTS**1. Programs on Swing**

1. Write a Java program to demonstrate the use of Java Swing components, namely, buttons, text boxes, lists/combos, menus etc.
2. Write a Java program to implement the JTrees.
3. Write a Java program to implement the JTable.

2. Programs on Network Programming

1. Write programs for TCP server and Client interaction
2. Write programs for Datagram server and Client interaction

3. Programs on Servlets

1. Write a program to display a greeting message in the browser by using HttpServlet.
2. Write a Java Servlet program to demonstrate the use of cookies.
3. Write a Java Servlet program to demonstrate the use of sessions.

4. Programs on JSP

1. Write JSP program to implement form data validation to accept correct data.
2. Write JSP program to implement employee salary calculation.

5. Programs on Struct

1. Write Java program to implement datetimestruct using struct.
2. Write Java program to implement File upload and save application using struct.

6. Programs on Java Beans

1. Write a program to develop a Enterprise Java Bean of "Session Bean" type.
2. Write a program to develop a Enterprise Java Bean of "Entity Bean" type.

P: 30 TOTAL: 30 PERIODS

15IT28E

CASE TOOLS LABORATORY

L T P C
0 0 2 1

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO1: design the suitable UML diagram for a given problem and develop the User Interface Design (K3)

LIST OF EXPERIMENTS

Develop a mini-project for any one problem of your choice using the following guidelines.

1. Develop a problem statement.
2. Develop an IEEE standard SRS document. Also develop risk management and project plan.
3. Identify Use Cases and develop the Use Case model.

4. Identify the business activities and develop an UML Activity diagram.
5. Identify the conceptual classes and develop a domain model with UML Class diagram.
6. Using the identified scenarios find the interaction between objects and represent them using UML Interaction diagrams.
7. Draw the State Chart diagram.
8. Identify the User Interface, Domain objects, and Technical services. Draw the partiallayered, logical architecture diagram with UML package diagram notation.
9. Implement the Technical services layer.
10. Implement the Domain objects layer.
11. Implement the User Interface layer.
12. Draw Component and Deployment diagrams.

Suggested Applications for Mini-project

1. Passport automation system.
2. Book bank
3. Exam Registration
4. Stock maintenance system.
5. Online course reservation system
6. E-ticketing
7. Credit card processing
8. E-book management system
9. Recruitment system
10. Library management system
11. Conference management system
12. BPO management system

P: 30 TOTAL: 30 PERIODS

Open Elective Course (OEC)
Group - I (Inter-disciplinary courses)

15ID01E	PRODUCT DESIGN AND DEVELOPMENT	L	T	P	C
		3	0	0	3

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO1: analyze various global trends and identify the scope of a new product (K4)
- CO2: perform requirement analysis and convert the requirements into design specification (K4)
- CO3: translate conceptual idea into detailed design (K6)
- CO4: create prototype to demonstrate the product (K6)
- CO5: perform sustenance engineering to improve the longevity of the product(K6)

UNIT I FUNDAMENTALS OF PRODUCT DEVELOPMENT 9

Global Trends Analysis and Product decision: Types of various trends affecting product decision - Social Trends-Technical Trends- Economical Trends- Environmental Trends- Political/ Policy Trends- PESTLE Analysis.

Introduction to Product Development Methodologies and Management: Overview of Products and Services- Types of Product Development- Overview of Product Development methodologies - Product Life Cycle and PLM - Product Development Planning and Management .

UNIT II REQUIREMENTS AND SYSTEM DESIGN 9

Requirement Engineering: Types of Requirements- Requirement Engineering- Analysis -Traceability Matrix and Analysis- Requirement Management

System Design and Modeling: Introduction to System Modeling- Introduction to System Optimization- System Specification-Sub-System Design- Interface Design.

UNIT III DESIGN AND TESTING 9

Conceptualization - Industrial Design and User Interface Design - Introduction to Concept generation Techniques - Concept Screening and Evaluation - Concept Design - S/W Architecture - Hardware Schematics and simulation

Detailed Design: Component Design and Verification - High Level Design/Low Level Design of S/W Programs - S/W Testing-Hardware Schematic - Component design - Layout and Hardware Testing.

UNIT IV IMPLEMENTATION AND INTEGRATION 9

Prototyping: Types of Prototypes -Introduction to Rapid Prototyping and Rapid Manufacturing.

System Integration- Testing- Certification and Documentation: Introduction to Manufacturing/Purchase and Assembly of Systems- Integration of Mechanical, Embedded and S/W systems- Introduction to Product verification and validation processes - Product Testing standards, Certification and Documentation.

UNIT V SUSTENANCE ENGINEERING AND BUSINESS DYNAMICS 9

Sustenance - Maintenance and Repair - Enhancements

Product End of Life (EoL): Obsolescence Management-Configuration Management - EoL Disposal.

The Industry - Engineering Services Industry overview - Product development in Industry versus Academia

The IPD Essentials - Introduction to vertical specific product development processes - Product development Trade-offs - Intellectual Property Rights and Confidentiality- Security and configuration management

L:45; TOTAL:45 PERIODS

TEXT BOOKS

1. Anita Goyal, Karl T Ulrich, Steven D Eppinger, "Product Design and Development ", Tata McGraw-Hill Education, 4th Edition, 2009, ISBN-10-007-14679-9.
2. George E Dieter, Linda C Schmidt, "Engineering Design", McGraw-Hill International Edition,4th Edition, 2009, ISBN 978-007-127189-9

REFERENCES

1. Kevin Otto, Kristin Wood, "Product Design", Indian Reprint 2004, Pearson Education, ISBN 9788177588217
2. Yousef Haik, Shahin T M M, "Engineering Design Process", Cengage Learning,2nd Edition Reprint, 2010, ISBN 0495668141
3. Clive L Dym, Patrick Little, "Engineering Design: A Project-based Introduction", John Wiley & Sons, 3rd Edition, 2009, ISBN 978-0-470-22596-7
4. Kevin Otto & Kristin Wood, "Product Design Techniques in Reverse Engineering and New Product Development", Pearson Education (LPE), 2001.
5. James R Evens, William M Lindsay "The Management and control of Quality" Pub:son south-western(www.swlearning.com), 6th edition.
6. AmitavaMitra, "Fundamentals of Quality control and improvement" Pearson Education Asia, 2nd edition, 2002.

7. Montgomery D C, "Design and Analysis of experiments", John Wiley and Sons, 2003.
8. Phillip J Rose, "Taguchi techniques for quality engineering", McGraw Hill, 1996.
9. Reddy G B, "Intellectual Property Rights and the Law", Gogia Law Agency, 7th Edition Reprint, 2009.
10. Subbaram N R, "Demystifying Intellectual Property Rights", Lexisexis Butterworths Wadhwa, 1st Edition, 2009.

15ID02E

DISASTER MANAGEMENT

L T P C

3 0 0 3

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO1: classify the various types of disaster. (K2)
- CO2: interpret various natural and manmade disasters. (K2)
- CO3: choose a Hazard Assessment procedure. (K3)
- CO4: construct the protection measures against Disaster. (K3)
- CO5: apply Science and Technology in Disaster Management. (K3)

UNIT I INTRODUCTION TO DISASTER

8

Hazard, risk, vulnerability, disaster significance, nature, importance, dimensions and scope of disaster management - national disaster management frame work- financial arrangements- disaster- management cycle.

UNIT II SOURCES OF DISASTER

10

Natural disasters- significance, nature, types and effects - floods, drought, cyclone, earthquakes, landslides, avalanches, volcanic eruptions, heat and cold waves, climatic change - global warming - sea level rise - ozone depletion. Manmade disasters- nuclear , chemical, biological, building fire, coal fire, forest fire, oil fire, air pollution, water pollution, deforestation, industrial waste water pollution, road accidents, rail accidents, air accidents and sea accidents.

UNIT III DISASTER MITIGATION AND HAZARDS ASSESMENT 10

Factors affecting damage – types, social status, habitation pattern, physiology and climate - Factors affecting mitigation measures - prediction – preparation - communication - area and accessibility - population - physiology and climate - Vulnerability Assessment and seismic strengthening of buildings - Vulnerability Assessment of Buildings procedure - Hazard Assessment-Visual Inspection and Study of Available Documents

UNIT IV DISASTER MANAGEMENT 9

Disaster management - efforts to mitigate natural disasters at national and global levels - international strategy for disaster reduction- Rescue ,relief And Rehabilitation, Role Of National And International Agencies In Disaster Management-National Disaster Policy Of India (Salient Features).

UNIT V APPLICATIONS OF SCIENCE AND TECHNOLOGY AND CASE STUDIES 8

Applications of Science and Technology (RS, GIS, GPS) - Early Warning And Prediction Systems- Earthquake, cyclone, landslides, fire accidents, accidents- case studies

L: 45; TOTAL: 45 PERIODS

TEXTBOOKS

1. S.K.Singh, S.C. Kundu, Shobha Singh A ,”Disaster management”, William Publications, New Delhi, 1997.
2. Vinod K Sharma, “Disaster Management”, IIPA, New Delhi, 1995

REFERENCE

1. Annual Report, 2009-10,Ministry of Home Affairs, GOI

15ID03E	ENERGY ENGINEERING	L	T	P	C
		3	0	0	3

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO1: explain the operation of Solar Thermal application and Solar Photovoltaic. (K2)
- CO2: explain the operation of wind energy systems. (K2)
- CO3: describe the concepts of various Bio-Energy Conversion techniques. (K2)
- CO4: illustrate the concepts of other conventional and nonconventional power plants. (K2)
- CO5: explain the concepts of hydrogen and fuel cell technology. (K2)

UNIT I INTRODUCTION TO SOLAR ENERGY 9

Sun - Earth Geometry, solar radiation, Solar Collectors - Application of solar thermal systems. Direct Electricity Conversion - Types of Solar cell - Solar Photovoltaic system and types.

UNIT II WIND ENERGY 9

Wind energy potential, Principle of wind energy conversion; Basic components, types and their constructional features; design considerations: wind data and site selection.

UNIT III BIO-ENERGY 9

Biomass: sources, characterization, principles of energy transfer technologies.
Biogas: Feedstock, types of Biogas plant- parameters affecting biogas production.

UNIT IV OTHER POWER PLANTS 9

Layout of Hydel - thermal - Nuclear - Gas turbine - Diesel - MHD- Geo thermal - OTEC -Tidal Power Plants.

UNIT V HYDROGEN AND FUEL CELLS 9

Energy carrier: Types - Hydrogen: generation, storage, transport and utilization - thermal energy storage: Principle and utilization - Fuel cells: Technologies, types and applications.

L:45; TOTAL:45 PERIODS

TEXT BOOKS

1. Soteris Kalogirou, "Solar Energy Engineering: Processes and Systems", Academic Press, 2014.
2. Godfrey Boyle, "Renewable Energy, Power for a Sustainable Future", Oxford University Press, U.K, 3rd Edition, 2012.

REFERENCES

1. Mukund R Patel, "Wind and Solar Power Systems", CRC Press, 2nd Edition, 2006.
2. Hart A B and Womack, G J, "Fuel Cells: Theory & Applications", Prentice Hall, 1997.
3. El-Wakil M M, "Power Plant Technology", Tata McGraw-Hill, 2010.
4. Khandelwal K C and Mahdi S S, "Biogas Technology" - A Practical Handbook, Tata McGraw Hill, 1986.
5. Duffie J A and Beckman W A, "Solar Engineering of Thermal Processes", Wiley, 4th Edition, 2013.
6. Chetan Singh Solanki, "Solar Photovoltaics Fundamentals, Technologies and Applications", Prentice Hall of India, 3rd Edition, 2015.

Group - II (Trans disciplinary courses)

15TD01E

INDIAN BUSINESS LAWS

L T P C
0 0 0 3

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO 1: explain the elements of a valid contract.
- CO 2: discuss main provisions relating to Sale of Goods Act and Negotiable Instruments Act.
- CO 3: explain provisions relating to incorporation and functioning of company and partnership firm.
- CO 4: understand the fundamentals of Consumer Protection Act and Foreign Exchange Management Act.
- CO 5: understand the basic knowledge of Information Technology Act and RTI Act.

UNIT I THE INDIAN CONTRACT ACT, 1872

Definition of a Contract and its essentials - Formation of a valid Contract - Offer and Acceptance, Consideration - Capacity to Contract - Free consent - Legality of object - Discharge of a Contract by performance - Impossibility and Frustration - Breach, Damages for breach of a contract - Quasi contracts - Special Contracts - Contract of Indemnity and Guarantee - Contract of Bailment and Pledge - Contract of Agency.

UNIT II THE SALE OF GOODS ACT, 1930

Definition of a Contract of Sale - Conditions and Warranties - Passing of Property - Right of Unpaid Seller against the Goods - Remedies for Breach - The Negotiable Instrument Act, 1881
Definition and characteristics - Kinds of negotiable instruments - Promissory Note - Bill of Exchange and Cheques - Holder and Holder in due course - Negotiation, Presentment, Discharge from Liability - Noting and Protest - Presumption - Crossing of Cheques - Bouncing of Cheques.

UNIT III THE COMPANIES ACT, 1956

Nature and Definition of a Company - Registration and Incorporation - Memorandum of Association - Articles of Association - Prospectus - Kinds of Companies - Directors: Their powers and duties - Meetings - Winding up - The Indian Partnership Act, 1932 - Definition of Partnership and its essentials - Rights and Duties of Partners: Types of Partners - Minor as a partner - Doctrine of Implied Authority - Registration of Firms - Dissolution of firms - Limited Liability Partnership Act, 2000.

UNIT IV THE CONSUMER PROTECTION ACT, 1986

Aims and Objects of the Act - Redressal Machinery and Procedure for complaints under the Act - Remedies - Appeals - Enforcement of orders and Penalties - Foreign Exchange Management Act 2000 - Definition and Main Provisions.

UNIT V THE INFORMATION TECHNOLOGY ACT

Definition, Digital Signature - Electronic Governance – Attribution - Acknowledgment and Dispatch of Electronic Records - Sense Electronic Records and Sense Digital Signatures - Regulation of Certifying Authorities Digital Signature Certificates - Duties of Subscribers - Penalties and Offences - The Right to Information Act, 2005 - Right to know - Salient Features of the Act - Obligation of Public Authority - Designation of Public Information Officer - Request for obtaining information - Duties of a PIO - Exemption from Disclosure of Information - Partial Disclosure of Information - Information Commissions - Powers of Information Commissions - Appellate Authorities – Penalties - Jurisdiction of Courts.

TEXT BOOKS

1. Kuchhal M.C, “Business and Industrial Laws”, 3rd Edition, JBA Publishers, New Delhi, 2013.
2. Gulshan S.S, “Merchantile Law”, 3rd Edition, JBA Publishers, New Delhi, 2007.

REFERENCES

1. Mulla D.F, “The Sale of Goods Act and the Indian Partnership Act”, 10th Edition, LexisNexis Ltd., India, 2012.
2. Dabas J, “Negotiable Instruments Act”, 2nd Edition, JBA Publishers, New Delhi, 2013.
3. Avtar S, “The Principles of Mercantile Law”, 9th Edition, Eastern Book Company, India, 2011.

15TD02E

**LEADERSHIP AND PERSONALITY
DEVELOPMENT**

**L T P C
0 0 0 3**

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO 1: identify the various leadership skills.
- CO 2: understand group dynamics and factors influencing the team performance.
- CO 3: describe the personality dimensions based on personality theories.
- CO 4: explain personality determinants and personality types.
- CO 5: apply effective training program for personality development.

UNIT I INTRODUCTION

Leadership – Meaning, Concepts and Myths about Leadership, Components of Leadership- Leader, Followers and Situations - Leadership Skills – Basic Leadership Skills - Building Technical Competency - Advanced Leadership Skills - Team Building for Work Teams - Building High Performance Teams.

UNIT II TEAMS AND LEADERSHIP

Assessing Leadership & Measuring Its Effects - Group- Nature, Size, Roles, Norms, Cohesion, and Stages of Group Development - Teams and their Leadership – Effective Team Characteristics and Team Building - Ginnetts Team Effectiveness Leadership Model.

UNIT III PERSONALITY

Personality - Meaning, Concept, Personality Patterns, Symbols of Self, Moulding the Personality Pattern, Persistence & Change - Personality & Personal Effectiveness - Psychometric Theories – Cattel and Big Five - Psychodynamic Theories - Carl Jung and MBTI - Transactional Analysis - Johari – Window - Personal Effectiveness.

UNIT IV PERSONALITY DETERMINANTS

Personality Determinants – Heredity and Environment – Types of personality.

UNIT V PERSONALITY TRAINING

Concept, Role, Need, Importance and types of personality Training - Understanding Process of Learning - Developing an Integrated Approach of Learning in Training Programme - Training Needs Assessment.

TEXT BOOKS

1. Yukl G, "Leadership in Organisations", 8th Edition, Pearson Education Ltd., England, 2013.
2. Lall M, Sharma S, "Personal Growth Training & Development", Kindle Edition, USA, 2009.

REFERENCES

1. Janakiraman B, "Training and Development", Wiley Dream tech, Biztantra, 2005.
2. Pareek U, "Understanding Organizational Behaviour", 2nd Edition, Oxford University Press, USA, 2007.

15TD03E

**INTERNATIONAL BUSINESS
MANAGEMENT**

**L T P C
0 0 0 3**

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO 1: understand the global business environment.
- CO 2: explain the impact of economic, legal, cultural, geographical and political factors on international business.
- CO 3: discuss the issues and problems of Multinational Enterprises.
- CO 4: discuss the role of various international financial institutions.
- CO 5: discuss about important aspects of WTO and GATT agreement.

UNIT I INTERNATIONAL BUSINESS ENVIRONMENT

International Business Environment - Globalization - Forces, Meaning, Dimensions and Stages in Globalization - Trading Environment of International Trade - Tariff and Non-tariff Barriers - Trade Blocks.

UNIT II RISK ANALYSIS AND PRACTICES

Country Risk Analysis - Political, Social and Economic - Cultural and Ethical practices - Responsibilities of International Business - Economic crisis in foreign countries.

UNIT III MULTINATIONAL ENTERPRISES

Managing Multinational Enterprises - Problems and Potential - Multinational Service Organizations - Indian companies becoming multinationals - Potential, Need and Problems.

UNIT IV INTERNATIONAL FINANCIAL MANAGEMENT

Introduction to International Financial Management - Balance of Trade and Balance of Payment - International Monetary Fund, Asian Development Bank and World Bank - Financial Markets and Instruments - Introduction to Export and Import Finance - Methods of Payment in International Trade.

UNIT V INTERNATAIONAL AGREEMENT

General Agreement on Trade and Tariffs, (GATT) - World Trade Organization - Seattle and Doha Round of Talks - Dispute Settlement Mechanism under WTO - Problems of Patent Laws - International Convention on Competitiveness - Global Sourcing and its Impact on Indian Industry - Globalization and Internal Reform Process.

TEXT BOOKS

1. Bhalla V.K, Shivaramu S, "International Business Environment", 9th Edition, Anmol Publications Pvt. Ltd., Delhi, 2005.
2. Apte P.G, "International Financial Management", 5th Edition, Tata McGraw Hill, India, 2008.
3. Cherulinam F, "International Business", 5th Edition, Prentice Hall of India, New Delhi, 2010.

REFERENCES

1. Rao, Rangachari, "International Business", Himalaya Publishing House, New Delhi, 2010.
2. Hill C, "International Business", 10th Edition, Tata McGraw Hill Education, New Delhi, 2014.
3. Daniels J.D, "International Business Environment", 15th Edition, Prentice Hall of India, New Delhi, 2014.

15TD04E

BASICS OF MARKETING

L T P C
0 0 0 3

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO 1: describe the basic concepts of marketing.
- CO 2: discuss the significance of consumer behavior and market segmentation.
- CO 3: discuss brand, trade mark, after- sales service and product life cycle concepts.
- CO 4: formulate strategies for pricing and channels of distribution.
- CO 5: analyze and selection of best promotional technique.

UNIT I INTRODUCTION

Nature and Scope of Marketing - Importance of Marketing – Concepts: Traditional and Modern - Selling Vs. Marketing - Marketing Mix - Marketing Environment.

UNIT II CONSUMER BEHAVIOR AND MARKET SEGMENTATION

Nature, Scope and Significance of Consumer Behavior - Market Segmentation - Concept and Importance - Bases for Market Segmentation.

UNIT III PRODUCT PLANNING

Concept of Product - Consumer and Industrial Goods - Product Planning and Development - Packaging - Role and Functions - Brand Name and Trade Mark - After- Sales Service - Product Life Cycle Concept.

UNIT IV PRICING AND PHYSICAL DISTRIBUTION

Price - Importance of Price in the Marketing Mix - Factors Affecting Price of a Product/Service - Discounts and Rebates - Distribution Channels - Concept and Role - Types of Distribution Channels - Factors Affecting Choice of a Distribution Channel - Retailer and Wholesaler - Distributions Channels and Physical Distribution.

UNIT V PROMOTION

Definition - Methods of Promotion - Optimum Promotion Mix - Advertising Media - Their Relative Merits and Limitations - Characteristics of an Effective Advertisement - Personal Selling - Selling as a Career - Classification of a Successful Sales Person - Functions of Salesman.

TEXT BOOKS

1. Etzel M.J, Walker B.J, Stanton W.J, "Fundamentals of Marketing", 13th Edition, McGraw Hill, New York, 2004.
2. Tanner J, Raymond M, "Principles of Marketing", University of Minnesota Libraries Publishing, New York, 2015.

REFERENCES

1. Rajan Nair N, Varma M.M, "Marketing Management", 2nd Edition, S.Chand & Sons, New Delhi, 2005.
2. Ramaswamy V.S, Namakumari S, "Marketing Management", 3rd Edition, Macmillan India Limited, London, 2002.

15TD05E RETAILING AND DISTRIBUTION MANAGEMENT

L T P C
0 0 0 3

COURSE OUTCOMES

Upon completion of this course, the students will be able to

CO 1: explain the concepts of retailing and distribution management.

CO 2: analyze and solve retailers' problems to make decisions in retail organizations.

CO 3: plan and formulate strategy for retail management process.

CO 4: discuss about various distribution technology and stores management.

CO 5: analyze the issues and challenges in Logistic Management

UNIT I INTRODUCTION

Meaning and Nature of Distribution and Retail Industry - Future of Retailing and Distribution in India - Distribution Channels – Concept, Role and Types - Factors Affecting Choice of Distribution Channel.

UNIT II TYPES OF RETAILING

Stores Classified by Owners - Stores Classified by Merchandising Categories - Wheel Of Retailing - Traditional Retail Formats Vs. Modern Retail Formats in India - Store and Non-Store Based Formats - Cash and Carry Business - Retailing Models – Franchiser Franchisee, Directly Owned - Wheel of Retailing and Retailing Life Cycle – Issues in Retailing.

UNIT III MANAGEMENT OF RETAILING OPERATIONS

Meaning - Functions of Retail Management - Strategic Retail Management Process - Retail Planning - Importance and Process - Developing Retailing Strategies.

UNIT IV TECHNOLOGY IN DISTRIBUTION

Bar-Coding – RFID – Electronic Payment Systems - Store Administration - Floor Space Management – Managing Store Inventories and Display Action Plans - Pricing Strategies and Location Strategies.

UNIT V LOGISTICS OF RETAIL MANAGEMENT

Components and Functions; Distribution Related Issues and Challenges - Gaining Competitive Advantage through Logistics Management.

TEXT BOOKS

1. Agrawal D. K., "Distribution & Logistics Management: A Strategic Marketing Approach", Macmillan Publishers India Limited, New Delhi, 2007.
2. Berman B, Evans J.R, "Retail Management – A Strategic approach", 12th Edition, Pearson Education Ltd., England, 2013.
3. Cox R, Brittan P, "Retailing an introduction, Financial Times Management", 5th Edition, Pearson Education Limited, England, 2004.

REFERENCES

1. Rushton A, Croucher P, Baker P, "The Handbook of Logistics & Distribution Management", Kogan Page Limited, London, 2006.
2. Coughlan A.T, Anderson E, Stern L.W, El-Ansary A.I, "Marketing Channels", 7th Edition, Prentice Hall, New Jersey, 2006.
3. Sinha P. K, Uniyal D.P, "Managing Retailing", Oxford University Press, India, 2007.

15TD06E

INTERNATIONAL ECONOMICS

**L T P C
0 0 0 3**

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO 1: discuss the impact of globalization.
- CO 2: identify and analyze different theoretical models of international economics in light of 'real world' situations.
- CO 3: examine the consequences of trade policies.
- CO 4: explain the importance of international financial markets.
- CO 5: discuss the important aspects of international banking.

UNIT I INTRODUCTION

Background of International Business Economics - Globalization and International Business – The Emergence of Global Institutions – Drivers of Globalizations - The Globalization Debate.

UNIT II THE INTERNATIONAL TRADE THEORY

The Law of Comparative Advantage – The Demand and Supply, Offer Curves - The Terms of Trade – Factor Endowments and the Heckscher – Ohlin Theory – Implications of Trade Theories - Economics of Scale - Imperfect Competition.

UNIT III INTERNATIONAL TRADE POLICY

Trade Restrictions - Tariffs, Non –Tariff Trade Barriers - Tariff Vs. Quota - The New Protectionism – Economic Integration - Custom Unions and Free Trade Areas - Major Regional Trade Agreements - Foreign Exchange Market – Types of Foreign Exchange Transactions – Reading Foreign Exchange Quotations – Forward and Futures Market – Foreign - Currency Options – Exchange Rate Determination – Arbitrage – Speculation and Exchange - Market Stability.

UNIT IV WORLD FINANCIAL ENVIRONMENT

Global Foreign Exchange Markets – Economic Theories of Exchange - Rate Determination - International Regime for FDI and MNC - Consequences of Economic Globalization.

UNIT V INTERNATIONAL BANKING

Reserves, Debt and Risk - Nature of International Reserves – Demand for International Reserves – Supply of International Reserves – Gold Exchange Standard – Special Drawing Rights – International Lending Risk – The Problem of International Debt – Financial Crisis and The International Monetary Fund – Eurocurrency Market.

TEXT BOOKS

1. Krugman P.R, Obstfeld M, “International Economics Theory and Policy”, 8th Edition, Prentice Hall, Boston, 2008.
2. Carbaugh R.J, “International Economics”, 15th Edition, South Western College publication, USA, 2014.

REFERENCES

1. Daniels J, Radebaugh L, Sullivan D, Salwan P, “International Business”, 12th Edition, Pearson Education, New Delhi, 2010.
2. Suranovic S, “International Economics: Theory and Policy”, Flat World Knowledge, USA, 2010.

15TD07E

INDIAN ECONOMY

L T P C
0 0 0 3

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO 1: discuss the current economic development in India
- CO 2: describe the key indicators of estimation of national income
- CO 3: explain elementary concepts of economic planning and development in India
- CO 4: discuss the concept of public finance and preparation of budget
- CO 5: discuss the influence of infrastructure growth on economic development

UNIT I ECONOMIC DEVELOPMENT

Meaning - Measurement of Economic Development - Characteristic of underdeveloped and developed economies - Causes for Indian economic underdevelopment - Major issues in development - Strategies for economic development Import substitution and Export oriented strategies - Determinants of economic development.

UNIT II NATIONAL INCOME

The National Income and its estimates in India - Limitations of National income estimation - Trends in National income of India: Growth and Structure - Inter-state variations in National income - Income distribution - Measurement of poverty in India.

UNIT III ECONOMIC PLANNING

Planning and economic development in India - Planning models in India (Elementary concepts) - Capital formation - Growth of Public and Private sector in India – Industrial policies an assessment - Capital formation and domestic saving.

UNIT IV INDIAN PUBLIC FINANCE

Budgetary policies of the central government - Composition and trends in public revenue and expenditure - Expenditure control and government consumption expenditure - concepts of Budgetary deficits and implications - state budget.

UNIT V INFRASTRUCTURE AND ECONOMIC DEVELOPMENT

Power and energy - Transport system in India's economic development - Communication system in India - Urban infrastructure - Science and technology - Private investment in infrastructure - Outlook and prospects.

TEXT BOOKS

1. Dutt R, Sundaram K.P.M, "Indian Economy", S.Chand and Co., New Delhi, 2006.
2. Agarwal A.N, Agarwal M.K, "Indian Economy: Problems of Development and Planning", 41st Edition, New Age International Ltd., New Delhi, 2016.

REFERENCES

1. Arvind P, "India: The Emerging Giant", Oxford University Press, USA, 2008.
2. Government of India, Economic Survey, (2010 -11 to 2014 -15).

15TD08E

RURAL ECONOMICS

L T P C
0 0 0 3

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO 1: discuss the role and importance of agriculture in economic development of India.
- CO 2: describe the impact of agricultural farming in rural employment, wage policy, technological change and green revolution.
- CO 3: analyze the relationship between rural and urban society.
- CO 4: recognize the formation and system of rural social institutions.
- CO 5: compare the social changes in the rural society after modernization and globalization.

UNIT I INTRODUCTION

Nature and Scope of Rural Economy - Importance of Agriculture in Economic Development of India - Nature of Land Problems - Evolution of Policy – Land Tenure System - Land Reform Measures.

UNIT II AGRICULTURE AND FARMING

Agricultural Holdings - Fragmentation and Sub-Division of Holdings, Cooperative Farming-Rural Labour Problems - Nature of Rural Unemployment - Employment and Wage Policy - Sources of Technological Change and Green Revolution.

UNIT III RURAL SOCIETY

Rural Society Structure and Change - Village and its Social Organization - Indian Village and its Types - Rural-Urban Continuum and Rural-Urban Relationships.

UNIT IV RURAL SOCIAL INSTITUTIONS

Rural Social Institutions - Family, Property, Caste, Class, Agrarian Structure - Indebtedness and Poverty - Jajmani System - Religion, Village, Panchayat Raj and Community Development Programmes – Problems.

UNIT V SOCIAL CHANGES

Social Change in Rural India-Impact of Westernization - Secularization, Urbanisation, Industrialisation, Migration, Transportation, Modernization of Indian Rural Society - Post Modernization and Globalization and Indian Villages.

TEXT BOOKS

1. Carver T.N, "The Principles of Rural Economics", Ginn and company, USA, 1911.
2. Desai A.R, "Rural Sociology in India", 5th Edition, Popular Prakashan Ltd., Mumbai, 2011.

REFERENCES

1. Dube S.C., "India's changing villages", Psychology Press, UK, 2003.
2. Datt R, Sundharam K.P.M, Datt G, Mahajan A, "Indian Economy", 72nd Edition, S.Chand & Co., New Delhi, 2016.
3. Chaudhari, C.M., "Rural Economics", Sublime Publication, Jaipur, 2009.

15TD09E

INTERNATIONAL TRADE

L T P C
0 0 0 3

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO 1: discuss the importance of international trade in developing countries.
- CO 2: describe the impact of Trade agreements in international Business environment.
- CO 3: explain the role of foreign exchange and their impact on trade and investment flows.
- CO 4: discuss the benefits of Multinational Corporation in Internal Trade
- CO 5: analyze the key role of globalisation in Indian economy.

UNIT I INTRODUCTION

International Marketing - Trends in International Trade - Reasons - Global Sourcing and Production Sharing - International Orientations - Internationalization Stages and Orientations - Growing Economic Power of Developing Countries – International Business Decision.

UNIT II INTERNATIONAL BUSINESS ENVIRONMENT

Trading Environment - Commodity Agreements – State Trading - Trading Blocks and Growing Intra-Regional Trade - Regional Groupings – SAARC, BRICS, ECM, ASEAN - Trade Liberalization - The Uruguay Round-Evaluation – UNCTAD – GATT – WTO.

UNIT III INTERNATIONAL FINANCIAL ENVIRONMENT

International Money and Capital Markets - Foreign Investment Flows – Pattern, Structure and Effects - Movements in Foreign Exchange and Interest Rates and their Impact on Trade and Investment Flows - Exchange Rate Mechanism and Arrangement.

UNIT IV MULTINATIONAL CORPORATIONS

Definition - Organizational Structures - Dominance of MNC's - Recent Trends - Code of Conduct - Multinationals in India - Issue in Investment, Technology

Transfer, Pricing and Regulations - International Collaborations and Strategic Alliances.

UNIT V INDIA IN THE GLOBAL SETTING

India an Emerging Market - India in the Global Trade - Liberalization and Integration with Global Economy - Factors Favouring and Resisting Globalization - Trade Policy and Regulation in India - Trade Strategies - Export-Import Policy - Regulation and Promotion of Foreign Trade in India.

TEXT BOOKS

1. Daniels J.D, Radebaugh L.H, Sullivan D.P, "International Business: Environment and Operations", 12th Edition, Prentice Hall, USA, 2009.
2. Ricky W.G, Michael W.P, "International Business: A Managerial Perspective", Prentice Hall, USA, 2009.

REFERENCES

1. Bhattacharya B, Varshney R.L, "International Marketing Management", 25th Revised Edition, S. Chand & Sons, New Delhi, 2015.
2. Verma M.L, "International Trade", Common wealth Publisher, New Delhi, 2010.

15TD10E

GLOBAL CHALLENGES AND ISSUES

L T P C
0 0 0 3

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO 1: understand the various global issues.
- CO 2: demonstrate a reasonable understanding of environmental debates and issues.
- CO 3: explain the developmental issues relating to food, health and energy.
- CO 4: demonstrate the economical issues in international trade.
- CO 5: describe the civilization issues relating to human rights and social justice.

UNIT I SECURITY ISSUES

Nuclear Issues - Global and South Asian Context - Small Weapons Proliferation and Internal Arms Race - Chemical and Biological Weapons – Terrorism - Causes, Consequences And Trends - Cyber Terrorism – Counter Terrorism.

UNIT II ENVIRONMENTAL ISSUES

Global Warming and Climate Change - Threats to Bio-Sphere and Space - Pollutions, De-Forestation, Solid, Chemical and Nuclear Wastes and their Management - Preserving the Green Cover and Wild Life.

UNIT III DEVELOPMENTAL ISSUES

Food Security - Poverty and Hunger - Energy Security - Supply and Demand - Traditional and Alternative Sources of Energy – ITER - Health Security – Health for all - Development Vs. Environment - Sustainable Development.

UNIT IV ECONOMIC ISSUES ON INTERNATIONAL TRADE

International Trade - GATT, WTO - Regional Associations - ECM, ASEAN, OPEC, BRICS - Financial Crisis - ASEAN, Mexico and Greece - Global Issues in Trade and Commerce.

UNIT V CIVILIZATION ISSUES

Human Rights - Issues Relating to Freedom of Speech and Expression - Right to Self Determination - Preservation of Cultures and Cultural Diversities - Rights of Women and Children - Dividends of Globalization and Social Justice – Good Governance.

TEXT BOOKS

1. Payne R, "Global Issues", 4th Edition, Pearson Education Ltd., New York, 2013.
2. Owens P, Baylis J, Smith S, "The Globalization of World Politics", 3rd Edition, Oxford University Press, USA, 2013.

REFERENCE

1. Chirco J.A, "Globalization: Prospects and Problems", Sage Publications, New Delhi, 2013.

15TD11E

INDIAN CULTURE AND HERITAGE

**L T P C
0 0 0 3**

COURSE OUTCOMES

Upon completion of this course, the students will be able to

CO1: describe Indian culture, civilization and its features.

CO2: demonstrate stone age, Indian races and their contribution in pre-historic culture.

CO3: explain historical development of Indian culture.

CO4: explain the significance, conditions and development of Vedic culture.

CO5: analyze the advent of Islam and European culture.

UNIT I INTRODUCTION

Introduction to Culture - Meaning and Scope - Culture and Civilization - General Characteristics Features of Indian Culture - Geographical Impact on Indian Culture.

UNIT II PRE-HISTORIC CULTURE

Dravidian Culture - Old Stone Age - New Stone Age - Metal Age - Indian Races and their Contribution to Indian Culture.

UNIT III HISTORICAL DEVELOPMENT OF INDIAN CULTURE

Indus Valley Culture - City Planning - Social and Religious Conditions - Vedic and Later Vedic Cultures - Dharmasastras and Caste Systems - Comparison of Indus and Vedic Culture - Importance of Indus Valley and Vedic Cultures.

UNIT IV CULTURE IN SANGAM AGE AND POST SANGAM AGE

Sangam Literature - Society - Political and Economical Conditions - Trade - Religion and Fine Arts.

UNIT V ADVENT OF ISLAM AND EUROPEAN CULTURE

Impact on Indian Culture and Heritage – Reform Movements - Brahma Samaj, Ariya Samaj, Self Respect Movement – Post Colonial Development.

TEXT BOOKS

1. Luniya B.N, "Evolution of Indian Culture", Lakshmi Narain Agarwal Publishers, Agra, 1986.
2. Jeyapalan N, "History of Indian culture", Atlantic publishers, New Delhi, 2001.
3. Sharma H.C, "Indian Culture and Heritage", Neha Publishers & Distributors, New Delhi, 2012.

REFERENCES

1. John G.A, "Dictionary of Indian Philosophy (Sanskrit-English)", University of Madras, Madras, 1998.
2. Misra R.S, "Studies in philosophy and Religion", Bharathiya Vidya Prakasans, Varanasi, 1991.
3. Misra S.K, "Culture and Rationality", Sage publications India Pvt. Ltd., New Delhi, 1988.
4. Suda J.P, "Religious in India", Sterling Publishers Pvt. Ltd., New Delhi, 1978.

15TD12E

INDIAN HISTORY

**L T P C
0 0 0 3**

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO1: illustrate the basics of Indian cultural heritage.
- CO2: describe interaction between Ancient Indian cultural heritage and Islamic culture.
- CO3: demonstrate Innovation by rulers of medieval period in the area of Administration, and their contact with the Europeans.
- CO4: analyse modern Indian movements, Economic history and Impact of the British rule on India.
- CO5: demonstrate the concepts of Indian National Movement and the history of freedom struggle in India.

UNIT I ANCIENT INDIAN CULTURE

Ancient Indian Cultural Heritage - Social, Political, Legal and in the Area of Religion and Philosophy.

UNIT II LAW RELATING TO CULTURE

Law Givers and Dispute Resolution Systems in Ancient India (Administration of Justice in Ancient India - Pre-Islamic Period) - Law Relating to Culture - The Advent of Islam - Interaction between Ancient Indian Cultural Heritage and Islamic Culture - The Emergence of Synthetic Indian Culture.

UNIT III ADMINISTRATION IN ANCIENT INDIA

Innovation by Rulers of Medieval Period in the Area of General and Revenue Administration - District Administration - Court Systems - Indian Contact with the Europeans.

UNIT IV SOCIO-ECONOMIC HISTORY

Socio-Religious Reform Movements in Modern India and its Legal Culture - Economic History of India During British Period - Impact of the British Rule on India – Education.

UNIT V EUROPEAN CULTURE IMPACT

Impact of European Culture and Liberal Thought on India – The Indian National Movement - The History of Freedom Struggle in India upto 1947.

TEXT BOOKS

1. Sreenivasa M.H.V, "History of India Part I and II", JBA Publishers, New Delhi, 2015.
2. Agarwal R.C, Bhatnagar M, "Constitutional Development and National Movement of India", S. Chand Publishers, New Delhi, 2005.

REFERENCES

1. Altekar S, "State and Government in Ancient India", Motilal Banarsidass Publishers, New Delhi, 2002.
2. Majumdar R.C, "History and Culture of the Indian People", Vol. 2, The Age of Imperial Unity, Bharatiya Vidya Bhavan, New Delhi, 2001

**15TD13E SUSTAINABLE DEVELOPMENT AND PRACTICES L T P C
0 0 0 3**

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO 1: recognize the sustainable development and the way to achieve the sustainable development.
- CO 2: outline the concept, factors governing the sustainability and their linkages.
- CO 3: explain the environmental impact assessment and environmental audit.

- CO 4: describe the environmental planning and managing the resources.
CO 5: acquire the knowledge about the environmental problems and their solutions.

UNIT I SUSTAINABLE DEVELOPMENT

Need for Sustainability - Nine Ways to Achieve Sustainability - Economics as the Dismal Science - Population, Resources and Environment.

UNIT II CHALLENGES OF SUSTAINABLE DEVELOPMENT

Concept of Sustainability - Factors Governing Sustainable Development - Linkages among Sustainable Development, Determinants of Sustainable Development - Case Studies on Sustainable Development.

UNIT III ENVIRONMENT IMPACT ASSESSMENT AND AUDIT

Concepts-process-evaluation methodology-EIA and EMS integration-setting up of audit programme - typical audit process - carrying out the audit-benefits of environmental auditing-environmental audit programmes in India.

UNIT IV ENVIRONMENTAL PLANNING

Introduction - Perspective of Environmental Planning - land resource development planning - Planning and managing the natural resources - landscape ecological planning - information and decision of environmental planning - Land use policy in India.

UNIT V ENVIRONMENTAL EDUCATION

Knowledge about the environment - Knowledge about the environment and population growth - Knowledge about the solution and environmental problems - Environmental education (EE) – Strategies for EE – Models for future Environmental Education Systems.

TEXT BOOKS

1. Rogers P, Jalal K.F, Boyd J.A, "An Introduction to Sustainable Development", Earth scan Publications Ltd., UK, 2006.
2. Santra S.C," Environmental Science", 3rd Edition, New Central Book Agency (P) Ltd., London, 2013.

REFERENCES

1. Stavins R.N. "Economics of the Environment: Selected Readings", 5th Edition, W.W. Norton and Company, New York, 2005.
2. Sachs J.D, "The Age of Sustainable Development", Columbia University Press, New York, 2015.

15TD14E

WOMEN IN INDIAN SOCIETY

L T P C
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COURSE OUTCOMES

Upon completion of this course, the students will be able to

CO1: Demonstrate historical perspective about women in Indian society.

CO2: Explain social problems of women.

CO3: Understand the legislation for women protection in India.

CO4: Demonstrate the involvement of women literacy, career and politics.

CO5: Analyse the role of NGO's in women empowerment.

UNIT I INTRODUCTION

A Historical Perspective - Early Vedic, Colonial and Modern Periods - Position of Women in Contemporary India.

UNIT II SOCIAL ISSUES

Issues of Girl Child - Female Infanticide and Foeticide, Sex Ratio, Child Marriage, Dowry and Property Rights - Women's Health and Birth Control - Reproduction - Violence against Women - Domestic Violence - Female Headed Households - Women in the Unorganized Sector of Employment - Women's Work- Status and Problems - Problems of Dalit Women.

UNIT III PROTECTIVE LEGISLATION FOR WOMEN

Protective Legislation for Women in the Indian Constitution - Anti Dowry, SITA, PNMT, And Prevention Sexual Harassment At Workplace (Visaka Case) - Domestic Violence (Prevention) Act.

UNIT IV WOMEN AND EDUCATION

Formal and Non-Formal Literacy - Post Literacy - Vocational Training - Dual Career Modernization – Women and Politics - Political Status - Global Movements and Indian Movements.

UNIT V ROLE OF NGO'S IN WOMEN EMPOWERMENT

Gender Economy - All India Women's Conference (AIWC) – Women's India Association (WIA) - National Council of Women in India (NCWIE) - Indian Association of Women's Studies – Women Development Cells - Self Help Groups.

TEXT BOOKS

1. Majumdar M, "Social Status of Women in India", Wisdom Press, New Delhi, 2012.
2. Harish R, Harishankar V.B, "Re-Defining Feminisms", Rawat Publications, Jaipur, 2011.

REFERENCES

1. Rathod P.B, "An Introduction to Women's Studies", ABD Publishers, Jaipur, 2010.
2. Ray R, "Hand Book of Gender", Oxford University Press, New Delhi, 2012.

15TD15E

INDIAN CONSTITUTION

L T P C
0 0 0 3

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO1: describe the basic understanding of the Indian Constitution.
- CO2: understand the structure and functions of parliament.
- CO3: demonstrate the organization and working of the Judiciary.
- CO4: understand the structure and functions of state legislature.
- CO5: understand the 73rd and 74th Constitutional Amendments.

UNIT I INDIAN CONSTITUTION

Salient Features - Preamble - Fundamental Rights – Directive Principles of State Policy - Fundamental Duties.

UNIT II PARLIAMENTARY SYSTEM

Powers and Functions of President and Prime Minister - Council of Ministers - The Legislature Structure and Functions of Lok Sabha and Rajya Sabha – Speaker.

UNIT III THE JUDICIARY

Organisation and Composition of Judiciary - Powers and Functions of the Supreme Court - Judicial Review – High Courts.

UNIT IV STATE GOVERNMENTS

Powers and Functions of Governor and Chief Minister – Council of Ministers - State Legislature.

UNIT V LOCAL GOVERNMENTS

73rd and 74th Constitutional Amendments – Federalism - Center – State Relations.

TEXT BOOKS

1. Basu D.D, "Introduction to Indian Constitution", Prentice Hall of India, New Delhi, 2015.
2. Gupta D.C, "Indian Government and Politics", Vikas Publishing House, New Delhi, 2010.

REFERENCES

1. Pylee M.V, "Introduction to the Constitution of India", Vikas Publishing House, NewDelhi, 2011.
2. Kashyap S, "Our Constitution", National Book Trust, New Delhi, 2010.

15TD16E

BIO MECHANICS IN SPORTS

L T P C
0 0 0 3

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- CO1: discuss the basics of biomechanics in sports & movement technique accurately.
- CO2: discuss the basics of linear kinematics and its applications in the field of sports.
- CO3: demonstrate the linear kinematics in the field of sports.
- CO4: discuss the basics of angular kinematics and its applications in the field of sports.
- CO5: demonstrate the angular kinematics in the field of sports.

UNIT I INTRODUCTION

Meaning, Aim and Objectives, Importance of Biomechanics in Sports - Types of Motion Linear, Angular, Curvilinear and Circular Motion.

UNIT II LINEAR KINEMATICS

Speed, Velocity, Acceleration, Motion, Projectile Motion – Application of Linear Kinematics in The Field of Physical Education and Sports.

UNIT III ANGULAR KINEMATICS

Angular Speed - Angular Velocity - Angular Acceleration - Relationship between Linear and Angular Motion – Application of Angular Kinematics in the Field of Physical Education and Sports.

UNIT IV LINEAR KINETICS

Mass, Weight, Force, Pressure, Work, Power, Energy, Impulse, Momentum, Impact, Friction, Newton's Law of Motion - Law of Inertia and Types of Inertia.

UNIT V ANGULAR KINETICS

Levers, Equilibrium and Centre of Gravity – Friction and its Types, Centrifugal and Centripetal Force Bio Mechanical Principles Involved in Designing Sports Equipments.

TEXT BOOKS

1. Singh S.K, "Biomechanics in Sports", Neha Publishers & Distributors, New Delhi, 2009.
2. McGinnis P.M, "Biomechanics of Sports and Exercise", 2nd Edition, Human Kinetics Publishers, USA, 2004.

REFERENCES

1. Saxena A, "Biomechanics in Sports", Neha Publishers & Distributors, New Delhi, 2011.
2. Heyward V.H, Gibson A.L, "Advanced Fitness Assessment and Exercise Prescription", 7th Edition, Human Kinetics, USA, 2014.