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

B.Tech. – INFORMATION TECHNOLOGY
CURRICULUM AND SYLLABUS

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

- ➢ 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)

PEO 1: Excel in IT, ITES industries and higher education by applying the principles and practices of computing.

PEO 2: Maintain professionalism and adapt to emerging technologies.

PEO 3: Equip themselves as a leader and capable of managing Multidisciplinary environment.

PROGRAM OUTCOMES (POs)

Engineering graduates will be able to:

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.
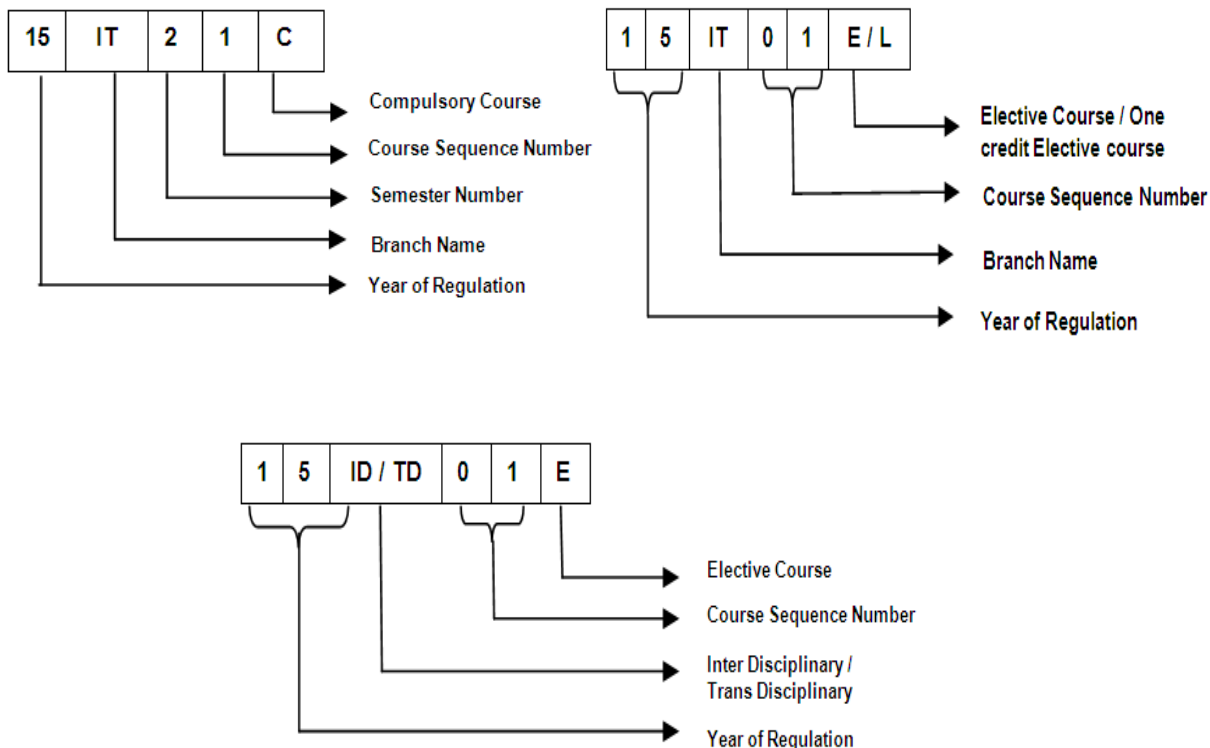
2. **Programme Core Courses (PCC)** include the core courses relevant to the chosen programme of study and the Employability Enhancement courses such as Project, Seminar and Inplant training/ Internship.

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

| 15 | IT | 2 | 1 | C |

Compulsory Course
Course Sequence Number
Semester Number
Branch Name
Year of Regulation

| 1 | 5 | IT | 0 | 1 | E / L |

Elective Course / One credit Elective course
Course Sequence Number
Branch Name
Year of Regulation

| 1 | 5 | ID / TD | 0 | 1 | E |

Elective Course
Course Sequence Number
Inter Disciplinary / Trans Disciplinary
Year of Regulation

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, *X*EC - *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.	*X*EC		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.	*X*EC		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.	*X*EC		Elective-III	3	0	0	3	B
2.	*X*EC		Elective-IV	3	0	0	3	B
3.	*X*EC		Elective-V	3	0	0	3	B
4.	*X*EC		Elective–VI	3	0	0	3	B
5.	*X*EC		Elective-VII	3	0	0	3	B
PRACTICAL								
6.	*X*EC		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.	*X*EC		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, *X*EC - *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	-
29.	PEC	15IT29E	Accounting for Information Technology	3	0	0	3	B
30.	PEC	15IT30E	Financial Accounting Package Laboratory	0	0	2	1	-

ONE CREDIT ELECTIVE COURSES (PEC)

S. No	Course Category	Course Code	COURSE TITLE	L	T	P	C	QP
INDUSTRY COLLOBORATIVE COURSES								
1.	PEC	15IT01L	Agile Development Process	1	0	0	1	G
2.	PEC	15IT02L	Microsoft Analytics	1	0	0	1	G
3.	PEC	15IT03L	HTML5and CSS3 mobile programming	0	0	2	1	-
4.	PEC	15IT04L	Web services for mobile programming	0	0	2	1	-
5.	PEC	15IT05L	E-Learning Platform	0	0	2	1	-
OTHER COURSES								
6.	PEC	15IT06L	Computer Hardware and Trouble Shooting	0	0	2	1	-
7.	PEC	15IT07L	PHP Programming	0	0	2	1	-
8.	PEC	15IT08L	Programming in python	0	0	2	1	-
9.	PEC	15IT09L	Theory of Computation	1	0	0	1	G
10.	PEC	15IT10L	Basics of Compiler Design	1	0	0	1	G
11.	PEC	15IT11L	Virtualization	1	0	0	1	G
12.	PEC	15IT12L	Programming in Ruby	0	0	2	1	-
13.	PEC	15IT13L	Social Media Application Development	1	0	0	1	G
14.	PEC	15IT14L	iOS Development with swift 2.0	1	0	0	1	G
15.	PEC	15IT15L	E-Commerce Security	1	0	0	1	G
16.	PEC	15IT16L	Computer Animation	0	0	2	1	-
17.	PEC	15IT17L	Hadoop Architecture and Installation	0	0	2	1	-
18.	PEC	15IT18L	Microcontroller and Raspberry Pi	1	0	0	1	G
19.	PEC	15IT19L	Programming in IOT	0	0	2	1	-
20.	PEC	15IT20L	Gamification	1	0	0	1	G
21.	PEC	15IT21L	Wearable computing	1	0	0	1	G
22.	PEC	15IT22L	R Programming	0	0	2	1	-
23.	PEC	15IT23L	Java Generics and Collections framework	0	0	2	1	-
24.	PEC	15IT24L	Deep learning	1	0	0	1	G
25.	PEC	15IT25L	Database Design and Programming with SQL	0	0	2	1	-
26.	PEC	15IT26L	Introduction to Networks	1	0	0	1	G
27.	PEC	15IT27L	Routing and Switching Essential	1	0	0	1	G
28.	PEC	15IT28L	Scaling Networks	1	0	0	1	G
29.	PEC	15IT29L	Connecting Networks	1	0	0	1	G

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**   **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
    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. (K2, S4)
    CO4: coordinate and communicate in a wide range of situation. (K3, S4)
    CO5: integrate and apply the acquired skills in real life situation. (K2, 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, Globerena.

15SH12C   MATHEMATICAL FOUNDATIONS FOR ENGINEERS   L T P C
                 (Common to all B.E. / B.Tech. Degree Programmes)   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 Textbook of Engineering Mathematics", 8th Edition, Laxmi Publications Private Limited, 2011.
2. George B.Thomas and 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 and James Flint, "Engineering Mathematics: A Foundation for Electronic, Electrical, Communications and Systems Engineers", 4th Edition, Pearson Education Private Limited, 2013.

15SH13C	ENGINEERING PHYSICS	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: 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 - CO_2 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. Ebewele 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: understand the OBE concepts and its components. (K2)

CO 5: understand learning components and creativity. (K3)

UNIT I   HISTORY OF ENGINEERING AND INTRODUCTION TO   7 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 FOR AN   8 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.ieagreements.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
		0 0 2 1

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

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

- 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.

15SH18C	ENGINEERING PRACTICE LABORATORY	L T P C
	(Common to all B.E./B.Tech. Degree Programmes)	0 0 2 1

PART A - MECHANICAL LABORATORY

COURSE OUTCOMES

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

CO 1: prepare basic carpentry jobs (at least three joints). (K3,S2, A2)

CO 2: prepare the welded joint (minimum three) using arc and gas welding. (K3, S2, A2)

CO 3: Machine metals using lathe, shaper and drilling machine (each one job). (K3, S2, A2)

UNIT I   CARPENTRY PRACTICES   5

Study of carpentry tools – preparation of joints like half lap, Tee and dove tail in wood.

UNIT II   WELDING   5

Study of welding tools – Preparation of welded joints with Mild steel specimen like lap, butt and tee joints using ARC and Gas welding. (any one exercise should be given using Gas welding among three)

UNIT III   BASIC MACHINING PRACTICES   5

Simple turning and taper turning using lathe – use of shaper and drilling machine for basic operations (Minimum three exercises should be given for students)

P: 15   TOTAL: 15 PERIODS

TEXT BOOK
1. Bawa H.S, "Workshop Practice", Tata McGraw Hill Publishing Company Limited, 2007.

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. Jeyapoovan 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	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: contribute the lingual power to frame sentences in different context. (K2, A2)

CO 2: write effectively in any Professional context. (K3, A2)

CO 3: acquire the skills related to Group discussion. (K3, A2)

CO 4: communicate and respond in different social and professional contexts. (K3, A3)

CO 5: recall the acquired skills in solving competitive exam. (K2, S3)

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	L T P C
	(Common to CSE and IT)	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 | L T P C |
| | CHEMISTRY LABORATORY | 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 + 1/2at2, 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. (K2)

CO 2: simulate various combinational circuits using VHDL/PSPICE. (K1)

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 path in a weighted 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. Tremblay 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: solve the computing problems using algorithm design techniques. (K3)

CO 2: solve the problems using linear data structures. (K3)

CO 3: apply tree data structure for solving computing problems. (K3)

CO 4: explain the various sorting and hashing techniques. (K2)

CO 5: solve the problems using graph data structure. (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. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction to Algorithms", Third Edition, MIT Press, 2009.
3. Horowitz, Sahni, Anderson-Freed, "Fundamentals of Data Structures in C", Second Edition, Universities Press, 2008.
4. Richard Gilberg, Behrouz Forouzan, "Data Structures: A Pseudocode Approach with C", Second Edition, Cengage Learning, 2004.
5. Alfred V. Aho, John E. Hopcroft, Jeffrey D.Ullman, "Data Structures and Algorithms", Pearson Education, 2012.

WEB REFERENCES
1. www.visualgo.net (for animation)
2. http://www.btechsmartclass.com/DS/U1_T1.html
3. www.khanacademy.org/computing/computer-science

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 object oriented programming. (K2)

CO 2: develop programs for object oriented programming concepts. (K3)
CO 3: explain expressions, branching and looping statements. (K2)
CO 4: develop classes and objects for real time applications. (K3)
CO 5: illustrate exception handling, threading and file handling. (K3)

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.

WEB REFERENCES
1. http://www.geeksforgeeks.org/c-plus-plus/
2. http://www.geeksforgeeks.org/java/
3. http://www.sanfoundry.com/java-questions-answers-freshers-experienced/
4. http://www.sanfoundry.com/cplusplus-interview-questions-answers

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 Communication. (K2)

CO 2: explain the various digital modulation schemes. (K2)

CO 3: describe the concepts of data communications standards and connectionless protocols. (K2)

CO 4: explain data communication codes and associated devices. (K2)

CO 5: illustrate the concept of spread spectrum and multiple access 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, 2012.
2. Simon Haykin, "Communication Systems", Fifth Edition, John Wiley & Sons. 2009.

REFERENCES

1. Rodger E. Ziemer, William H. Tranter, "Principles of Communications", 7th Edition, Wiley Publication 2015.
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: describe the internal structure and operation of digital computer. (K2)

CO2: explain the instruction execution and arithmetic operation. (K2)

CO3: apply pipelining concept for instruction execution. (K3)

CO4: explain the types of memory systems. (K2)

CO5: summarize the different I/O mechanisms. (K2)

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 VALUES	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: 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 mini project using C++/java features. (K3)

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: apply data structure concepts for solving problems. (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, Fiftht 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

CO 1: explain the fundamental concepts of C# and .Net. (K2)
CO 2: implement OOPs concepts using C#. (K3)
CO 3: design web applications using various web based GUI tools. (K3)
CO 4: develop web applications using ADO.NET. (K3)
CO 5: describe the web services and .NET Compact Framework. (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.

WEB REFERENCES

1. http://nareshit.in/c-net-training/
2. https://www.lynda.com/C-sharp-training-tutorials/1022-0.html

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 various services of an operating system. (K2)

CO 2: solve process scheduling, synchronization and deadlock problems. (K3)

CO 3: illustrate the various primary memory management techniques. (K2)

CO 4: summarize the various secondary storage management techniques. (K2)

CO 5: describe protection methods in operating system. (K2)

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", Nineth 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

CO 1: explain the role of data and databases in information systems. (K2)

CO 2: design relational model and pose complex SQL queries of relational databases. (K3)

CO 3: describe normalization and its role in the database design process. (K2)

CO 4: illustrate the concepts of transaction processing, concurrency control and recovery procedure.(K2)

CO 5: summarize the storage structures using different indexing techniques, query optimization. (K2)

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 / Addision 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 (K2)

CO2: describe 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: summarize the principal approaches for software testing and maintenance. (K2)

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", Nineth 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: summarize the importance of IT components to confirm about low-power computation. (K2)
   CO 3: describe the ways to make computing greener and efficient. (K2)
   CO 4: explain the greening process in designing datacenter. (K2)
   CO 5: apply Green IT strategies in real time applications. (K3)

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.
2. Mohammad Dastbaz, Colin Pattinson "Green Information Technology: A Sustainable Approach", Morgan Kauffman imprint of Elsevier, 2015

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: implement the various system calls in Linux operating system. (K3)

    CO 2: develop programs for process handling and memory management. (K3)

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: develop a set of queries in SQL and PL/SQL to handle typical user inquiries for information extraction from the database. (K3)

CO 2: develop a mini 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

CO 1: apply fundamental concepts of C# and .Net. (K3)

CO 2: design real time web applications using ASP.NET and ADO.NET. (K3)

LIST OF 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 processor functionalities and architectures. (K2)

   CO 2: describe the memory and interrupt handling mechanism in ARM processor. (K2)

   CO 3: explain the importance of multi tasking in embedded systems. (K2)

   CO 4: develop programs using embedded C. (K3)

   CO 5: summarize the design principles of real time 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. Raj Kamal, "Embedded Systems: Architecture, Programming and Design", Tata McGraw-Hill Education, 2011.
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

CO 1: design web pages using HTML & CSS. (K3)

CO 2: develop scripting languages for validation of web pages. (K3)

CO 3: design dynamic web pages using server side programming. (K3)

CO 4: design web pages using Java framework. (K3)

CO 5: develop the web applications using 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 BOOKS

1. Jeffrey C.Jackson, "Web Technologies - A Computer Science Perspective", Pearson Education, 2011.
2. H.M.Deitel, P.J. Deitel, T.R. Nieto, "Internet & World Wide Web How to Program", Fourth Edition, Pearson, 2012

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", 7th Edition, Pearson Education, 2013.

WEB REFERENCES

1. http://nareshit.in/html5-training/
2. https://www.lynda.com

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. (K2)

    CO 2: explain the principles of data link layer and its issues. (K2)

    CO 3: explain the switching techniques and routing algorithms. (K2)

    CO 4: describe the transport layer and application layer protocols. (K2)

    CO 5: summarize the functions of 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.
4. Vijay. K. Garg, "Wireless Communication and Networking", Morgan Kaufmann Series in Networking, First Edition, 2007.

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

COURSE OUTCOMES

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

CO 1: describe 2D graphics and clipping algorithms. (K2)

CO 2: explain algorithms for clippings, 3D transformations and viewing. (K2)

CO 3: develop graphics programs using OpenGL. (K3)

CO 4: summarize the multimedia compression techniques for audio and video streams. (K3)

CO 5: design audio/video animations using multimedia presentation tools. (K3)

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

WEB REFERENCES

1. http://www.webreference.com/3d/index.html.
2. https://www.sciencedaily.com/terms/3d_computer_graphics.htm.
3. http://geomalgorithms.com/websites.html.
4. https://www.tutorialspoint.com/computer_graphics/line_generation_algorithm.htm.
5. https://www.w3.org/standards/webdesign/audiovideo.

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   9
              PARTICIPATION

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. Gobalakrishnan 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 dynamic web applications using server side programming and 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: implement routing and switching algorithms. (K3)

CO 2: design network topology using CISCO packet tracer. (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

CO 1: implement 2D and 3D transformation algorithms. (K3)

CO 2: develop a mini project using computer graphics software. (K3)

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 the activities involved during project development phase. (K2)

CO 2: summarize the various project evaluation and management techniques. (K2)

CO 3: describe the activities of project development. (K2)
CO 4: evaluate the cost estimation methods. (K4)
CO 5: describe the people management and team organization skills. (K2)

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, Mikecotterell, "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. Gopalaswamy 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

CO 1: design and validate web pages using HTML and JavaScript. (K3)
CO 2: explain the devices, platform, and layers in mobile architecture. (K2)
CO 3: describe the concepts of various mobile platforms (K2)
CO 4: develop mobile applications using Android. (K3)
CO 5: describe advanced technologies in mobility. (K2)

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.
2. Zak Ruvalcaba and Anne Boehm, "Murachs HTML5 & CSS3 ", Mike Murach & Associates Inc, Third edition , 2015

REFERENCES

1. Nicholas C. Zakas, "Professional Javascript For Web Developers", Third Edition, Wiley India Pvt Ltd, 2012.
2. Greg Shackles, "Mobile Development with C#: Building Native IOS, Android, and Windows Phone Applications (Paperback)", O'Reilly Media Publishers, 2012.
3. Sumi Helal, Raja Bose, Wengdong Li, "Mobile Platforms and Development Environments (Paperback)", Morgan & Claypool Publishers, 2012.
4. Jeffrey C. Jackson, "Web Technologies: A Computer Science Perspective", Pearson Education, 2007.
5. Herbert Schildt, "Java The Complete Reference", 9th Edition, Tata McGraw Hill Publishing Company Limited, 2014.

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

CO 1: describe the linear regression models for analyzing the data. (K2)

CO 2: explain the usage of various logistic regression models. (K2)

CO 3: explain the casual inference and perform simulation. (K3)

CO 4: describe the multilevel regression models. (K2)

CO 5: summarize 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 – R^2 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 algorithms of symmetric and asymmetric cryptosystem. (K2)
CO 3: apply data integrity and authentication techniques for securing a system. (K3)
CO 4: describe the various authentication and internet security protocols. (K2)
CO 5: explain the security mechanisms in wireless networks. (K2)

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.

15IT65C	CLOUD COMPUTING	L T P C
		3 2 0 4

COURSE OUTCOMES

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

    CO 1: describe the fundamentals of cloud computing. (K2)

    CO 2: distinguish the various cloud services. (K2)

    CO 3: explain collaborations on cloud computing. (K2)

    CO 4: summarize the different cloud based applications. (K2)

    CO 5: illustrate the different social networks and groupware. (K3)

UNIT I   INTRODUCTION   15

Cloud Computing – History of Cloud Computing – Cloud Architecture – Cloud Storage – Why Cloud Computing Matters – Types - Advantages – Disadvantages – Case Study: Companies in the Cloud Today

UNIT II   DEVELOPING CLOUD SERVICES   15

Web-Based Application – Pros and Cons of Cloud Service Development – Types of Cloud Service   Web Services – On-Demand Computing – Discovering Cloud Services Development Services and Tools – Amazon Ec2 – Google App Engine – IBM Clouds – Case study: Amazon Web Service.

UNIT III   CLOUD COMPUTING FOR EVERYONE   15

Centralizing Email Communications – Collaborating on Schedules, To-Do Lists, Contact Lists, Group Projects and Events – Cloud Computing for the Community, Corporation – Case study: RTM, Google contact lists

UNIT IV   USING CLOUD SERVICES   15

Collaborating on Calendars, Schedules, and Task Management – Exploring Online Scheduling Applications – Collaborating on Event, Contact and Project Management –

Collaborating on Word Processing and Databases – Storing and Sharing Files- Case study: Yahoo calendar, Google calendar

UNIT V   OTHER WAYS TO COLLABORATE ONLINE   15

Collaborating via Web-Based Communication Tools – Evaluating Web Mail Services and Web Conference Tools – Collaborating via Social Networks and Groupware – Blogs and Wikis – Case study: Facebook, Whatsapp

L: 45 T: 30 TOTAL: 75 PERIODS

TEXT BOOK
1. Michael Miller, "Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online", First Edition, Que Publishing, 2009.

REFERENCES
1. Haley Beard, "Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing, Applications and Data Centers in the Cloud with SLAs", Second Edition, Emereo Pvt Limited, 2009.
2. http://thecloudtutorial.com/

15IT66C	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: apply business modeling methods for real time applications using R programming. (K3)

CO 2: develop hypothetical statistics and prediction using data analysis software.(K4)

List of Experiments
1. Descriptive Statistics
2. Hypothesis – Parametric
3. Hypothesis – Non-parametric
4. Correlation & Regression
5. Forecasting
6. Portfolio Selection
7. Risk Analysis & Sensitivity Analysis
8. Revenue Management
9. Transportation & Assignment
10. Networking Models
11. Queuing Theory
12. Inventory Models

P: 30 TOTAL: 30 PERIODS

15IT67C   MOBILE TECHNOLOGIES LABORATORY   L T P C
**   0 0 2 1**

COURSE OUTCOMES

Upon completion of this course, the students will be able to
   CO1: develop mobile applications using Android. (K3)

LIST OF EXPERIMENTS

1. Develop mobile applications that use User Interface Components
2. Develop an application using Layout Managers and event listeners.
3. Develop a mobile application for loading images to the SD card
4. Develop mobile applications using SQLITE
5. Develop mobile applications using external database.
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

15IT71C   **MINI PROJECT**   **L T P C**
                                                                            0 0 8 4

COURSE OUTCOMES
  Upon Successful completion of this course, the students will be able to
    CO1: gather the requirement and design the working model (K3)
    CO1: develop the project based on the real time application needs. (K3)
    CO1: demonstrate the results and preparation of the report. (K3)

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**
Review1	• Problem identification in emerging technologies (Social / E-Governance / etc) • Literature review	• A panel of 3 internal expert members (depends upon the Domain Expert Group) review the oral presentation	20
External Evaluation			
External Examiner reviews the oral presentation of the students.			

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

COURSE OUTCOMES
  Upon Successful completion of this course, the students will be able to
    CO1: Understand the emerging research technology and acquire knowledge through published in reputed journals and patents

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

CO1: summarize the fundamental concepts to meet out the industrial expectations. (K2)

CO2: debug / develop programs in C / C++ / Java. (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

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

CO1: design and develop the working model (K3)

CO2: work independently to complete the project along with team members (K2)

CO3: demonstrate the results and documents the report (K4)

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**	**Weight age**	**Duration**
Review1	• Problem identification in emerging technologies (Social/E-Governance/ etc) • Literature review	• A panel of 3 internal expert members (depends upon the Domain Expert Group) review the oral presentation	20	4 months (VII Sem)
Review2	• Technology feasibility • Proposed methodology • 50% of implementation	• 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	• 100 % of implementation • Report preparation • Conference / Journal submission	• 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 V   DISTRIBUTED OBJECT DBMS   9

Architectural Issues - Object Management - Distributed Object Storage - Object Query Processing - Transaction Management: Transaction Management in Object DBMSs - Transactions as Objects.

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

1. Stefano Ceri, Giuseppe Pelagatti, "Distributed Database Principles & Systems", Second Edition, McGraw-Hill, 2008.

2. M.Tamer Ozsu, Patrick Valduriez, "Principles of Distributed Database Systems", Third Edition, Springer, 2011.

REFERENCES

1. R. Elmasri, S.B. Navathe, "Fundamentals of Database Systems", Fifth Edition, Pearson Education/Addison Wesley, 2009.
2. Saeed K. Rahimi, Frank S. Haug, "Distributed Database Management Systems: A Practical Approach", Wiley, 2010.
3. Ray, Chhanda, "Distributed Database Systems", Pearson Education, India, 2009.

| 15IT02E | ADVANCED DATABASE 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 distributed database architectures and their models. (K2)

CO 2: design object model to manipulate an object database. (K3)

CO 3: develop web applications using PHP. (K3)

CO 4: describe mobile databases and geographic information systems. (K2)

CO 5: explain temporal and spatial databases. (K2)

UNIT I DISTRIBUTED DATABASES 9

Database System Architectures: Centralized and Client-Server Architectures –Distributed Database Concepts – Distributed Database Design – Types – Distributed Query Processing – Concurrency control - Recovery control - Three Tier Client Server Architecture- Distributed Database in Oracle.

UNIT II OBJECT RELATIONAL DATABASES 9

Concepts for Object Databases: Object Identity – Object structure – Type Constructors – Encapsulation of Operations – Methods – Persistence – Type and Class Hierarchies – Inheritance – Complex Objects – Object Database Standards, Languages and Design: ODMG Model – ODL – OQL – Object Relational and Extended – Relational Systems: Object Relational features in SQL / Oracle.

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: explain 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.
2. Guus Schreiber, Hans Akkermans, "Knowledge Engineering and Management", MIT Press, 2005.

REFERENCES
1. Kimiz Dalkir, "Knowledge Management in Theory and Practice", Third Edition, MIT Press, 2017.
2. Clyde W. Holsapple, "Handbook on Knowledge Management: Knowledge Matters", Springer, 2013.
3. I. Becerra-Fernandez and R. Sabherwal, "Knowledge Management: Systems and Processes", M.E. Sharpe, Inc., 2010.
4. Shelda Debowski, "Knowledge Management: A Strategic Management Perspective", First Edition, Wiley, 2005.
5. S. Barnes, "Knowledge Management Systems: Theory and Practices", Cengage Learning, 2002.

15IT04E INFORMATION STORAGE AND 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 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. (K2)
CO 4: discuss cloud computing characteristics and benefits. (K2)
CO 5: summarize security and monitoring aspects of data center components. (K2)

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. (K2)
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)

    CO 2: describe the databases for bioinformatics. (K2)

    CO 3: explain the data mining tools. (K2)

    CO 4: apply various machine learning techniques for modeling the bioinformatics applications. (K3)

    CO 5: apply genomic data analysis algorithms for biomedical applications. (K3)

UNIT I   INTRODUCTION   9

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

UNIT II   DATABASES   9

Description and Organization of Sequence - Structure and Other databases-Data Warehousing and data mining in Bioinformatics.

UNIT III   TOOLS   9

Need for tools - Knowledge discovery - Industry trends and data mining tools - Data submission tools - Data analysis tools - Prediction tools and modeling tools.

UNIT IV   MACHINE LEARNING   9

Neural network - Genetic and fuzzy logic applications in Bioinformatics - Modeling for Bioinformatics – Hidden Markov – Comparative - probabilistic and molecular modeling.

UNIT V   ALGORITHMS   9

Classification algorithms - Implementing algorithms - biological algorithms - bioinformatics tasks - corresponding algorithms - bioinformatics software - Data analysis algorithms - Sequence comparison - Substitution matrices and sequence alignment optimal algorithm - Prediction algorithms - Gene prediction - Phylogenetic prediction - protein structure prediction algorithms.

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

1. Orpita Bosu and Simminder Kaur Thukral, "Bioinformatics Databases, Tools and Algorithms", First Edition, Oxford University press, New Delhi, 2007.
2. Yi – Ping Phoebe Chen, "Bioinformatics Technologies", Springer International Edition, New Delhi, 2014.

REFERENCES

1. Harshawardhan P.Bal, "Bioinformatics principles and applications", TataMcGraw Hill Publishing Company Ltd, New Delhi, 2007.
2. Kenneth Baclawski, Tianhua Niu," Bioinformatics", Jaico Publishing House, Delhi, 2007.
3. Lukas K. Beehler and Hooman H. Rashidi, "Bioinformatics basics Applications in biological science and medicine", Taylor and Francis Group, 2005.

15IT07E   **ANALYTIC COMPUTING**   **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 descriptive statistics and probability distributions. (K2)

    CO 2: describe the continuous and discrete probability distributions. (K2)

    CO 3: describe the machine learning approaches. (K2)

    CO 4: summarize the association rule mining and big data. (K2)

    CO 5: explain the clustering methods for data analysis. (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

15IT08E   **INFORMATION SECURITY**   **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 concepts of information security. (K2)

    CO 2: describe the issues and risk management in information security. (K2)

    CO 3: explain the concepts, tools used in cryptography and attacks and security in cryptosystems (K2)

    CO 4: enumerate the various technologies ued in security system (K2)

    CO 5: describe the information security roles of professionals within an organization (K2)

UNIT I   INFORMATION SECURITY & NEEDS FOR SECURITY   9

Information Security: Introduction- History of Information security - What is Security - CNSS Security Model - Components of Information System - Balancing Information Security and Access -Approaches to Information Security Implementation - The Security Systems Development Life Cycle, Threats, Attacks, Secure Software development.

**UNIT II   RISK MANAGEMENT & PROFESSIONAL ISSUES IN INFORMATION
                SECURITY   9**

Law & Ethics in Information Security-Risk Management-Risk Identification-Risk Assessment-Risk Control Strategies- Information Security Planning & Governance-Information Security Policy, Standards, and Practices – Continuity Strategies

UNIT III   CRYPTOGRAPHY   9

Foundation of Cryptology - Cipher methods – Cryptographic Algorithms – Cryptographic tools – Protocol for secure communications - Attacks on cryptosystems - Physical Security.

UNIT IV   SECURITY TECHNOLOGY   9

Introduction – Access Control – Firewall – Protecting Remote Connections- Intrusion Detection and Prevention systems – Honeypots, Honeynets and padded cell systems – Scanning and Analysis Tools – Biometric access Controls.

UNIT V   IMPLEMENTATION AND MAINTENANCE   9

Information Security Project Management – Bull's Eye Model –Security Certification and Accreditation - Credentials of Information Security Professionals – Employment Policy and Practices – Security Management Maintenance Models – Digital Forensics.

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

1. Michael E. Whitman, Herbert J. Mattord, "Principles of Information Security", Fourth Edition, CENGAGE Learning, 2012.
2. William Stallings, "Cryptography and Network Security", Fourth Edition, Pearson Education, 2011.
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 the various components in Hadoop ecosystems (K2)

CO 2: describe the concepts of data science and R programming (K2)

CO 3: apply hadoop mapReduce programming for handing Big Data (K3)

CO 4: apply machine learning algorithms with R and Hadoop for data analytics. (K3)

CO 5: describe the knowledge of social networking data analytics(K2)

UNIT I   BIG DATA AND HADOOP   9

Introduction: Big Data and its importance, Four Vs, Drivers for Big data- BigData meets hadoop - Hadoop: Meeting the Big Data Challenge - Hadoop Ecosystem - HDFS, HDFS Architecture - Hadoop Distributions

UNIT II   DATA SCIENCE AND R PROGRAMMING   9

Data Science in the Business World - Data science process – Loading data into R - Exploring data - Managing data.

UNIT III   MAPREDUCE   9

MapReduce working principles: Anatomy of a MapReduce Job run – Failure – Job scheduling – Shuffle and Sort – Task execution - Loading data into HDFS - Writing Hadoop MapReduce Programs and implementations.

UNIT IV   DATA ANALYTICS WITH R AND HADOOP   9

Data analytics project life cycle -Understanding data analytics problems: Exploring web pages categorization- Computing the frequency of stock market change - Predicting the sale price of blue book for bulldozers – BigData Analysis with machine learning : Supervised machine-learning algorithms - Unsupervised machine-learning algorithms.

UNIT V   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.

TEXT BOOKS
1. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, "Professional Hadoop Solutions", Wiley, ISBN: 9788126551071, 2015.
2. Vignesh Prajapati, "Big Data Analytics with R and Hadoop", Packet Publishing 2013

REFERENCES
1. Nina Zumel and John Mount , Practical Data Science with R, Manning Publications, 2014
2. Tom White, Hadoop: The Definitive Guide, 4th Edition, O'Reilly, 2015
3. Charu C. Aggarwal , "Social Network Data Analytics", Springer,2011.
4. Jared Dean, "Big Data, Data Mining, and Machine Learning: Value Creation for Business Leaders and Practitioners", Wiley India Private Limited, 2014.
5. Jiawei Han, MichelineKamber, Jian Pei, "Data Mining Concepts and Techniques", Morgan Kaufman Publications, 3rd Edition, 2011

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 computer forensics fundamentals, technologies and its types. (K2)

CO 2: explain the various methods of data recovery, evidence collection, and authentication related to computer forensics. (K2)

CO 3: analyze the computer forensics data with various forensics tools. (K3)

CO 4: analyze the cyber crime attacks and threats in networks and give the solutions. (K4)

CO 5: explain the digital forensic techniques for protecting data. (K2)

UNIT I   OVERVIEW OF COMPUTER FORENSICS TECHNOLOGY   9
Computer Forensics Fundamentals – Types of Computer Forensics Technology – Types of Vendor and Computer Forensics Services – The emergence of e-Cash.

UNIT II   COMPUTER FORENSICS EVIDENCE AND CAPTURE   9
Data Acquisition - Data Recovery – Evidence Collection and Data Seizure – Duplication and Prevention of Digital Evidence – Computer Image Verification and Authentication - The Complex World of Corporate Cyber Forensics Investigations – Case Study.

UNIT III   COMPUTER FORENSICS ANALYSIS   9

Discovery of Electronic Evidence – Identification of Data – Reconstructing Past Events – Processing Crime and Incident Scenes - Current Computer Forensics Tools – Case Study.

UNIT IV   NETWORK FORENSICS   9

Investigating Network Intrusions and Cyber Crime - Network Forensics and Investigating logs - Investigating network Traffic - Investigating Web attacks - Router Forensics - An IP Traceback Model for Network Forensics – Case Study.

UNIT V   DIGITAL FORENSICS AND CYBER CRIME   9

Dealing with the Problem of Cybercrime - Software Piracy Forensics - Detecting Intermediary Hosts by TCP Latency Measurements - Secure Biometric Readers for Effective Digital Forensic Investigation - Reporting Digital Evidence Items in Computer Forensic Tools - Protecting Digital Evidence Integrity by Using Smart Cards.

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS
1. John R.Vacca, "Computer Forensics: Computer Crime Scene Investigation", Firewall Media, First Edition, 2017.
2. Ibrahim Baggili, "Digital Forensics and Cyber Crime", Springer, 2010.

REFERENCES
1. Bill Nelson, Amelia Phillips, Christopher Steuart, "Guide to Computer Forensics and Investigations", Fourth Edition, Cengage Learning, 2010.
2. Marjie T.Britz, "Computer Forensics and Cyber Crime: An Introduction", Second Edition, Pearson, 2012.
3. A.J. Sammes, Brian Jenkinson, "Forensic Computing: A Practitioner's Guide", Second Edition, Springer-Verlag, 2007.
4. Eoghan Casey, "Digital Evidence and Computer Crime: Forensic Science, Computers, and the Internet", Third Edition, Elsevier, 2011.
5. Peter Stephenson, Keith Gilbert, "Investigating Computer-Related Crime", Second Edition, CRC Press, 2013.
6. Norbert Zaenglein, "Secret Software : Making The Most of Computer Resources For Data Protection, Information Recovery, Forensic Examination, Crime Investigation and More", Paladin Press, 2000.

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   design IIR filters with desired frequency responses. (K3)
   CO 4: design linear-phase FIR filters according to predefined specifications using the window and frequency sampling methods. (K3)

CO 5: analyze the process of multi-rate 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 Antisymmteric 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: describe the roles and responsibilities of the tester. (K2)
- CO 2: explain various testing strategies based on test case design. (K2)
- CO 3: summarize common characteristics of various levels of testing methodologies. (K2)
- CO 4: apply various test procedures and test planning techniques in commercial environment. (K3)
- CO 5**:** recognize the implications of various controlling and monitoring techniques. (K3)

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 Gopalaswamy 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. (K2)
   CO 2: write network programs using java. (K3)
   CO 3: develop dynamic web applications using servlets . (K3)
   CO 4: develop dynamic web applications using JSP. (K3)
   CO 5: explain the concepts of Enterprise Java Beans. (K2)

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 – configuring the connection – Reading the header – telnet application – Java Messaging services.

UNIT III   SERVLETS   9
Servlet Overview and Architecture – Interface Servlet and the Servlet Life Cycle – Handling HTTP get Requests – Handling HTTP post Requests – Redirecting Requests to Other Resources – Session Tracking – Cookies – Session Tracking with HttpSession.

UNIT IV   JAVA SERVER PAGES (JSP)   9
Introduction – Java Server Pages Overview – A First JavaServer Page Example – Implicit Objects – Scripting – Standard Actions – Directives – Custom Tag Libraries – Structs.

UNIT V   ENTERPRISE JAVA BEANS   9
Introduction to J2EE – EJB Architecture –– Session Beans – Entity Beans.

L: 45 TOTAL: 45 PERIODS

TEXT BOOKS

1. Paul Deitel, Harvey Deitel, "Java How to program", Eighth Edition, PHI, 2010.
2. H. M.Deitel, P. J. Deitel, S. E. Santry ,"Advanced Java 2 Platform How To Program", Prentice Hall, 2002.

REFERENCES

1. Jeffrey C. Jackson, "Web Technologies: A Computer Science Perspective", Pearson, 2007.
2. Ed Roman, "Mastering Enterprise JavaBeans and the Java 2 Platform", Enterprise Edition, Wiley, 2004.
3. Herbert Schildt, "Java The Complete Reference", 9th Edition, Tata McGraw Hill Publishing Company Limited, 2014.
4. Hortsmann and Cornell, "Core Java 2 Advanced Features", Vol II, Pearson Education, 2002.
5. Brian Cole, Robert Eckstein, James Elliott, Marc Loy, David Wood , "Java™ Swing", 2nd Edition, O'Reilly, 2002.

WEB REFERENCES

1. https://www.tutorialspoint.com/servlets/
2. https://docs.oracle.com/javaee/6/tutorial/doc/bnafd.html
3. http://www.ejbtutorial.com/
.

15IT14E	SOFTWARE QUALITY ASSURANCE	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 various software engineering design models and its process. (K2)

CO 2: explain the parameters which are associated with the software project development. (K2)

CO 3: describe different models for software quality management. (K2)

CO 4: analyze the various software testing functionalities under different conditions. (K4)

CO 5: explain the software quality assurance measurements. (K2)

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 matrics – 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

　　CO 1: explain new models for market strategic interaction. (K2)
　　CO 2: summarize the various protocols for Internet of Things. (K2)
　　CO 3: describe business intelligence and information security for web of things. (K2)
　　CO 4: explain the integrated solution of network dynamics. (K2)
　　CO 5: recognize the application of Internet of Things. (K2)

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.

REFERENCES
1. Dieter Uckelmann, Mark Harrison, Florian Michahelles, "Architecting the Internet of Things", Springer, 2011.
2. David Easley and Jon Kleinberg, "Networks, Crowds, and Markets: Reasoning About a Highly Connected World", Cambridge University Press, 2010 .
3. Olivier Hersent, Omar Elloumi and David Boswarthick, "The Internet of Things: Applications to the Smart Grid and Building Automation", Wiley, 2012.
4. Olivier Hersent, David Boswarthick, Omar Elloumi, "The Internet of Things – Key applications and Protocols", Wiley, 2012.

15IT16E	NATURAL LANGUAGE PROCESSING	L T P C
		3 0 0 3

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

CO 1: explain natural language processing and apply its basic algorithms. (K2)

CO 2: describe the concepts of information retrieval. (K2)

CO 3: apply NLP in text processing(K3)
CO 4: describe the multi-lingual speech processing and coding. (K2)
CO 5: design an application that uses different aspects of language processing. (K3)

UNIT I   INTRODUCTION   9
Natural Language Processing – Linguistic Background - Spoken language input and output Technologies – Written language Input - Mathematical Methods – Statistical Modeling and Classification Finite State methods Grammar for Natural Language Processing – Parsing – Semantic and Logic Form – Ambiguity Resolution – Semantic Interpretation.

UNIT II   INFORMATION RETRIEVAL   9
Information Retrieval architecture - Indexing- Storage – Compression Techniques – Retrieval Approaches – Evaluation - Search engines- commercial search engine features- comparison - performance measures – Document Processing - NLP based Information Retrieval – Information Extraction.

UNIT III   TEXT MINING   9
Categorization – Extraction based Categorization- Clustering- Hierarchical Clustering - Document Classification and routing- finding and organizing answers from Text search – use of categories and clusters for organizing retrieval results – Text Categorization and efficient Summarization using Lexical Chains – Pattern Extraction.

UNIT IV   GENERIC ISSUES   9
Multilinguality – Multilingual Information Retrieval and Speech processing – Multimodality – Text and Images – Modality Integration - Transmission 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: explain LINUX commands for file processing and process control. (K2)

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 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

CO 1: summarize the network management architectures and protocols. (K**2)**

CO 2: explain the importance of network management and how it impacts cost, revenue and network availability. (K2)

CO 3: describe the different phases in the network management functional models. (K2)

CO 4: analyze the network management primitives and protocol message structures. (K3)

CO 5: 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.
4. Daw Sudira, "Network Management", Sonali Publications, 2004.

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: explain 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: summarize 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 Ba ̧Sar, Are Hjo Rungnes, "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.

15IT20E   HIGH PERFORMANCE NETWORKS   L T P C
3 0 0 3

COURSE OUTCOMES

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

    CO 1: explain switching networks. (K2)

    CO 2: describe high performance network protocols for multimedia networks. (K2)

    CO 3: describe advanced concepts in high performance network. (K2)

    CO 4: analyze performance of network related issues using mathematical models. (K3)

    CO 5: illustrate the network security mechanisms and management. (K2)

UNIT I   SWITCHING NETWORKS   9

Switching - Packet switching, Circuit Switched – ATM- Internetworking with ATM.

UNIT II   MULTIMEDIA NETWORKING APPLICATIONS   9

Streaming stored Audio and Video, Best effort service, protocols for real time interactive applications, scheduling and policing mechanism, QoS, integrated services, RSVP- differentiated services.

UNIT III   ADVANCED NETWORKS CONCEPTS   9

VPN- Security in VPN - MPLS- overlay networks - P2P connections.-IPv4 vs. V6.

UNIT IV   PACKET QUEUES AND DELAY ANALYSIS   9

Little's theorem, Birth and Death process, queueing discipline- Control & stability - Pollaczek-Khinchin formula and M/G/1, M/D/1, self-similar models and Batch-arrival model, Networks of Queues – Burke's theorem and Jackson Theorem.

UNIT V   NETWORK SECURITY AND MANAGEMENT   9

Principles of cryptography – fire walls – attacks and counter measures – security in network layers – The internet standard management framework- Security and administration – ASN.1.

L: 45 TOTAL: 45 PERIODS

TEXT BOOK

1. Aunurag Kumar, D. Manjunath, Joy Kuri, "Communication Networking- An Analytical Approach", Morgan Kaufmann, 2011.

REFERENCES

1. Fred Halsall and Lingana Gouda Kulkarni, "Computer Networking and the Internet", Fifth Edition,Pearson Education, 2012.
2. Walrand .J. Varatya, "High Performance Communication Network", Morgan Kaufmann – HarcourtAsia Pvt. Ltd., Second Edition, 2010.
3. J.F. Kurose & K.W. Ross, "Computer Networking- A Top Down Approach", Pearson, Fifth Edition, 2012.
4. Nader F.Mir, "Computer and Communication Networks", Pearson Education, 2009.
5. Hersent Gurle & petit, "IP Telephony, Packet based Multimedia Communication Systems", Pearson Education 2003.

15IT21E	SOCIAL NETWORKING	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 social networks and data. (K2)

CO 2: describe the structural and locational properties. (K2)

CO 3: describe the various privacy and security concerns on social networks based on web analysis. (K2)

CO 4: outline the market and strategic interaction in networks. (K2)

CO 5: illustrate the performance of network effects. (K3)

UNIT I   INTRODUCTION TO SOCIAL NETWORK   9

Introduction: Motivation - Different Sources of Network Data - Types of Networks - Tools for Visualizing Network Data - Review of Graph Theory Basics.

UNIT II   STRUCTURAL AND LOCATIONAL PROPERTIES   9

Structural Properties of Networks - Notions of Centrality - Cohesiveness of Subgroups - Roles and Positions - Structural Equivalence - Representation of Network Positions - Block Models.

UNIT III   SOCIAL NETWORK ANALYSIS   9

Introduction to Web - Limitations of current Web – Development of Semantic Web – Emergence of the Social Web - Network analysis - Development of Social Network Analysis - Key concepts and measures in network analysis - Electronic sources for network analysis - Electronic discussion networks, Blogs and online communities, Web-based networks - Applications of Social Network Analysis.

UNIT IV   MARKET AND STRATEGIC INTERACTION IN NETWORK   9

Matching Market: Bipartite Graphs and Perfect Matching - Prices and Market - Clearing Property - Network Models of Markets with Intermediaries - Price Setting in Market - Social Welfare - Trader Profit. Bargaining and Power in Network - Power in Social Network - Results of Network Exchange Experts - Modeling with Network Exchange - Stable outcomes - Modeling with Network Exchange - Balanced outcomes.

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.
2. Borko Furht, "Handbook of Social Network Technologies and Applications", 1ˢᵗ Edition, Springer, 2010.

REFERENCE

1. Stanley Wasserman, Katherine Faust, "Social Network Analysis: Methods and Applications", Second Edition, Cambridge University Press, 1999.
2. Gavin Bell, "Building Social Web Applications", First Edition, O'Reilly Media, 2009.
3. John G. Breslin, Alexander Passant and Stefan Decker, "The Social Semantic Web", Springer, 2009.

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. (K2)

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. (K2)

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: Outline the underlying architecture of E-commerce applications. (K2)
    CO 2: explain the infrastructure and services required for m-commerce. (K2)

CO 3: identify the critical building blocks of M-commerce and different types of prevailing business models. (K3)

CO 4: illustrate the theory and applications of M-commerce in mobile business. (K2)

CO 5: summarize the usage of M-commerce in business domain. (K2)

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.
2. Paul May, "Mobil Commerce: Opportunities, Applications, and Technologies of Wireless Business", Cambridge University Press, 2001.
3. P.Candace Deans, "E-Commerce and M-Commerce Technologies", Idea Group Inc (IGI), 2004.

15IT24E	DIGITAL 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 concepts of digital communication systems. (K2)

CO 2: calculate signal to quantization noise ratio for various modulation techniques. (K3)

CO 3: design an encoder and decoder for error control. (K3)

CO 4: explain base band reception techniques. (K2)

CO 5: estimate the performance of coherent detection systems. (K3)

UNIT I   INFORMATION THEORY AND INTRODUCTION TO DIGITAL COMMUNICATION SYSTEM   9

Measure of information – Entropy – Source coding theorem – Discrete memory less channels, Mutual information, Channel capacity, Shannon-Fanocoding, Digital communication Systems – Functional description, Channel classification, Bandwidth.

UNIT II   BASEBAND FORMATTING TECHNIQUES   9

Quantization – Uniform and Non-uniform; Encoding Techniques – Temporal waveform encoding -PCM, Bandwidth of PCM system, Noise in a PCM system, SNR of PCM system with quantization noise, Adaptive PCM, DPCM.

UNIT III   CHANNEL CODING TECHNIQUES AND LINE CODES   9

Error Control Codes - Block Codes, Convolutional Codes, Concept of Error Free communication;Classification of line codes, desirable characteristics and power spectra of line codes.

UNIT IV   BASEBAND RECEPTION TECHNIQUES   9

Geometric representation of Signals, Gram Schmidt Orthogonalization Procedure, Noise in Communication Systems; Receiving Filter – Correlator type, Matched Filter type; Equalizing Filter -Signal and system design for ISI elimination, Implementation, Eye Pattern analysis.

UNIT V   BANDPASS SIGNAL TRANSMISSION AND RECEPTION   9

Memory-less modulation methods - Representation and Spectral characteristics, Binary ASK, Binary PSK, Binary FSK, QAM, QPSK; Band 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. Purrsley, "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
  CO 1: set up multi-node Hadoop Clusters and integrated infrastructure of R and Hadoop. (K2)
  CO 2: apply machine learning algorithms for BigData Analytics using R and Hadoop. (K3)

List of Experiments
- Installation of Apache Hadoop and MapReduce.
- Installation of clustered Hadoop and MapReduce.
- Develop MapReduce programs.
- Classification using SVM.
- Implement data mining clustering algorithms.
- Big Data processing with Hive.
- Query Processing using Hive and Beeswax.
- Data Visualization.
- Mini Project.

Software:
- R and Hadoop Integrated Programming Environment (RHIPE)

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: identify test cases for C programs. (K2)

CO 2: generate test cases for software requirements using various test processes. (K4)

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

CO 1: implement swing and network programming in java. (K3)

CO 2: develop web application using servlet, JSP, struct and EJB. (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 using usebean directive.
2. Write JSP program to implement employee salary calculation.

5. Programs on Struct
1. Write a Java program to implement datetimepicker using struct.
2. Write a 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

CO 1: design the suitable UML diagram for a given problem and develop the User Interface Design. (K3)

CO 2: develop a mini project using programming languages. (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. Identity 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

**15IT29E   ACCOUNTING FOR INFORMATION TECHNOLOGY   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 financial accounting. (K2)
   CO 2: apply the accounting principles to prepare of final account for sole trader business. (K3)
   CO 3: apply the accounting principles to prepare of final account for partnership firm. (K3)
   CO 4: describe the company formation procedure with accounting entries. (K2)
   CO 5: demonstrate integration of manual accounting procedures into computerized accounting environment. (K3)

UNIT I   INTRODUCTION TO ACCOUNTING   9
Fundamentals of Book Keeping – Accounting Concepts and Conventions – Indian Accounting Standards - Journal – Ledger – Trial balance – Simple problems.

UNIT II   PREPARATION OF FINANCIAL STATEMENT   9
Meaning and features of sole trader form of business organization – Preparation of final accounts with adjustments - Simple problems.

UNIT III   PREPARATION OF PARTNERSHIP ACCOUNTS   9

Meaning and features of partnership – Partnership deed – Kinds of partners - Admission of a Partner - Retirement of the Partner - Death of a partner – Preparation of final accounts - Simple problems.

UNIT IV   PREPARATION OF COMPANY ACCOUNTS   9

Meaning and characteristics of a company – Private limited Vs Public limited companies - Formation of companies – Issue of shares – Journal entries - Simple problems.

UNIT V   INTRODUCTION TO ACCOUNTING PACKAGES   9

Computerised Accounting: Meaning – Advantages – Manual Accounting Vs Computerised Accounting – Popular Accounting Packages in India – Tally ERP.9 - Features of 'Tally.ERP 9' – Components of the Tally.ERP 9.

L: 45; TOTAL: 45 PERIODS

TEXT BOOKS

1. T.S.Grewal – Introduction to Accountancy- S.Chand & Company Ltd., Revised edition, 2016
2. Financial Accounting, Jain S.P., Narang K.L., Kalyani Publishers, 2nd edition, 2014.
3. Accounting and Financial Management, E.Gnanasekaran, A.R.S. publications, 3rd edition, 2012
4. Ashok K. Nadhani : Mastering Tally. ERP 9 – Basic Accounts, Invoice, Inventory

REFERENCES

1. Fundamental Accounting Principles, John J Wild, Ken Shaw and Barbara Chiappetta, Tata McGraw Hill, 23rd Edition, 2016
2. Financial Accounting, S.N. Maheshwari, S.K. Maheshwari & Sharad K. Maheswari Vikas Publishing House, 5th edition, 2013.
3. Kogent Learning Solutions Inc.: Tally. ERP 9 in Simple Steps

15IT30E   FINANCIAL ACCOUNTING PACKAGE 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 integration of manual accounting procedures into the computerized accounting environment. (K2)

CO2: apply the Tally.ERP 9 for preparing final accounts and evaluate the performance. (K3)

LIST OF EXPERIMENTS

1. Creation, alteration and deletion of primary and secondary accounting groups.
2. Journal Entries

3. Final A/Cs with adjustments (Creation and deletion of ledgers)
4. Voucher entry problems in double entry mode
5. Voucher entry problem in single entry mode.
6. Budget preparation and reporting variance
7. Payroll preparation
8. Accounting vouchers using stock items
9. Order processing and inventory vouchers
10. Generation of accounting books and reports
11. Generation of inventory books and reports.

P: 30 TOTAL: 30 PERIODS

B.Tech. – INFORMATION TECHNOLOGY
ONE CREDIT ELECTIVE COURSES

15IT01L   **AGILE DEVELOPMENT PROCESS**   **L T P C**
                                                                 1 0 0 1

COURSE OUTCOMES
Upon Completion of this course, the students will be able to
   CO1: describe the fundamental principles and practices associated with agile
         development methods. (K2)

LIST OF CONTENTS
   1. Agile Methodology
   2. Agile Models in Software Development & Testing
   3. SCRUM Process Framework
   4. KANBAN Process Framework
   5. Software Development using SCRUM
   6. Software Testing using KANBAN

                                        L: 15 TOTAL: 15 PERIODS

REFERENCES
   1. Robert C.Martin, "Agile Software Development, Principles, Patterns, and
      Practices",   Pearson New International publication, First Edition, 2013.
   2. Ken Schwaber, Mike Beedle,"Agile Software Development with Scrum", First
      Edition, Van Haren Publishing, 2001.

15IT02L   **DATA ANALYTICS**   **L T P C**
                                                                 0 0 2 1

COURSE OUTCOMES
Upon Completion of this course, the students will be able to
   CO1: Design, implement, populate and query relational databases for operational and
         informational data. (K3)

LIST OF EXPERIMENTS
   1. Fundamentals of Analytics
   2. Typical Analytics Application Structure
   3. Microsoft Analytics Solution (OLAP) Model
   4. Creating Database using Microsoft SQL Server
   5. Creating DataMart using Microsoft SQL Server
   6. Creating Employee Analytics (OLAP) using Microsoft Analytics Server
   7. Understanding Dimensions and Measures in Microsoft Analytics
   8. Understanding MDX Queries
   9. Samples of Analytical Reporting

                                        L: 30 TOTAL: 30 PERIODS

REFERENCES
1. Buck Woody, Danielle Dean, Debraj GuhaThakurta, Gagan Bansal, Matt Conners, Wee-Hyong Tok," Data Science with Microsoft SQL Server 2016",Microsoft publisher, 2016.
2. Stacia Varga, Denny Cherry, and Joseph D'Antoni," Introducing Microsoft SQL Server 2016: Mission-Critical Applications, Deeper Insights, Hyperscale Cloud, Microsoft publisher,2016.

| 15IT03L | HTML5 and CSS3 MOBILE PROGRAMMING | L T P C |
| | | 0 0 2 1 |

COURSE OUTCOMES

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

CO1**:** develop client side intensive mobile applications using HTML5 family technologies. (K3)

LIST OF EXPERIMENTS
1. Fundamentals of Mobile Programming.
2. Introduction to HTML5.
3. Introduction to CSS3.
4. Typical Mobile App Model using HTML5 and CSS3.
5. Creating a Mobile App using HTML5 and CSS3.
6. Deployment of Mobile App on Android and IOS platforms.

P: 30 TOTAL: 30 PERIODS

REFERENCES
1. Oswald Campesato, "jQuery, CSS3, and HTML5 for Mobile and Desktop Devices: A Primer", Mercury Learning and Information, 2014.
2. Jake Carter," HTML5 Mobile Web Development", O'Reilly Media publisher, 2010.

| 15IT04L | WEB SERVICES FOR MOBILE PROGRAMMING | L T P C |
| | | 0 0 2 1 |

COURSE OUTCOMES

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

CO 1: apply the core standards related to programming of Web services for Mobile environments. (K3)

LIST OF EXPERIMENTS
1. Introduction to Web services Concept
2. Create a Web service using ASP.NET C#
3. Testing Web service
4. Deploying Web service

5. Role of Web service in Mobile App
6. Calling Web service from Mobile App
7. Penetration Testing

P:30 TOTAL: 30 PERIODS

REFERENCES
1. DT Editorial Services,"Mobile Application Development Black Book", Dreamtech Press, 2015.
2. https://www.cs.cmu.edu/~bam/uicourse/830spring09/BFeiginMobileApplicationDevelopment

15IT05L	**E-LEARNING PLATFORM**	L T P C
		0 0 2 1

COURSE OUTCOMES

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

CO1: develop E-learning applications comprising of all latest innovative education methodologies and assessment techniques.(K3)

LIST OF EXPERIMENTS
1. Introduction to E-Learning
2. Typical E-Learning Application Model
3. E-Learning Content Creation & Management
4. E-Learning Content Delivery
5. E-Learning Courses Management
6. E-Learning Participants Management
7. E-Learning Assessments

P: 30 TOTAL: 30 PERIODS

REFERENCES
1. https://www.talentlms.com/elearning/elearning-101-jan2014-v1.1.pdf.
2. www.efrontlearning.net .
3. www.talentlms.com.

15IT06L	**COMPUTER HARDWARE AND TROUBLE SHOOTING**	L T P C
		0 0 2 1

COURSE OUTCOMES

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

CO 1: explain the working principles of components required for system assembly, data transfer and networking. (K2)

CO 2: perform software installation, data recovery and troubleshooting techniques. (K3)

LIST OF EXPERIMENTS

1. **PC Hardware Overview**

   Basic Parts of PC, System board, Microprocessor, Interrupts, DMA, SMPS, BIOS, POST sequence, System configuration, Memory, Mass storage, I/O interface standards.

2. **Bus Standards and Networking**

   ISA, PCI, SCSI, IDE, USB, Network Interface Cards, Cables and connectors, MODEM

3. **Installation and Preventive Maintenance**

   System Configuration, Installation Practice, PC Assembling and Integration, Virus, data Recovery

4. **Troubleshooting & Tools**

   Troubleshooting problems of system boards, add on cards and peripherals.

P:30 TOTAL: 30 PERIODS

REFERENCES

1. Michael Meyers,"Introduction to PC Hardware and Troubleshooting", McGraw Hill Publisher, First Edition,2003.
2. Kyle McRae, Gary Marshall," Computer Troubleshooting: The Complete Step-by-step Guide to Diagnosing and Fixing Common PC Problems", Second Edition, 2008.
3. Govindarajalu.B, "IBM PC AND CLONES: Hardware, Troubleshooting and Maintenance", Tata McGraw-Hill, 2011.

15IT07L	**PHP PROGRAMMING**	**L T P C**
		0 0 2 1

COURSE OUTCOMES

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

CO1: develop PHP programs to build interactive, data-driven sites with Database connectivity. (K3)

LIST OF EXPERIMENTS

1. History
2. Web Brower
3. Web - Server, Xampp
4. Installation and Configuration files
5. Variable Types
6. Constants
7. Function
8. Arrays

9. Date & Time, Image Uploading
10. WEB FEATURES: Sessions,Forms,GET and POST data, Cookies,HTTP Headers
11. Database Programming
12. AJAX
13. Error handling in PHP
14. File handling in PHP

P: 30 TOTAL: 30 PERIODS

REFERENCES
1. W.J.Gilmore "A Programmer's Introduction to PHP4.0", Apress, 2001.
2. W.Jason Gilmore," Beginning PHP and MySQL", Fifth Edition, Apress, 2014.

15IT08L	PROGRAMMING IN PYTHON	L T P C
		0 0 2 1

COURSE OUTCOMES
Upon Completion of this course, the students will be able to
 CO1: demonstrate the common programming idioms: variables, loop, branch, subroutine, and input/output. (K2)
 CO2: develop programs to solve real-world problem using the language idioms, data structures and standard library. (K3)

LIST OF EXPERIMENTS
1. Python object types-Numeric types-Strings
2. Lists-dictionaries-files-tuples
3. Functions and generators
4. Statements, expressions, variables
5. Functions, logic, conditionals
6. DB Connectivity, Event-driven programming, local/global variable
7. Lists, keyboard input, the basics of modeling motion

P: 30 TOTAL: 30 PERIODS

REFERENCES
1. Mark lutz, "Learning Python", Fifth Edition, O'Reilly, 2013.
2. Steven F. Lott, "Building Skills in Object-Oriented Design",Steven F. Lott publisher, 2009.
3. Steven F. Lott, "Building Skills in Python", 2010.

15IT09L	THEORY OF COMPUTATION	L T P C
		1 0 0 1

COURSE OUTCOMES
Upon Completion of this course, the students will be able to
 CO 1: explain the basics of finite automata and construct the equivalence of languages described by PDA and CFG. (K3)
 CO 2: describe the working principles of Turing machine. (K2)

LIST OF CONTENTS

1. **Regular Expressions and Finite Automata**
   Regular Expression - FA and Regular Expressions - Finite Automata (FA) - Deterministic Finite Automata (DFA) - Non-deterministic Finite Automata (NFA) - Finite Automata with Epsilon transitions.

2. **Context free Languages and push down automata**
   Context-Free Grammar (CFG) - Parse Trees - Definition of the Pushdown automata - Languages of a Pushdown Automata - Equivalence of Pushdown automata and CFG - Deterministic Pushdown Automata - Normal forms for CFG - Pumping Lemma for CFL

3. **Turing machines and undecidability**
   Turing Machines - Programming Techniques for TM - Un-decidable problems about Turing Machine

L: 15 TOTAL: 15 PERIODS

REFERENCES

1. J.E. Hopcroft, R. Motwani and J.D. Ullman, "Introduction to Automata Theory, Languages and Computations", Third Edition, Pearson Education, 2007.
2. Anil Maheshwari, Michiel Smid,"Introduction to Theory of Computation"E-book,2016.

15IT10L   **BASICS OF COMPILER DESIGN**   **L T P C**
                                                            1 0 0 1

COURSE OUTCOMES

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

   CO 1: describe the functions of lexical analyzer and design various types of parser for language specification. (K3)
   CO 2: apply various types of intermediate code generation for various constructs. (K3)

LIST OF CONTENTS

1. **Lexical Analysis**
   Representation of tokens and regular expression - Token reorganization and finite state automata

2. **Syntax Analysis**
   Parser and its types - Top-down parser - Bottom-up parser

3. **Intermediate code generation**
   Intermediate code generation- Need for Intermediate code - Types of Intermediate code - Representation of all language constructs by three-address code - Grammar symbols and attributes - Semantic routines for intermediate code generation - Directed Acyclic Graph

L: 15 TOTAL: 15 PERIODS

REFERENCES

1. K.Muneeswaran, "Compiler Design", Oxford University Press, 2013.

2. Alfred Aho, Monica S.Lam, Ravi Sethi and Jeffrey D.Ullman, "Compiler Principles, Techniques and Tools", 3rd Edition, Addison Wesley, 2006.

15IT11L	VIRTUALIZATION	L T P C
		1 0 0 1

COURSE OUTCOMES

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

CO 1: describe the fundamental concepts of server and client virtualization. (K2)

CO 2: develop an application by utilizing cloud platforms such as Google app Engine and Amazon Web Services. (K3)

LIST OF CONTENTS

1. **Introduction to Cloud Computing**

   Cloud Computing in a Nutshell, Roots of Cloud Computing, Layers and Types of Cloud,

   Features of a cloud, Infrastructure-as-a-Service, Software-as-a-Service, Platform-as-a-Service, Google App Engine, Microsoft Azure;, Amazon EC2; Challenges and Risks.

2. **Cloud Technologies Hypervisor**

   Introduction, Types of Hypervisor. Virtualization Technology: Virtual machine Technology, virtualization applications in enterprises.

3. **Network storage**

   Network Attached Storage (NAS), Storage Area Network (SAN), Network Virtualization,

   Server Virtualization, Pitfalls of virtualization.

                                                    L: 15 TOTAL: 15 PERIODS

REFERENCES

1. Rajkumar Buyya, James Broberg , Andrzej M. Goscinski, "Cloud Computing: Principles and Paradigms", John Wiley & Sons, First Edition, 2011.
2. Mitch Tulloch with Nigel Cain, Alvin Morales, Michel Luescher, Damian Flynn , "Microsoft System Center: Building a Virtualized Network Solution", Microsoft Press, 1st edition, 2014.

15IT12L	PROGRAMMING IN RUBY	L T P C
		0 0 2 1

COURSE OUTCOMES

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

CO 1: apply Ruby programming to solve problems. (K3)

LIST OF EXPERIMENTS
1. Classes,objects and Variables
2. Expressions,Exceptions,I/O
3. Containers,Blocks and iterators
4. Threading
5. Ruby and web
6. Networking
7. Meta programming- Basics

P: 30 TOTAL: 30 PERIODS

REFERENCES
1. Dave Thomas, Chad Fowler and Andy Hun, "Programming Ruby 1.9 (The Pragmatic Programmers' Guide)",3rd edition, The Pragmatic Bookshelf,North Carolina Dallas, Texas, 2009.
2. Dave Thomas, "The Ruby ObjectModel and Meta programming", The Pragmatic Bookshelf,North Carolina Dallas, Texas, 2009.

15IT13L   **SOCIAL MEDIA APPLICATION DEVELOPMENT**   **L T P C**
                                                            1 0 0 1

COURSE OUTCOMES
Upon Completion of this course, the students will be able to
   CO1: explain various concepts in developing Social Media Applications. (K2)

LIST OF CONTENTS
1. Overview of Graph theory
2. Strong and Weak Ties
3. Positive and Negative Relationships
4. Evolutionary Game Theory
5. Modeling Network Traffic using Game Theory
6. Auctions
7. Markets and Strategic Interaction in Networks
8. Bargaining and Power in Networks
9. Information Cascades
10. Power Laws
11. Cascading Behavior in Networks

L: 15 TOTAL: 15 PERIODS

REFERENCES
1. Easley D. Kleinberg J., "Networks, Crowds, and Markets – Reasoning about a Highly Connected World", Cambridge University Press,2010.
2. Jackson, Matthew O., "Social and Economic Networks", Princeton University Press, 2008.

15IT14L	iOS DEVELOPMENT USING SWIFT 2.0	L T P C
		0 0 2 1

COURSE OUTCOMES

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

CO 1: describe key programming terms relevant to Swift and iOS programming. (K2)

CO 2: develop mobile apps using networking and tvOS.(K3)

LIST OF EXPERIMENTS

1. **Swift**

    Introduction- Control- Function and closure-Class and structure

2. **iOS**

    User Interactivity - Multiple View Controllers & Navigation -webservice

3. **Persistence & Networking**

    Introduction to Developing for tvOS –Location- Locomotion and Motion

P: 30 TOTAL: 30 PERIODS

REFERENCES

1. Vandad Nahavandipoor, "iOS 8 Swift Programming Cookbook Solutions & Examples for iOS Apps", O'Reilly Media, 2014.
2. Boisy G. Pitre, "Swift for Beginners: Design and Development", PEACHPIT PRESS, 2013.
3. Christian Keur and Aaron Hillegass, "IOS Programming: The Big Nerd Ranch Guide -Big Nerd Ranch Guides", 4th Edition, 2011.

15IT15L	E-COMMERCE SECURITY	L T P C
		1 0 0 1

COURSE OUTCOMES

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

CO 1: explain wide range of security issues in online forums and services. (K2)

CO 2: illustrate various E-commerce security techniques. (K2)

LIST OF CONTENTS

1. Online Security Issues - Overview
2. Security for Client Computers
3. Communication Channel Security
4. Security for Server Computers
5. Organizations that provide Computer Security
6. Payment Systems for Electronic Commerce
7. Online Payment Basics
8. Digital Wallets
9. Internet Technologies and the Banking Industry
10. Criminal Activity and payment systems: Phishing and Identity Theft

L: 15 TOTAL: 15 PERIODS

REFERENCES
1. Gray P. Schneider, "Electronic Commerce", Course Technology, Cengage Learning, USA, 10th Edition, 2012.
2. Anup K. Ghosh,"E-Commerce Security and Privacy (Advances in Information Security)", Springer, 2001.

15IT16L	**COMPUTER ANIMATION**	**L T P C**
		0 0 2 1

COURSE OUTCOMES
Upon Completion of this course, the students will be able to
CO 1: develop 2D & 3D computer animation.(K3)
CO 2: demonstrate the use of animation, digitized sound, video control, and scanned images (K2)

LIST OF EXPERIMENTS
1. Introduction & Learning perspective drawing - Drawing for Animation: Gesture Drawing, Action Drawing, Line of action
2. 2D, 3D Design concepts & Composition.
3. Principles of Animation.
4. Process film making & Editing Tools (Adobe After Effect CS6 ,Cyber link power director)
5. Editing & Animatics.
6. Input Sound - Sound Effects – Sound Recording.

P: 30 TOTAL: 30 PERIODS

REFERENCES
1. Andy Chong, "Basics Animation: Digital Animation", Ava Publishing, Vol: 2, 2007.
2. Rick Parent," Computer Animation", Morgan Kaufmann publisher, 2012.

15IT17L	**HADOOP ARCHITECTURE AND INSTALLATION**	**L T P C**
		0 0 2 1

COURSE OUTCOMES
Upon Completion of this course, the students will be able to
CO 1: install and build a Hadoop cluster capable of processing large data. (K3)
CO 2: implement Map/Reduce concepts for parallel programming using Java. (K3)

LIST OF EXPERIMENTS
1. Hadoop Architecture
2. Installing Ubuntu with Java 1.8 on VM Workstation 11
3. Hadoop Versioning and Configuration
4. Single Node Hadoop 1.2.1 installation on Ubuntu 14.4.1
5. Multi Node Hadoop 1.2.1 installation on Ubuntu 14.4.1

6. Linux commands and Hadoop commands1.8. Cluster architecture and block placement
7. Pseudo Distributed Mode
8. Fully Distributed Mode
9. Master Daemons(Name Node, Secondary Name Node, Job Tracker)
10. Slave Daemons(Job tracker, Task tracker)
11. Task Instance
12. Hadoop HDFS Commands
13. Accessing HDFS
14. CLI Approach
15. Implementation of Map/Reduce using Java

P:30 TOTAL: 30 PERIODS

REFERENCES
1. https://www.tutorialspoint.com/hadoop/hadoop_tutorial.pdf.
2. Tom White,"Hadoop: The Definitive Guide, Storage and Analysis at Internet Scale",O'Reilly Media / Yahoo Press, Third Edition, 2012.

15IT18L	MICROCONTROLLER AND RASPBERRY PI	L T P C
		1 0 0 1

COURSE OUTCOMES
Upon Completion of this course, the students will be able to
CO1: describe the architecture and applications of microcontroller.(K2)
CO2: describe the functionality of raspberry Pi and its interfacing (K2)

LIST OF CONTENTS
1. Introduction to microcontroller- Architecture of 8051 Microcontroller.
2. Instruction sets and Addressing modes.
3. Signals and I/O ports, Timers and interrupt.
4. Interfacing -keyboard, LCD, ADC & DA. Applications- Stepper motor- Power plant control, Traffic light controller
5. Raspberry Pi
6. HDMI output
7. Connection with VGA, VIM text editor
8. Switch relay ,Servo Control ,GUI interface
9. Simple Arduino application

L: 15 TOTAL: 15 PERIODS

REFERENCES
1. Kenneth J.Ayala, "The 8051 microcontroller Architecture, Programming and applications" Third Edition, Minneapolis West Pub, 2005.
2. Eben Upton, Gareth Halfacree, "Raspberry Pi User Guide" ,Third Edition ,Wiley, 2014.

15IT19L   **PROGRAMMING IN IOT**   **L T P C**
                                                                      0 0 2 1

COURSE OUTCOMES

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

   CO 1: describe the fundamentals of IOT and networking (K2).

   CO 2: apply programming in IOT devices (K3).

LIST OF EXPERIMENTS

1. Introduction to IOT: Sensing, Actuation
2. Basics of IOT Networking: Communication Protocols, Sensor Networks, Machine-to-Machine Communications
3. Interoperability in IOT: Introduction to Arduino Programming, Integration of Sensors and Actuators
4. Introduction to Raspberry Pi

P: 30 TOTAL: 30 PERIODS

REFERENCES

1. Pethuru Raj and Anupama C. Raman, "The Internet of Things: Enabling echnologies, Platforms, and Use Cases", CRC Press, 2017
2. Arshdeep Bahga and Vijay Madisetti, "Internet of Things: A Hands-on Approach", Universities Press, 2015.

15IT20L   **GAMIFICATION**   **L T P C**
                                                               1 0 0 1

COURSE OUTCOMES

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

  CO 1: describe the Gaming fundamentals and its mechanics (K2).

LIST OF CONTENTS

- **Foundations:** The Fun Quotient, The Evolution of Loyalty, Status at the Wheel, The House Always Wins.
- **Player Motivation**: Powerful Human Motivators, Why People Play, Player Types, Social Games, Intrinsic versus Extrinsic Motivation, Progression to Mastery, Motivational Moment.
- **Game Mechanics**: **Designing for Engagement**: MDA Framework, Game Mechanics, Points, Levels, Leader boards, Badges, On boarding, Challenges and Quests, Social Engagement Loops , Contents Customization ,Gaming the System ,Agile and Gamification Design ,Empty Bar Problem, Foursquare, Case Study.

L: 15 TOTAL: 15 PERIODS

REFERENCES

1. Gabe Zichermann, "Gamification by Design", O'Reilly Publisher, 2011.
2. Gabe Zichermann, Christopher Cunningham, "Gamification by Design: Implementing Game Mechanics in Web and Mobile Apps", O'Reilly Publisher, 2016.

15IT21L	WEARABLE COMPUTING	L T P C
		1 0 0 1

COURSE OUTCOMES
Upon Completion of this course, the students will be able to
CO 1: describe the concepts of wearable computing and its technologies (K2).

LIST OF CONTENTS
- **INTRODUCTION:** Wearable Computers and Augmented Reality: Musings and Future Directions, Wearable Computing: Meeting the Challenge, Intimacy and Extimacy: Ethics, Power, and Potential of Wearable Technologies
- **TECHNOLOGY**: Head-Mounted Display Technologies for Augmented Reality, Optics for Smart, Smart Eyewear, Augmented Reality, and Virtual Reality Headsets, Visual Tracking for Augmented Reality in Natural Environments.

L: 15 TOTAL: 15 PERIODS

REFERENCES
1. Woodrow Barfield, "Fundamentals of Wearable Computers and Augmented Reality", Second Edition, CRC Press, 2016.
2. Dieter Schmalstieg, Tobias Hollerer, "Augmented Reality: Principles and Practice (Usability)", First Edition, Pearson Education, 2016.

15IT22L	R PROGRAMMING	L T P C
		0 0 2 1

COURSE OUTCOMES
Upon Completion of this course, the students will be able to
CO 1: develop simple applications using R programming. (K3)

LIST OF EXPERIMENTS
- Getting Data In and Out of R
- Control Structures
- Functions
- Data Manipulation
- String Operations
- Data Visualization
- Basic statistics
- Regression modeling

P: 30 TOTAL: 30 PERIODS

REFERENCES
1. Torsten Hothorn, Brian S. Everitt, "A Handbook of Statistical Analyses using R", Third Edition, CRC Press, 2014
2. Michael J. Crawley, "Statistics: An Introduction using R", Second edition, Wiley, 2015.
3. https://www.analytixlabs.co.in/data-analytics-using-r

15IT23L   **JAVA GENERICS AND COLLECTIONS FRAMEWORK**   **L T P C**
                                                                  0 0 2 1

COURSE OUTCOMES
Upon Completion of this course, the students will be able to
   CO 1: apply the concepts of generic classes and collections for computing problems.(K3)

LIST OF EXPERIMENTS
   1. **Generics**
      Generic Class - Generic Methods - Wild Card Types

   2. **Collection Interfaces**
      Collection interface - List interface - Set interface - Queue interface

   3. **Collection Classes**
      ArrayList – LinkedList – HashSet – LinkedHashSet – TreeSet

   4. **Map Interfaces**
      Map interface - NavigableMap Interface

                                             P: 30 TOTAL: 30 PERIODS
REFERENCES
   1. Herbert Schildt, "Java™ The Complete Reference", Ninth Edition, McGraw-Hill, 2014
   2. Cay S. Horstmann and Gary Cornell, "Core Java: Volume I – Fundamentals", Ninth Edition, Sun Microsystems Press, 2012.

15IT24L   **DEEP LEARNING**   **L T P C**
                                                               1 0 0 1
COURSE OUTCOMES
 Upon Completion of this course, the students will be able to
   CO 1: explain the fundamentals of deep learning connected with Artificial Intelligence and machine Learning. (K2)
LIST OF CONTENTS
      1. Machine learning
      2. Learning representation from data
      3. The "deep" in deep learning
      4. Understanding how deep learning works in three figures
      5. What deep learning has achieved so far
      6. The promise of AI
      7. Hardware
      8. Data
      9. Algorithms
      10. A new wave of investment
      11. Democratization of deep learning

                                             L: 15 TOTAL: 15 PERIODS

REFERENCES
1. Francois Chollet, "Deep Learning with Python", First Edition, MEAP publication January 2017.
2. N Buduma, N Locascio, "Fundamentals of Deep Learning: Designing Next-generation Machine Intelligence Algorithms", First Edition, O'Reilly publications, 2017.

15IT25L	DATABASE DESIGN AND PROGRAMMING WITH SQL	L T P C
		0 0 2 1

COURSE OUTCOMES

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

CO 1: demonstrate a database solution for a business or organization. (K3)

LIST OF EXPERIMENTS

Database Design
- Introduction
- Entities and Attributes
- Relationship Basics
- Super/Sub Types and Business Rules
- Relationship Fundamentals
- UIDs and Normalization
- Arcs, Hierarchies, and Recursive Modeling
- Changes and Historical Modeling
- Mapping
- Creating Database Projects
- Presenting Database Projects

Database Programming with SQL
- Introduction
- Select with WHERE, ORDER BY, and Intro to Functions
- Types of Functions
- JOINs
- Group Functions
- Sub queries
- DML, DDL Statements
- Constraints
- Database Objectives
- Privileges and Regular Expressions
- TCL

P: 30 TOTAL: 30 PERIODS

REFERENCE
1. http://ilearning.oracle.com

15IT26L   **INTRODUCTION TO NETWORKS**   **L T P C**
                                                          1 0 0 1

COURSE OUTCOMES

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

CO1: build simple LANs, perform basic configurations for routers and switches

CO2: implement IP addressing schemes.

Introduction and explore the network - Configure a network operating system - Network Protocol and Communications - Network Access – Ethernet - Network Layer - IP addressing - Subnetting IP Network - Transport layer - Application Layer - Build a small network

L: 15 TOTAL: 15 PERIODS

REFERENCES

1. https://www.freeccnastudyguide.com/study-guides/ccna/ch1/intro-to-networks/
2. https://www.netacad.com/group/resources/ccna-rs-itn/6.0

15IT27L   **ROUTING AND SWITCHING ESSENTIAL**   **L T P C**
                                                                1 0 0 1

COURSE OUTCOMES

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

CO1: recognize architecture, components, and operations of routers and switches in a small   network. Students learn how to configure a router and a switch for basic functionality.

CO2: build simple LANs, perform basic configurations for routers and switches, and implement IP

Routing Concepts - Routing Initial configuration - Routing Operation - Static Routing - Configuration & Troubleshooting - Dynamic Routing - Protocols and Routing Tables - Switched Networks - Switch Configuration - Device Configuration.

LAN Design and Switched Environment – VLANs - Segmentation - Implementation - VLAN Routing - Access Control Lists - ACL Operation - Standard IPv4 ACL – DHCP - DHCP v4 – DHCP v6 - NAT for IPv4 -Operation - Configuration - Device Discovery - Management and Maintenance.

L: 15 TOTAL: 15 PERIODS

REFERENCES

1. 'CCNA Routing and Switching Complete Study Guide', Todd Lammle, 2nd Edition, John Wiley & Sons, 2016.
2. https://www.netacad.com/group/resources/ccna-rs-rse/6.0

15IT28L	SCALING NETWORKS	L T P C
		1 0 0 1

COURSE OUTCOMES

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

CO1: configure and troubleshoot routers and switches for advanced functionality

CO2: resolve common issues with protocols in both IPv4 and IPv6 networks.

LAN Design: Campus Wired LAN Designs - Campus Network Device Selection. Scaling VLANs: VTP, Extended VLANs, and DTP - Troubleshoot Multi-VLAN Issues. Spanning Tree Protocol (STP): Spanning Tree Concepts - Varieties of Spanning Tree Protocols. Ether Channel and HSRP: Link Aggregation Concepts - Link Aggregation Configuration - First Hop Redundancy Protocols.

Dynamic Routing: Dynamic Routing Protocols - Distance Vector Dynamic Routing - Link-State Dynamic Routing. EIGRP: features and characteristics - Implement EIGRP for IPv4 - EIGRP Tuning and Troubleshooting. OSPF: Single-Area OSPF Operation - Varieties of Spanning Tree Protocols - Multiarea OSPF - OSPF Tuning and Troubleshooting.

L: 15 TOTAL: 15 PERIODS

REFERENCES

1. 'Scaling Networks Companion Guide', CISCO Press, 2014.
2. https://www.netacad.com/group/resources/ccna-rs-scaling/6.0

15IT29L	CONNECTING NETWORKS	L T P C
		1 0 0 1

COURSE OUTCOMES

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

CO1: configure and troubleshoot network devices

CO2: implement Virtual Private Networks.

WAN Concepts - WAN Technologies Overview - Selecting a WAN Technology - Point-to-Point Connections - Serial Point-to-Point Overview - PPP Operation - Troubleshoot WAN Connectivity - Branch Connections - Remote Access Connections – VPNs.

Access Control Lists - Standard ACL Operation and Configuration Review - Extended IPv4 ACLs - LAN Security – SNMP - QoS Overview - QoS Mechanisms - Network Evolution - Network Troubleshooting - Troubleshooting Methodology - Troubleshooting Scenarios

L: 15 TOTAL: 15 PERIODS

REFERENCES

1. 'Connecting Networks Companion Guide', CISCO Press, 2014.
2. https://www.netacad.com/group/resources/ccna-rs-connect/6.0

B.Tech. – INFORMATION TECHNOLOGY
OPEN ELECTIVE COURSES

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 – Cattele and Big Five - Psychodynamic Theories - Carl Jung and MBTI - Transactional Analysi - 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.
4.

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 forming 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**

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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 ANCIENTY 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. Majumdur 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
		0 0 0 3

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, PNDT, 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.