SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)

Approved by AICTE, Recognized by UGC & Affiliated to Anna University
Accredited by NBA-AICTE, NAAC-UGC with 'A+' Grade

Saravanampatti , Coimbatore -641035

CURRICULA AND SYLLABI

REGULATION 2016

CHOICE BASED CREDIT SYSTEM

DEPARTMENT OF INFORMATION TECHNOLOGY

B.TECH – INFORMATION TECHNOLOGY

SNS COLLEGE OF TECHNOLOGY
COIMBATORE – 641035
(AN AUTONOMOUS
INSTITUTION)
REGULATION – 2016
CHOICE BASED CREDIT SYSTEM
SUGGESTED CURRICULUM AND SYLLABI
B.Tech - INFORMATION TECHNOLOGY
SEMESTER I

S.NO.	COURSE CODE	COURSE TITLE	CAT	CONTACT PERIODS	L	T	P	C	PRE-REQUISITES
THEORY									
1	16EN101	Technical English – I	**HS**	3	3	0	0	3	-
2	16MA101	Engineering Mathematics – I	**BS**	4	3	1	0	4	-
3	16PY101	Engineering Physics	**BS**	3	3	0	0	3	-
4	16CH101	Engineering Chemistry	**BS**	3	3	0	0	3	-
5	16CS101	Fundamentals of Computing and Programming	**ES**	3	3	0	0	3	-
6	16GE101	Basic Civil and Mechanical Engineering	**ES**	3	3	0	0	3	-
7	16GE111/ 16GE113	Career Development Programme - I	**EEC**	3	1	0	2	2*	
PRACTICAL									
8	16PY103	Physics Laboratory	**BS**	2	0	0	2	1	-
9	16CS102	Fundamentals of Computing and Programming Laboratory	**ES**	4	0	0	4	2	-
10	16GE102	Engineering Practices Laboratory	**ES**	4	0	0	4	2	-
TOTAL				**32**	**20**	**0**	**12**	**24+2***	

SEMESTER II

S.NO.	COURSE CODE	COURSE TITLE	CAT	CONTACT PERIODS	L	T	P	C	PRE-REQUISITES
THEORY									
1	16EN102	Technical English – II	**HS**	3	3	0	0	3	16EN101
2	16MA102	Engineering Mathematics-II	**BS**	4	3	1	0	4	16MA101
3	16PY102	Physics of Materials	**BS**	3	3	0	0	3	
4	16CH102	Environmental Science and Engineering	**BS**	3	3	0	0	3	
5	16IT101	Advanced C Programming	**ES**	4	4	0	0	4	16CS101

6	16ME104	Engineering Graphics	**ES**	5	3	0	2	4	-
7	16GE112/ 16IT103	Career Development Programme - II (Problem Solving Using C)	**EEC**	3	1	0	2	2*	16GE111
PRACTICAL									
8	16EN103	Communication skills Laboratory	**HS**	4	0	0	4	2	-
9	16CH103	Chemistry Laboratory	**BS**	2	0	0	2	1	-
10	16IT102	Advanced C Programming Laboratory	**ES**	2	0	0	2	1	16CS102
		TOTAL		**33**	**21**	**0**	**12**	**25+2***	

SEMESTER III

S.NO.	COURSE CODE	COURSE TITLE	CAT	CONTACT PERIODS	L	T	P	C	PRE-REQUISITES
THEORY									
1.	16MA201	Transforms and partial Differential Equations	**BS**	4	3	1	0	4	16MA102
2.	16CS201	Object Oriented Programming	**PC**	3	3	0	0	3	16CS101
3.	16EC231	Digital Electronics	**ES**	3	3	0	0	3	
4.	16EE202	Electronic Devices and Circuits	**ES**	3	3	0	0	3	
5.	16IT201	Data Structures	**PC**	3	3	0	0	3	16IT101
6.	16IT202	Computer Organization and Architecture	**PC**	3	3	0	0	3	16CS101
7.	16GE211/ 16GE213	Career Development Programme–III	**EEC**	3	1	0	2	2*	16GE112
PRACTICAL									
8.	16CS203	Object Oriented Programming Laboratory	**PC**	4	0	0	4	2	16CS102
9.	16EC232	Digital Electronics Laboratory	**ES**	2	0	0	2	1	
10.	16IT203	Data Structures Laboratory	**PC**	4	0	0	4	2	16IT102
		TOTAL		**32**	**20**	**0**	**12**	**24+2***	

SEMESTER IV

S.NO.	COURSE CODE	COURSE TITLE	CAT	CONTACT PERIODS	L	T	P	C	PRE-REQUISITES
THEORY									
1.	16MA202	Statistics and Numerical Methods	**BS**	4	3	1	0	4	16MA201
2.	16CS204	Operating Systems	**PC**	3	3	0	0	3	16CS101
3.	16CS205	Database Management Systems	**PC**	3	3	0	0	3	16IT201
4.	16EC233	Microprocessor and Microcontroller	**ES**	3	3	0	0	3	

S.NO.	COURSE CODE	COURSE TITLE	CAT	CONTACT PERIODS	L	T	P	C	PRE-REQUISITES
5.	16IT204	Java Programming	PC	3	3	0	0	3	16CS201
6.	16CS202	Software Engineering	PC	3	3	0	0	3	16CS101
7.	16GE212/ 16GE214	Career Development Programme– IV	EEC	3	1	0	2	2*	16GE211
PRACTICAL									
8.	16CS207	Operating Systems Laboratory	PC	4	0	0	4	2	16CS102
9.	16CS209	Database Management Systems Laboratory	PC	4	0	0	4	2	16CS102
10.	16IT205	Java Programming Laboratory	PC	4	0	0	4	2	16CS203
			TOTAL	**34**	**20**	**0**	**14**	**25+2***	

SEMESTER V

S.NO.	COURSE CODE	COURSE TITLE	CAT	CONTACT PERIODS	L	T	P	C	PRE-REQUISITES
THEORY									
1.	16MA301	Probability and Queuing Theory	BS	4	3	1	0	4	16MA201
2.	16IT301	Computer Networks	PC	3	3	0	0	3	16CS101
3.	16IT302	Design and Analysis of Algorithms	PC	5	3	2	0	4	16IT201
4.	16IT303	System Software and Compiler Design	PC	5	3	0	2	4	16CS204
5.		Professional Elective - I	PE	3	3	0	0	3	
6.		Open Elective I**	OE	3	3	0	0	3	
7.	16IT399/ 16GE313	Career Development Programme– V	EEC	3	1	0	2	2*	
PRACTICAL									
8.	16IT304	Network Programming Laboratory	PC	4	0	0	4	2	16IT102
9.	16IT305	Design and Analysis of Algorithms Laboratory	PC	2	0	0	2	1	16IT203
10.	16IT306	Internship /Industrial Training[1 Weeks]#	EEC	0	0	0	0	1	
			TOTAL	**32**	**20**	**2**	**10**	**25+2***	

SEMESTER VI

S.NO.	COURSE CODE	COURSE TITLE	CAT	CONTACT PERIODS	L	T	P	C	PRE-REQUISITES
THEORY									
1.	16CS306	Composing Mobile Apps.	EEC	3	3	0	0	3	16IT204
2	16IT307	Web Technology	PC	3	3	0	0	3	16IT204 16CS205
3.	16GE302	Engineering Economics and Cost Analysis	HS	3	3	0	0	3	

S.NO.	COURSE CODE	COURSE TITLE	CAT	CONTACT PERIODS	L	T	P	C	PRE-REQUISITES
4.		Professional Elective - II	PE	3	3	0	0	3	
5.		Open Elective –II**	OE	3	3	0	0	3	
6.		Professional Elective - III	PE	3	3	0	0	3	
7.	16GE312/ 16GE314	Career Development Programme– VI	EEC	3	1	0	2	2*	16GE212
PRACTICAL									
8.	16IT308	Web Technology Laboratory	PC	4	0	0	4	2	16IT205 16CS209
9.	16CS308	Mobile Application Development Laboratory	EEC	4	0	0	4	2	16IT205
10.	16IT309	Mini Project	EEC	4	0	0	4	2	16CS209, 16IT205
		TOTAL		**33**	**19**	**0**	**14**	**24+2***	

SEMESTER VII

S.NO.	COURSE CODE	COURSE TITLE	CAT	CONTACT PERIODS	L	T	P	C	PRE-REQUISITES
THEORY									
1.	16IT401	Cryptography and Network Security	PC	3	3	0	0	3	16CS204
2.	16GE301	Professional Ethics	HS	3	3	0	0	3	
3.		Professional Elective - IV	PE	3	3	0	0	3	
4.		Professional Elective - V	PE	3	3	0	0	3	
5.		Open Elective –III**	OE	3	3	0	0	3	
PRACTICAL									
6.	16IT402	Cryptanalysis Laboratory	PC	4	0	0	4	2	16IT304
7.	16IT403	Project Phase I	EEC	4	0	0	4	2	16IT309
		TOTAL		**23**	**15**	**0**	**8**	**19**	

S.NO.	COURSE CODE	COURSE TITLE	CAT	CONTACT PERIODS	L	T	P	C	PRE-REQUISITES
THEORY									
1.		Professional Elective - VI	PE	3	3	0	0	3	-
2.		Professional Elective - VII	PE	3	3	0	0	3	-
PRACTICAL									
3.	16IT404	Project Phase II	EEC	20	0	0	20	10	16IT403
			TOTAL	26	6	0	20	16	

TOTAL NO. OF CREDITS: 182

*Not included in the calculation of CGPA

**Courses from the curriculum of other UG Programmes

HUMANITIES AND SOCIAL SCIENCES (HS)

S.NO.	COURSE CODE	COURSE TITLE	CONTACT PERIODS	L	T	P	C	PRE-REQUISITES
1.	16EN101	Technical English – I	3	3	0	0	3	
2.	16EN102	Technical English – II	3	3	0	0	3	16EN101
3.	16EN103	Communication skills Laboratory	4	0	0	4	2	
4.	16GE302	Engineering Economics and Cost Analysis	3	3	0	0	3	
5.	16GE301	Professional Ethics	3	3	0	0	3	

BASIC SCIENCES (BS)

S.NO.	COURSE CODE	COURSE TITLE	CONTACT PERIODS	L	T	P	C	PRE-REQUISITES
1.	16MA101	Engineering Mathematics – I	4	3	1	0	4	
2.	16PY101	Engineering Physics	3	3	0	0	3	
3.	16CH101	Engineering Chemistry	3	3	0	0	3	
4.	16PY103	Physics Laboratory	2	0	0	2	1	
5.	16MA102	Engineering Mathematics-II	4	3	1	0	4	16MA101
6.	16PY102	Physics of Materials	3	3	0	0	3	
7.	16CH102	Environmental Science and Engineering	3	3	0	0	3	
8.	16CH103	Chemistry Laboratory	2	0	0	2	1	
9.	16MA201	Transforms and partial Differential Equations	4	3	1	0	4	16MA102
10.	16MA202	Statistics and Numerical Methods	4	3	1	0	4	16MA201
11.	16MA301	Probability and Queuing Theory	4	3	1	0	4	16MA201

ENGINEERING SCIENCES (ES)

S.NO.	COURSE CODE	COURSE TITLE	CONTACT PERIODS	L	T	P	C	PRE-REQUISITES
1.	16CS101	Fundamentals of Computing and Programming	3	3	0	0	3	
2.	16GE101	Basic Civil & Mechanical Engineering	3	3	0	0	3	
3.	16CS102	Fundamentals of Computing and Programming Laboratory	4	0	0	4	2	
4.	16GE102	Engineering Practices Laboratory	4	0	0	4	2	
5.	16IT101	Advanced C programming	4	4	0	0	4	16CS101
6.	16ME104	Engineering Graphics	5	3	0	2	4	
7.	16IT102	Advanced C programming Laboratory	2	0	0	2	1	16CS102
8.	16EC231	Digital Electronics	3	3	0	0	3	
9.	16EE202	Electronic Devices and Circuits	3	3	0	0	3	
10.	16EC232	Digital Electronics Laboratory	2	0	0	2	1	
11.	16EC233	Microprocessor and Microcontroller	3	3	0	0	3	

PROFESSIONAL CORE (PC)

S.NO.	COURSE CODE	COURSE TITLE	CONTACT PERIODS	L	T	P	C	PRE-REQUISITES
1.	16CS201	Object Oriented Programming	3	3	0	0	3	16CS101
2.	16IT201	Data Structures	3	3	0	0	3	16IT101
3.	16IT202	Computer Organization and Architecture	3	3	0	0	3	16CS101
4.	16CS203	Object Oriented Programming Laboratory	4	0	0	4	2	16CS102
5.	16IT203	Data Structures Laboratory	4	0	0	4	2	16IT102
6.	16CS204	Operating Systems	3	3	0	0	3	16CS101
7.	16CS205	Database Management Systems	3	3	0	0	3	16IT201
8.	16IT204	Java Programming	3	3	0	0	3	16CS201
9.	16CS202	Software Engineering	3	3	0	0	3	16CS101
10.	16CS207	Operating Systems Laboratory	4	0	0	4	2	16CS102
11.	16CS209	Database Management Systems Laboratory	4	0	0	4	2	16CS102
12.	16IT205	Java Programming Laboratory	4	0	0	4	2	16CS203
13.	16IT301	Computer Networks	3	3	0	0	3	16CS101

S.No.	Course Code	Course Title	Contact Periods	L	T	P	C	Pre-requisites
14.	16IT302	Design and Analysis of Algorithms	5	3	2	0	4	16IT201
15.	16IT303	System Software and Compiler Design	5	3	0	2	4	16CS204
16.	16IT304	Network Programming Laboratory	4	0	0	4	2	16IT102
17.	16IT305	Design and Analysis of Algorithms Laboratory	2	0	0	2	1	16IT203
18.	16IT307	Web Technology	3	3	0	0	3	16IT204 16CS205
19.	16IT308	Web Technology Laboratory	4	0	0	4	2	16IT205 16CS209
20.	16IT401	Cryptography and Network Security	3	3	0	0	3	16CS204
21.	16IT402	Cryptanalysis Laboratory	4	0	0	4	2	16IT304

PROFESSIONAL ELECTIVE (PE) I

S.NO.	COURSE CODE	COURSE TITLE	CONTACT PERIODS	L	T	P	C	PRE-REQUISITES
1.	16IT311	E-Waste Management	3	3	0	0	3	-
2.	16IT312	Object Oriented Analysis And Design	3	3	0	0	3	16CS202
3.	16IT313	Embedded System Design	3	3	0	0	3	16EC233
4.	16IT314	Information Theory and Coding	3	3	0	0	3	16CS101, 16EC231
5.	16IT315	Service Oriented Architecture	3	3	0	0	3	16IT307
6.	16IT316	Business Intelligence-Data Warehousing and Analytics (Offered by Infosys)	3	3	0	0	3	16CS205
7.	16CS318	Artificial Intelligence	3	3	0	0	3	16MA204

PROFESSIONAL ELECTIVE (PE) II

S.NO.	COURSE CODE	COURSE TITLE	CONTACT PERIODS	L	T	P	C	PRE-REQUISITES
1.	16IT317	Real Time System Design	3	3	0	0	3	16CS204
2.	16IT318	Software Requirement Engineering	3	3	0	0	3	16CS202
3.	16IT319	Client Server Computing	3	3	0	0	3	16IT301
4.	16IT320	Grid and Cloud Computing	3	3	0	0	3	16IT301
5.	16IT321	Big Data Analytics (Offered by Infosys)	3	3	0	0	3	16CS205
6.	16CS315	UNIX Internals	3	3	0	0	3	16CS204

PROFESSIONAL ELECTIVE (PE) III

S.NO.	COURSE CODE	COURSE TITLE	CONTACT PERIODS	L	T	P	C	PRE-REQUISITES
1.	16IT322	Data Sciences	3	3	0	0	3	16CS205
2.	16IT323	Image Processing	3	3	0	0	3	-
3.	16IT324	Bioinformatics	3	3	0	0	3	-
4.	16IT325	Software Quality Assurance	3	3	0	0	3	16CS202
5.	16CS404	Internet of Things (Offered by Infosys)	3	3	0	0	3	16IT301
6.	16CS409	TCP/IP Design and Implementation	3	3	0	0	3	16IT301
7.	16CS319	Mobile Computing	3	3	0	0	3	16IT301

PROFESSIONAL ELECTIVE (PE) IV

S.NO.	COURSE CODE	COURSE TITLE	CONTACT PERIODS	L	T	P	C	PRE-REQUISITES
1.	16IT405	Software Testing	3	3	0	0	3	16CS202
2.	16IT406	High Performance Networks	3	3	0	0	3	16IT301
3.	16IT407	Information Security	3	3	0	0	3	16IT301
4.	16CS419	Knowledge Management	3	3	0	0	3	-
5.	16CS406	Machine Learning	3	3	0	0	3	16CS205, 16IT318
6.	16CS407	Computer Graphics and Multimedia	3	3	0	0	3	-
7.	16CS413	Agent Based Intelligent Systems	3	3	0	0	3	16CS318

PROFESSIONAL ELECTIVE (PE) V

S.NO.	COURSE CODE	COURSE TITLE	CONTACT PERIODS	L	T	P	C	PRE-REQUISITES
1.	16IT408	Front end Technologies	3	3	0	0	3	16CS205, 16IT307
2.	16IT409	Software Project Management	3	3	0	0	3	16CS202
3.	16IT410	Adhoc and Sensor Networks	3	3	0	0	3	16IT301
4	16IT411	Information Retrieval	3	3	0	0	3	16CS205 16IT303 16IT316
5.	16IT412	Software Defined Networks	3	3	0	0	3	16IT301
6.	16IT413	Semantic Web	3	3	0	0	3	16IT303
7.	16GE303	Total Quality Management	3	3	0	0	3	-

PROFESSIONAL ELECTIVE (PE) VI

S.NO.	COURSE CODE	COURSE TITLE	CONTACT PERIODS	L	T	P	C	PRE-REQUISITES
1.	16IT414	User Interface Design	3	3	0	0	3	16CS202, 16IT312
2.	16IT415	Mainframe Technologies	3	3	0	0	3	16IT303
3.	16IT416	Pervasive Computing	3	3	0	0	3	16IT301
4.	16IT417	Ethical Hacking and Cyber Security	3	3	0	0	3	16IT301
5.	16IT418	Digital Marketing (Offered by Verticurl)	3	3	0	0	3	16IT301, 16IT303
6.	16CS322	Python Programming	3	3	0	0	3	-

PROFESSIONAL ELECTIVE (PE) VII

S.NO.	COURSE CODE	COURSE TITLE	CONTACT PERIODS	L	T	P	C	PRE-REQUISITES
1.	16IT419	Enterprise Resource Planning	3	3	0	0	3	16IT303, 16IT312
2.	16IT420	Social Network Analysis	3	3	0	0	3	16IT301
3.	16IT421	Network Processor	3	3	0	0	3	16IT301
4.	16CS321	C# And .Net Framework	3	3	0	0	3	16CS206
5.	16GE304	Principles of Management	3	3	0	0	3	-
6.	16GE306	HRM and Entrepreneurship	3	3	0	0	3	-

EMPLOYABILITY ENHANCEMENT COURSES (EEC)

S.NO.	COURSE CODE	COURSE TITLE	CONTACT PERIODS	L	T	P	C	PRE-REQUISITES
1.	16GE111/ 16GE113	Career Development Programme - I	3	1	0	2	2*	
2.	16GE112/ 16IT103	Career Development Programme- II(Problem Solving Using C)	3	1	0	2	2*	16GE111
3.	16GE211/ 16GE213	Career Development Programme –III	3	1	0	2	2*	16GE112
4.	16GE212/ 16GE214	Career Development Programme – IV	3	1	0	2	2*	16GE211
5.	16IT399/ 16GE313	Career Development Programme – V	3	1	0	2	2*	
6.	16IT306	Internship /Industrial Training[1 Weeks]#	0	0	0	0	1	
7.	16CS306	Composing Mobile Apps.	3	3	0	0	3	16IT204
8.	16GE312/ 16GE314	Career Development Programme – VI	3	1	0	2	2*	16GE212
9.	16CS308	Mobile Application Development Laboratory	4	0	0	4	2	16IT205
10.	16IT309	Mini Project	4	0	0	4	2	16CS209, 16IT205
11.	16IT403	Project Phase I	4	0	0	4	2	16IT309
13.	16IT404	Project Phase II	20	0	0	20	10	16IT403

OPEN ELECTIVE OFFERED TO OTHER PROGRAMMES

COURSE CODE	COURSE	L	T	P	C	Pre-requisites
16ITOE1	Green Computing	3	0	0	3	-
16ITOE2	Ethics in Computing	3	0	0	3	-
16ITOE3	Management Information System	3	0	0	3	-
16ITOE4	Basics of Internet of Things	3	0	0	3	-
16ITOE5	Programming in C++ and Java	3	0	0	3	-
16ITOE6	Fundamentals of Operating Systems	3	0	0	3	-
16ITOE7	Principles of Multimedia	3	0	0	3	-

ONE CREDIT COURSES

COURSE CODE	COURSE TITLE	L	T	P	C	Pre-requisites
16ITOC1	IoT using Raspberry Pi	-	-	-	-	-
16ITOC2	Bigdata Analytics Using SPARK Engine	-	-	-	-	-
16ITOC3	Object Oriented Programming Using Python	-	-	-	-	-

S. No.	SUBJECT AREA	Credits Per Semester								Total Credits
		I	II	III	IV	V	VI	VII	VIII	
1	HS	3	5				3	3		14
2	BS	11	11	4	4	4				34
3	ES	10	9	7	3					29
4	PC			13	18	14	5	5		55
5	PE					3	6	6	6	21
6	OE					3	3	3		9
7	EEC					1	7	2	10	20
	TOTAL	24	25	24	25	25	24	19	16	182
8.	Non-Credit / Mandatory	2	2	2	2	2	2			12

16EN101	TECHNICAL ENGLISH I	L	T	P	C
	(Common to all B.E. / B. Tech. Courses)	3	0	0	3

UNIT I 9

General Vocabulary (Word–formation - prefixes & suffixes, root words) – Tenses – Adjectives forms – Adverb forms - Compound nouns - Abbreviations and Acronyms –Techniques of reading – Autobiographical writing.

UNITII 9

Active and Passive voice – Impersonal passive voice - Articles - Prepositions –Spelling and Punctuation –'WH' Question forms – Yes / No question form – Reading & note-making – Paragraph writing - comparison and contrast.

UNIT III 9

Uses of Modal auxiliaries – Instructions– Definitions - Single line & Extended - Reading and understanding through Context –Transfer of information – bar chart, flowchart- Crafting advertisements.

UNIT IV 9

Concord (subject & verb agreement) – Cause and effect expressions – One word substitution - Letter writing- letter to the editor & permission letter (for Industrial Visit & In-plant training) - Paragraph writing-descriptive.

UNIT V 9

Empty verbs - 'If' conditionals – Gerund & Infinitive - Formal Letter writing – invitation, accepting & declining - Paragraph writing – analytical.

L :45   T: 0   P: 0   Total: 45 PERIODS

TEXT BOOKS

1 Dhanavel.S.P. English and Communication Skills for Students of Science and Engineering, Orient Blackswan, Chennai, 2011.
2. Gunasekaran.S , ' Technical English I' Third Edition, Vishnu Prints Media, Chennai, 2016.

REFERENCES

1 Raman, Meenakshi & Sangeetha Sharma. Technical Communication: Principles and Practice, Oxford University Press, New Delhi, 2011. .
2 Regional Institute of English. English for Engineers, Cambridge University Press, New Delhi, 2006.
3 Rizvi, Ashraf. M. Effective Technical Communication, Tata McGraw-Hill, New Delhi, 2005.
4 Department of English, Anna University, Mindscapes: English for Technologists and Engineers. Orient Blackswan, Chennai. 2012 .
5 Mitra K. Barun, " Effective Technical Communication – A Guide for Scientists and Engineers", Oxford University Press, New Delhi, 2006.

COURSE OUTCOMES

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

CO1 Employ their active and passive vocabulary and construct basic sentence structures.
CO2 Become active readers who appreciate ambiguity and complexity, and who can articulate their own interpretations.
CO3 Write effectively and flawlessly avoiding grammatical errors for a variety of professional and social settings.
CO4 Demonstrate the usage of language effectively, creatively and successfully in both general and specific contexts.
CO5   Exhibit letter writing skills for effective communication both in formal and informal situations.

16MA101   **ENGINEERING MATHEMATICS- I**   **L   T   P   C**
                     (Common to All B.E. / B. Tech. Courses)   **3   1   0   4**

UNIT I   MATRICES   9+3

Characteristic equation – Eigen values and Eigen vectors of a real matrix –Properties–Orthogonal transformation of a symmetric matrix to diagonal form – Quadratic form –Reduction of quadratic form to canonical form by orthogonal transformation – Cayley– Hamilton theorem (excluding proof).

UNIT II   THREE DIMENSIONAL ANALYTICAL GEOMETRY   9+3

Equation of a sphere – Plane section of a sphere – Tangent Plane – Equation of a cone – Right circular cone – Equation of a cylinder – Right circular cylinder.

UNIT III   DIFFERENTIAL CALCULUS   9+3

Curvature in Cartesian co-ordinates – Centre and radius of curvature – Circle of curvature – Evolutes – Envelopes.

UNIT IV   FUNCTIONS OF SEVERAL VARIABLES   9+3

Partial derivatives – Euler's theorem for homogenous functions – Total derivatives – Jacobians – Taylor's expansion– Maxima and Minima – Method of Lagrangian multipliers.

UNIT V   DIFFERENTIAL EQUATIONS OF HIGHER ORDER   9+3

Higher order linear differential equations with constant coefficients – Method of variation of parameters – Cauchy's and Legendre's linear differential equations.

L :45   T:15   P: 0   Total: 60 PERIODS

TEXT BOOKS
 1   Bali, N. P. and Manish Goyal, "Text book of Engineering Mathematics", 4th Edition, University Science Press, 2014.
 2.   Grewal, B.S., "Higher Engineering Mathematics", 43rd Edition, Khanna Publications, Delhi, 2014.

REFERENCES
 1   Ramana, B.V., "Higher Engineering Mathematics", Tata McGraw Hill Publishing Company, New Delhi, 2014.
 2   Kandasamy, P., Thilagavathy, K. and Gunavathy, K., "Engineering Mathematics", Volume I., S. Chand & Co., New Delhi, 2012.
 3   Veerarajan, T., "Engineering Mathematics for First Year", Tata McGraw Hill Pub. Co. Ltd., New Delhi, 2014.
 4   Kreyszig, E., "Advanced Engineering Mathematics", 8th Edition, John Wiley & Sons, Inc, Singapore, 2008.
 5   Glyn James, "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education Ltd., 2013.

COURSE OUTCOMES

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

CO1   Know Eigen values and Eigen vectors and its role in the system of equations.

CO2   Explore the knowledge to solving problems involving Sphere, Cone and Cylinder.

CO3   Discover the radius, centre and circle of curvature of any curves.

CO4   Identify the maximum and minimum values of surfaces.

CO5   Solve the ordinary differential equations of certain types.

16PY101   **ENGINEERING PHYSICS**   **L   T   P   C**
                              (Common to All B.E. / B. Tech. Courses)   **3   0   0   3**

UNIT I   CRYSTAL PHYSICS   9

Lattice – Unit cell – Bravais lattice – Lattice planes – Miller indices – d spacing in cubic lattice – Calculation of number of atoms per unit cell – Atomic radius – Coordination number – Packing factor for SC, BCC, FCC and HCP structures – Diamond and graphite structures (qualitative treatment)

UNIT II   PROPERTIES OF MATTER AND THERMAL PHYSICS   9

Elasticity- Hooke's law - Relationship between three moduli of elasticity– stress -strain diagram – Poisson's ratio –Factors affecting elasticity –Bending moment – Depression of a cantilever Young's modulus by uniform bending- I-shaped girders Modes of heat transfer- thermal conductivity- Newton's law of cooling - Linear heat flow -Lee's disc method – Radial heat flow – Rubber tube method – conduction through compound media (series and parallel).

UNIT III   QUANTUM PHYSICS   9

Black body radiation – Planck's theory (derivation) – Deduction of Wien's displacement law and Rayleigh – Jean's Law from Planck's theory – Compton effect. Theory and experimental verification – Properties of Matter waves – G.P Thomson experiment- Physical significance of wave function -Schrödinger's wave equation – Time independent and time dependent equations– Particle in a one dimensional box –Electron microscope- Scanning electron microscope

UNIT IV   ACOUSTICS AND ULTRASONICS   9

Classification of Sound- decibel- Weber–Fechner law – Sabine's formula- derivation using growth and decay method – Absorption Coefficient and its determination –factors affecting acoustics of buildings and their remedies. Production of Ultrasonic's by magnetostriction and piezoelectric methods - acoustic grating - Non Destructive Testing – pulse echo system through transmission and reflection modes - A,B and C –scan displays, Medical applications – Sonogram.

UNIT V   PHOTONICS AND FIBRE OPTICS   9

Spontaneous and stimulated emission- Population inversion -Einstein's A and B coefficients - derivation. Types of lasers – Nd:YAG, CO , Semiconductor lasers –applications. Principle and propagation of light in optical fibres – Numerical aperture and Acceptance angle - Types of optical fibres (material, refractive index, mode) – Losses in optical fibre- attenuation, dispersion, bending - Fibre Optical Communication system (Block diagram)

L :45   T: 0   P: 0   T: 45 PERIODS

TEXT BOOKS
1   Naresh Kumar. P and Balasubramanian. V, Engineering Physics I, Gems Publishers,2015
2   Avadhanalu.M.N and   Kshirsagar.P.G, A textbook of Engineering Physics,S.Chand & ompany Ltd, 2013.

REFERENCES
1   Searls and Zemansky, University Physics, 2009.
2   Gaur R.K. And Gupta S.L, Engineering Physics, Dhanpat Rai publishers, 2009.
3   Palanisamy P.K, Engineering Physics, SCITECH Publications, 2011.
4   Rajendran.V,   Engineering   Physics,Tata   Mcgraw-Hill   Publishing Company Limited, New Delhi.2009.
5   Dr.G.Senthil kumar, Engineering Physics-I, VRB Publishers Pvt.Ltd.Chennai.(2013).

COURSE OUTCOMES :
At the end of the course student should be able to
  CO1   Understand the properties of the crystalline materials.
  CO2   Analyze the elastic and thermal properties of the materials.
  CO3   Understand the basics of quantum mechanics.
  CO4   Identify the applications of acoustics and ultrasonic waves.
  CO5   Understand the basics and applications of photonics and fibre optics technology.

16CH101   **ENGINEERING CHEMISTRY**   L   T   P   C
                     (Common to All B.E. / B. Tech. Courses)   3   0   0   3

UNIT I   ELECTRO CHEMISTRY   9

Electrochemical - EMF – Electrode potential – Nernst equation — problem – electrochemical series – significance– reference electrodes –Standard Hydrogen electrode - Calomel electrode – Ion selective electrode – glass electrode and measurement of pH and Fuel cells – hydrogen – oxygen fuel cell – batteries – Primary —– Leclanche cell – secondary – Lead – acid battery – Lithium batteries (Li-TiS$_2$ and Li - S battery).

UNIT II   CORROSION AND ITS CONTROL   9

Chemical corrosion – oxidation corrosion – mechanism – Pilling – Bed worth rule – electrochemical corrosion – different types – galvanic corrosion – differential aeration corrosion – corrosion control – sacrificial anode and impressed cathodic current methods – corrosion inhibitors – protective coatings – paints – constituents and functions – metallic coatings – electroplating (Gold plating).

UNIT III   SPECTROSCOPY   9

Beer-Lambert's law – problem – UV-visible spectroscopy and IR spectroscopy (principle – instrumentation) (block diagram only) – estimation of iron by colorimetry – flame photometry – principle – instrumentation (block diagram only) – estimation of sodium by flame photometry – atomic absorption spectroscopy – principle – instrumentation (block diagram only) – estimation of nickel by atomic absorption spectroscopy

UNIT IV   SURFACE CHEMISTRY & WATER TECHNOLOGY   9

Adsorption – types – adsorption of gases on solids – adsorption isotherms – Frendlich and Langmuir isotherms —– role of adsorbents in ion-exchange adsorption (Demineralization only). Water – hardness – problems –Domestic water treatment – disinfection methods (Chlorination, Ozonation, UV treatment) – break point chlorination – salinity – desalination by reverse osmosis

UNIT V   ENGINEERING MATERIALS   9

Refractories – classification – acidic, basic and neutral refractories – properties (refractoriness, refractoriness under load, dimensional stability, porosity, thermal spalling) Abrasives – natural and synthetic abrasives – quartz, corundum, emery, garnet, diamond, silicon carbide and boron carbide. Lubricants – mechanism of lubrication - properties – viscosity index, flash and fire points, cloud and pour points, oiliness) – solid lubricants – graphite and molybdenum sulphide.

                                   L :45   T: 0   P: 0   T:45 PERIODS

TEXT BOOKS
1   M.Manjuladevi, R.Anitha "Engineering Chemistry" Gem Pub. Coimbatore. 2013.
2.   P.C.Jain and Monica Jain, "Engineering Chemistry" Dhanpat Rai Pub, Co., New Delhi 2008.

REFERENCES
1   B. Sivasankar "Engineering Chemistry" Tata McGraw-Hill Pub.Co.Ltd, New Delhi (2009).
2   R. Sivakumar and N Sivakumar, "Engineering Chemistry" Tata McGraw-Hill Pub.Co.Ltd. New Delhi.2009.
3   Dr.Gourkrishna and Dasmohapatra, "Engineering Chemistry" Vikas Pub. House Pvt.Ltd. 2011.
4   O.Gpalanna, "Engineering Chemistry" Tata McGraw-Hill Pub.Co.Ltd, New Delhi.2009.
5   B.R.Puri,L.R.Sharma&M.S.Pathania,"Principles of Physical Chemistry" Vishalpublishing Co. Jalandhar, Punjab. 2013.

COURSE OUTCOMES :
At the end of the course student should be able to:
CO1   Assemble a battery and illustrate the phenomenon of production of electric current
CO2   Know the technical information about corrosion, corrosion control by galvanization and electroplating

CO3   Gain knowledge on the principles and instrumentation of spectroscopic techniques

CO4   Apply the theory of adsorption in real life situations

CO5   Acquire sound knowledge on different types of Engineering materials

16CS101 **FUNDAMENTALS OF COMPUTING AND** **L** **T** **P** **C**
PROGRAMMING
(Common to All B.E. / B. Tech.) **3** **0** **0** **3**

UNIT I **INTRODUCTION TO COMPUTERS** **8**

Introduction – Characteristics of Computers –Computer Generations – Classification of Computers – Basic Computer organization – Number Systems- Algorithm –Pseudo code –Flow Chart- Computer Software –Types of Software– Internet Terminology

UNITII **C PROGRAMMING BASICS** **10**

Introduction to 'C' programming –fundamental Rules–structure of a 'C' program –compilation and linking processes –Constants, Variables, keywords, Identifier, Delimiters –Declaring and Initializing variables–Data Types –Operators and Expressions–Managing Input and Output operations –Decision Making and Branching –Looping statements –solving simple scientific and statistical problems.

UNIT III **ARRAYS AND STRINGS** **10**

Arrays – Characteristics, Initialization – Declaration – One dimensional and two dimensional arrays. String- String operations – String Arrays. Simple programs-sorting-searching –matrix operations (Addition, subtraction and Multiplication).

UNIT IV **FUNCTIONS AND POINTERS** **9**

Function –definition of function – User-defined Functions - Declaration of function – Call by reference – Call by value –Recursion –Pointers -Definition –Initialization –Pointers arithmetic –Pointers and arrays-Example Problems.

UNIT V **STRUCTURES AND UNIONS** **8**

Defining Structures and Unions–Structure declaration –need for structure data type - Structure within a structure- Union -Programs using structures and Unions- Pre-processor directives.

L : 45 T: 0 P: 0 Total: 45 PERIODS

TEXT BOOKS

1 E.Balagurusamy, "Fundamentals of Computing and Computer Programming", Tata McGRaw-Hill Publishing Company Limited, (2011).

2. Ashok.N.Kamthane," Computer Programming", Pearson Education (India) (2010).

REFERENCES

1 Byron Gottfried, "Programming with C", 2nd Edition, (Indian Adapted Edition), TMH Publications, (2006).

2 Stephan G kochan, "Programming in C" Pearson Education (2010).

3 P.Sudharson, "Computer Programming", RBA Publications (2008).

4 Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", Dorling Kindersley (India) Pvt. Ltd., Pearson Education in South Asia, 2011.

5 Yashavant P. Kanetkar. "Let Us C", BPB Publications, 2011.

COURSE OUTCOMES

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

CO1 Distinguish the differences among the various generation and classification of computers and solve problems in number system

CO2 Understand the basic concepts of C programming and write programs using various control statements

CO3 Implement programs using arrays and apply the concepts to solve basic problems

CO4 Write C programs to solve problems using functions and pointers

CO5 Understand the concepts structures and unions and apply them

16GE101   **BASIC CIVIL AND MECHANICAL ENGINEERING**   L   T   P   C

(Common to all B.E. / B. Tech. Courses)   3   0   0   3

UNIT I   CIVIL ENGINEERING MATERIALS AND SURVEYING   9

Introduction: Civil engineering-scope of civil engineering-building materials- Brick, stone, cement, concrete, properties-uses Surveying: Objects – types – classification – principles – measurements of distances – angles – leveling – determination of areas – illustrative examples.

UNIT II   BUILDING COMPONENTS   9

Foundations: Types, Bearing capacity – Requirement of good foundations.

Superstructure: Brick masonry – stone masonry – beams – columns – lintels – roofing – flooring plastering.

UNIT III   POWER PLANT ENGINEERING   9

Introduction, Classification of Power Plants – Working principle of steam, Gas, Diesel, Hydro-electric and Nuclear Power plants – Merits and Demerits – working principle of Pumps - Single, Double acting and Centrifugal Pumps.

UNIT IV   IC ENGINES, REFRIGERATION AND AIR CONDITIONING   9
**   SYSTEM**

Internal combustion engines as automobile power plant – Working principle of Petrol and Diesel Engines – Four stroke and two stroke cycles –Principle of Vapour compression system – Layout of typical domestic refrigerator – Window and Split type room Air conditioner.

UNIT V   BASIC MANUFACTURING PROCESSES   9

Foundry: Introduction- patterns – Moulding – casting - cupola furnace.

Welding: Introduction-Classification – ARC, TIG, MIG welding, Gas welding, soldering and brazing.

Machining process: Introduction-Classification – lathe and drilling machines.

L : 45   T:0   P: 0   Total: 45 PERIODS

TEXT BOOKS
1   Naveen Sait.A., Soundararajan.R., "Basic Civil and Mechanical Engineering", RP Publications, Coimbatore, [2016].
2. Shanmugam G and Palanichamy M S, "Basic Civil and Mechanical Engineering",Tata McGraw Hill Publishing Co., New Delhi, (2016).

REFERENCES
1   Rangwala,S.C., " Engineering Materials" , Charotar Publishing House, Anand, 2014.
2   Surendra Singh, "Building Materials" Vikas Publishing Company, New Delhi, 2015.
3   Venugopal K and Prahu Raja V, "Basic Mechanical Engineering", AnuradhaPublishers, Kumbakonam, (2016).
4   Shantha Kumar S R J., "Basic Mechanical Engineering", Hi-tech Publications, Mayiladuthurai, (2016).
5   Rao, P N, Manufacturing Technology: Foundry, Forming And Welding", Tata McGraw-Hill, New Delhi, 2015.

COURSE OUTCOMES

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

CO1   Describe about building materials & surveying equipments in real time.
CO2   Outline the basic building components and requirements of good foundation.
CO3   Identify the possibilities of energy conversion from various energy sources using power plants.
CO4   Summarize the working principles of various Mechanical systems used in day to day applications.
CO5   Apply the various basic Manufacturing processes to make products.

16GE111	**CAREER DEVELOPMENT PROGRAMME - I**	**L**	**T**	**P**	**C**
	(Common to All B.E. / B. Tech. Courses)	1	0	2	2*

UNIT I   TRAINING FUNDAMENTALS   3+6

Goal Settings – Insights into pre-placement requisites – SWOT Analysis – LSRW Skills.

UNIT II   LINGUISTIC SKILLS I   3+6

Parts of Speech – Noun, Verb, Participle, Articles, Pronoun, Preposition, Adverb, Conjunction –

Logical sequence of words –Tense & Voice – Comparison – Comprehension   – comprehend and understand a paragraph

UNIT III   QUANTITATIVE ABILITY I   3+6

Number theory – Percentage – Profit, loss and discount – Simple and compound interest.

UNIT IV   QUANTITATIVE ABILITY II   3+6

Ratio & Proportions – Partnership – Problems on Average & Ages – Clocks – Time sequence test.

UNIT V   COMMUNICATION SKILLS   3+6

Impromptu Speech – Group Discussion – Questioning Technique.

L:15   T:0   P:30   Total: 45 PERIODS

TEXT BOOKS

1   John Eastwood, "Oxford Practice Grammar", Oxford, 2006.

2.   Rajesh Varma, "Fast Track Objective Arithmetic", Arihant Publications, 2010.

REFERENCES

1   Barun K. Mithra, 2016, "Personality Development & Soft Skills", Oxford.

2   R.V.Praveen, "Quantitative Aptitude and Reasoning" PHI Publication, 2012.

3   R.S.Agarwal, "Quantitative Aptitude for Competitive Examinations", S.Chand & Company Pvt Limited, 2016.

4   Kreyszig, E., "Advanced Engineering Mathematics", 8th Edition, John Wiley & Sons, Inc, Singapore, 2008.

5   Glyn James, "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education Ltd., 2013.

COURSE OUTCOMES

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

CO1   Set their career goals through SWOT analysis.

CO2   Form sentences through logical sequence of words and understand passage

         through Comprehension

CO3   Apply the shortcut methods in quantitative aptitude.

CO4   Solve application orientated concepts in quantitative aptitude.

CO5   Communicate well and familiarize with the questioning techniques.

16GE113	CAREER DEVELOPMENT PROGRAMME - I	L	T	P	C
	(Common to All B.E. / B. Tech. Courses)	1	0	2	2*

UNIT I   TRAINING FUNDAMENTALS   8

Goal Settings – Insights into pre-placement requisites – SWOT Analysis – LSRW Skills.

UNIT II   LINGUISTIC SKILLS I   12

Parts of Speech – Error spotting, Logical sequence of words, Tense & Voice, Comparison, Paragraph completion.

UNIT III   LINGUISTIC SKILLS II   8

Comprehend – comprehend and understand a paragraph , Sentences - Simple, Compound & Complex sentences, Jumbled sentence, Idioms & Phrases.

UNIT IV   PERSONALITY DEVELOPMENT   9

Personality, Presentation Skills – stages, selection of topic, content & aids, Minutes of meeting, Public speaking.

UNIT V   COMMUNICATION SKILLS   8

Impromptu Speech – Group Discussion – Questioning Technique.

L:15   T:0   P: 30   Total: 45 PERIODS

TEXT BOOKS

1   John Eastwood, "Oxford Practice Grammar", Oxford.

2.   Barun K. Mithra, "Personality Development & Soft Skills", Oxford.

REFERENCES

1   Barun K. Mithra, 2016, "Personality Development & Soft Skills", Oxford.

2   R.V.Praveen, "Quantitative Aptitude and Reasoning" PHI Publication, 2012.

3   R.S.Agarwal, "Quantitative Aptitude for Competitive Examinations", S.Chand & Company Pvt Limited, 2016.

4   Kreyszig, E., "Advanced Engineering Mathematics", 8th Edition, John Wiley & Sons, Inc, Singapore, 2008.

5   Glyn James, "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education Ltd., 2013.

COURSE OUTCOMES

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

CO1   Understand language structures and functioning of the language.

CO2   Analyse the parts of speech.

CO3   Demonstrate knowledge of personal beliefs and values.

CO4   Understand language attitudes.

CO5   Raise the basic language skills.

16PY103   **PHYSICS LABORATORY**   **L   T   P   C**

(Common to All B.E. / B. Tech. Courses)   **0   0   2   1**

LIST OF EXPERIMENTS

1. Determination of wavelength of mercury spectrum – Spectrometer grating
2. Determination of Young's modulus of the material – uniform bending.
3. Determination of viscosity of liquid – Poiseuille's method.
     (a) Particle size determination using Diode Laser.
     (b) Determination of Laser parameters – Wavelength.
4. Determination of velocity of sound and compressibility of liquid –
    Ultrasonic Interferometer.
5. Determination of thickness of a thin wire – Air wedge method.
6. Determination of dispersive power of a prism using spectrometer.
7. Determination of Young's modulus of the material – non uniform bending.
8. Torsional Pendulum - determination of rigidity modulus of wire and
    moment of inertia of disc.
9. Determination of Band gap of semiconductor material.

MAJOR EQUIPMENTS / SOFTWARE REQUIRED
- Spectrometer
- Young's modulus apparatus
- Poiseuille's method apparatus
- Diode Laser
- Ultrasonic Interferrometer
- Air Wedge apparatus
- Torisional Pendulum Apparatus
- Bandgap determination kit

L : 0   T: 0   P:30   **Total:30 PERIODS**

COURSE OUTCOMES

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

CO1 Experiment the concept of stress, strain for the given material.

CO2 Utilize the concept of interference and diffraction in optical measuring instruments.

CO3 Experiment the concept of diffraction in determining the wavelength, velocity of ultrasonic waves.

CO4 Grasp the knowledge of dependency of viscosity of a liquid on its density and velocity of liquid motion.

CO5 Apply the concept of temperature dependence of resistance of a semiconducting

16CS102   **FUNDAMENTALS OF COMPUTING AND**   **L   T   P   C**

              PROGRAMMINGLABORATORY

(Common to All B.E. / B. Tech.)   **0   0   4   2**

LIST OF EXPERIMENTS

A) Word Processing

1. Document creation, Text manipulation with Scientific notations
2. Table creation, Table formatting and Conversion
3. Mail merge and Letter preparation
4. Drawing Flow Chart

B) Spread Sheet

1. Chart - Line, XY, Bar and Pie.
2. Formula - formula editor.
3. Spread sheet - inclusion of object, Picture and graphics, protecting the document and sheet.
4. Sorting and Import / Export features.

C) Simple C Programming

1. Data types, Expression Evaluation, Condition Statements.
2. Arrays , Looping Statement
3. Functions , Pointers
4. Structures and Unions

MAJOR EQUIPMENTS / SOFTWARE REQUIRED

Hardware

- LAN System with 33 nodes (OR) Standalone PCs – 33 Nos.
- Printers – 3 Nos.

Software

- OS – Windows / UNIX Clone
- Application Package – Office suite
- Compiler – C

L : 0   T: 0   P:60   Total:60 PERIODS

COURSE OUTCOMES

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

CO1   Create a document, insert formulas and pictures and prepare letters using MS office

CO2   Create tables and charts, use formula in calculations and protect worksheets in MS Excel

CO3   Write simple programs using basic C Concepts

CO4   Write C programs using concepts in control statements

CO5   Write C programs to solve problems using Arrays, Functions, Pointers, Unions, and

16GE102   **ENGINEERING PRACTICES LABORATORY**   **L   T   P   C**

                                                                0   0   4   2

LIST OF EXPERIMENTS

GROUP A (CIVIL & MECHANICAL) (36)

CIVIL ENGINEERING   (18)

1. Study of plumbing tools and Components
2. Preparation of threads in pipes
3. Preparation of single and multi tap connections for domestic
4. Study of carpentry tools and its applications
5. Preparation of Cross Lap and Dove Tail Joints.

MECHANICAL ENGINEERING   (18)

1. Study of different types of Welding and its applications
2. Preparation of Butt, Lap and Tee joints
3. Study of sheet metal and its applications
4. Preparation of Rectangular, Square Trays and Funnel
5. Demonstration of Lathe and Drilling Operations
6. Demonstration of Smithy and Foundry tools.

GROUP B (ELECTRICAL AND ELECTRONICS) (30)

ELECTRICAL ENGINEERING PRACTICE (18)

1. Residential house wiring using switches, fuse, miniature circuit breaker, 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 insulation resistance to earth of electrical equipment.
7. Measurement of single and three phase voltages.
8. Study of Iron Box, Emergency Lamp and Fan.

ELECTRONICS ENGINEERING PRACTICE (18)

1. Study of Electronic components and equipments –Resistor, colour coding, measurement of AC signal parameter (peak-peak, rms period, frequency) using CRO.
2. Verification of logic gates: AND, OR, Ex-OR and NOT.
3. Generation of Clock Signal.
4. Soldering practice –Components Devices and Circuits Using general purpose PCB.
5. Characteristics of a PN Junction diode

MAJOR EQUIPMENTS / SOFTWARE REQUIRED

CIVIL
1
2 Assorted components for plumbing consisting of metallic pipes, plastic pipes, flexible pipes, couplings, unions, elbows, plugs and other fittings.
3 Carpentry vice(fitted to workbench)
4 Standard wood working tools
5 Models of industrial trusses, door joints, furniture joints
6 Power Tools:
   (a)Rotary Hammer
   (b)Demolition Hammer
   (c)Circular Saw
   (d)Planer
   (e)Hand Drilling Machine
   (f)Jigsaw

MECHANICAL
1 Arc welding transformer with cables and holders
2 Welding booth with exhaust facility
3 Welding accessories like welding shield, chipping hammer, wire brush, etc.
4 Oxygen and acetylene gas cylinders, blow pipe and other welding outfit.
5 Centre lathe
6 Hearth furnace, anvil and smithy tools
7 Moulding table, foundry tools
8 Power Tool: Angle Grinder
9 Study-purpose items: centrifugal pump, air-conditioner

ELECTRICAL
1 Assorted electrical components for house wiring
2 Electrical measuring instruments
3 Study purpose items: Iron box, fan and regulator, emergency lamp
4 Megger (250V/500V)
5 Power Tools:
   (a) Range Finder
   (b) Digital Live-wire detector

ELECTRONICS
1 Soldering guns
2 Assorted electronic components for making circuits
3 Small PCBs
4 Multi Meters
5 Study purpose items: Telephone, FM radio, low-voltage power supply
6 Bread Board
7 CRO

L : 0   T: 0   P: 60   Total:60 PERIODS

COURSE OUTCOMES
At the end of the course student should be able to:

CO1 Demonstrate plumbing system and Carpentry for the required applications.

CO2 Relate the basic machining operations with engineering problems.

CO3 Apply different types of Welding processes and Sheet metal processes for the Industrial applications

CO4 Illustrate Residential House wiring and simple wiring circuits.

CO5 Employ knowledge on measuring electrical quantities and usage of energy meters.

16EN102   **TECHNICAL ENGLISH II**   **L   T   P   C**
(Common to all B.E. / B. Tech. Courses)   **3   0   0   3**

UNIT I   **9**

Technical Vocabulary – meanings in context – Sentence pattern - Process description - Sequencing words - Uses of Pronouns - Paragraph writing – narrative.

UNITII   **9**

Numerical adjective - Phrasal verbs - Phrases / Structures indicating use / purpose – Introduction to communication & Barriers to communication - Non-verbal communication – Different grammatical forms of the same word.

UNIT III   **9**

Stress and Intonation – Word stress & Sentence stress – Formal Letter writing- quotations, clarification, placing orders, complaint letter – Writing – Using connectives (discourse makers) - Recommendations - Report writing – types of report, report format, recommendations/suggestions- (Fire Accident & Road Accident).

UNIT IV   **9**

Direct & Indirect speech – Argumentative paragraphs – Letter of application – content, format (CV / Resume) –Checklist– E-mail communication – Blog writing.

UNIT V   **9**

Auxiliary verbs - Preparing Agenda, Notices and Minutes – Proposal writing – project/business proposal-   Technical essay – Conversational skills – four types of speeches – extempore, manuscript, impromptu, memorized.

L :45   T: 0   P: 0   Total: 45 PERIODS

TEXT BOOKS
 1   Gunasekaran.S , ' Technical English II' Third Edition, Vishnu Prints Media, Chennai, 2016.
 2.   Dhanavel, S.P. English and Communication Skills for Students of Science and Engineering. Orient Blackswan, Chennai. 2011.

REFERENCES
 1   Muralikrishna & Sunita Mishra. Communication Skills for Engineers. Pearson, New Delhi. 2011.
 2   Smith-Worthington, Darlene & Sue Jefferson. Technical Writing for Success. Cengage, Mason USA. 2007.
 3   Rizvi, Ashraf. M, Effective Technical Communication, Tata McGraw-Hill, New Delhi, 2005.
 4   Mitra K. Barun, " Effective Technical Communication – A Guide for Scientists and Engineers", Oxford University Press, New Delhi, 2006.
 5   Anderson, Paul V. Technical Communication: A Reader-Centered Approach. Cengage. New Delhi. 2008

COURSE OUTCOMES
At the end of the course student should be able to:
CO1   Apply knowledge about the various principles of communication and its various stages.
CO2   Imply the importance of verbal and non-verbal communication in the professional world along with its uses.
CO3   Review the grammar – verbs and its different forms and application of the different forms of advanced grammar.
CO4   Apply grammatical knowledge which enhances speaking and writing skills to prepare reports and resume in a professional manner.
CO5   Speak clearly, confidently, comprehensively, and communicate with one or many listeners using appropriate communicative strategies.

16MA102   **ENGINEERING MATHEMATICS II**   **L   T   P   C**
(Common to all B.E. / B. Tech. Courses)   **3   1   0   4**

UNIT I   **MULTIPLE INTEGRALS**   **9+3**

Double integration in Cartesian co-ordinates – Change of order of integration – Triple Integrals – Simple problems – Area and volume by multiple integrals.

UNIT II   **VECTOR CALCULUS**   **9+3**

Gradient Divergence and Curl – Directional derivative – Irrotational and solenoidal vector fields – Vector integration – Green's theorem in a plane, Gauss divergence theorem and Stokes' theorem (excluding proofs) – Simple problems involving cubes and rectangular parallelepipeds.

UNIT III   **COMPLEX DIFFERENTIATION**   **9+3**

Functions of a complex variable – Analytic functions – Necessary conditions, Cauchy – Riemann equation and Sufficient conditions (excluding proofs) – Harmonic and orthogonal properties of analytic function – Harmonic conjugate – Construction of analytic functions using Milne Thomson's method – Conformal mapping : $w= z + c$, cz, $1/z$, and bilinear transformation.

UNIT IV   **COMPLEX INTEGRATION**   **9+3**

Complex integration – Statement and Problems of Cauchy's integral theorem and Cauchy's integral formula – Taylor's and Laurent's expansion – Singular points – Residues – Residue theorem – Problems only.

UNIT V   **LAPLACE TRANSFORMS**   **9+3**

Laplace transform – Conditions for existence (statement only) – Transforms of standard functions – Properties (statement only) – Transforms of derivatives and integrals – Initial and Final value theorems (statement only) – Periodic functions - Inverse transforms – Convolution theorems (statement only) – Applications of Laplace transforms for solving the ordinary differential equations up to second order with constant co-efficient.

                                    L :45   T:15   P:0   Total: 60 PERIODS

TEXT BOOKS

1.   Bali, N. P. and Manish Goyal, "Text book of Engineering Mathematics", 4th Edition, University Science Press, 2014.
2.   Grewal, B.S., "Higher Engineering Mathematics", 43rd Edition, Khanna Publications, Delhi, 2014.

REFERENCES

1.   Ramana, B.V., "Higher Engineering Mathematics", Tata McGraw Hill Publishing Company, New Delhi, 2014.
2.   Kandasamy, P., Thilagavathy, K. and Gunavathy, K., "Engineering Mathematics", Volume I., S. Chand & Co., New Delhi, 2012.
3.   Jain, R.K. and Iyengar S.R.K., "Advanced Engineering Mathematics", 4th Edition, Narosa Publishing House Pvt. Ltd., 2015.
4.   Kreyszig, E., "Advanced Engineering Mathematics", 8th Edition, John Wiley & Sons, Inc, Singapore, 2008.
5.   Glyn James, "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education Ltd., 2013.

COURSE OUTCOMES

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

CO1   Evaluate double integral and triple integral to compute area, volume for two dimensional and three dimensional solid structure.

CO2   Know the gradient, divergence and curl, related theorems useful for engineering applications.

CO3   Test the analyticity and to construct the analytic function and transform complex functions from one plane to another plane graphically.

CO4   Evaluate real and complex integrals over suitable closed paths or contours.

CO5   Know the Applications of Laplace transform and its properties & to solve certain linear differential equations using Laplace transform technique.

16PY102　　　　　　　　**PHYSICS OF MATERIALS**　　　　L　T　P　C

(Common to All B.E. / B. Tech. Courses)　　　　3　0　0　3

UNIT I　　　　**CONDUCTING AND SUPERCONDUCTING MATERIALS**　　　9

Classification of materials based on conductivity- Conductors –Quantum theory – Fermi distribution function – Effect of temperature on Fermi Function – Density of energy states – carrier concentration in metals.Superconductors – Type I and Type II superconductors – BCS theory of superconductivity (Qualitative) –High T_c superconductors – Application of superconductors –SQUID,Magnetic levitation.

UNIT II　　　　**SEMICONDUCTING MATERIALS**　　　9

Intrinsic semiconductor – carrier concentration derivation – Fermi level – Variation of Fermi level with temperature – electrical conductivity – band gap determination –direct and indirect band gap semiconductors- derivation of carrier concentration in n-type and p-type semiconductors – variation of Fermi level with temperature and impurity concentration — Hall effect –Determination of Hall coefficient – Applications.

UNIT III　　　　**MAGNETIC MATERIALS**　　　9

Basic concepts – magnetic moment, susceptibility, permeability. Origin of magnetic moment – Bohrmagneton –Dia, Para and Ferro magnetism – Domain theory – Hysteresis – soft and hard magnetic materials – antiferromagnetic materials – Ferrites and its applications. Magnetic storage devices- magnetic hard disc, bubble memory.

UNIT IV　　　　**DIELECTRIC MATERIALS**　　　9

Electrical susceptibility – dielectric constant – electronic, ionic, orientational and space charge polarization – frequency and temperature dependence of polarisation – internal field – Claussius - Mosotti relation (derivation) – dielectric loss – dielectric breakdown – Applications of dielectric materials (capacitor and transformer) – ferroelectricity and applications.

UNIT V　　　　**ADVANCED ENGINEERING MATERIALS**　　　9

Metallic glasses: preparation, properties and applications. Shape memory alloys (SMA): Characteristics, properties of NiTi alloy, applications – Nanomaterials: Properties –Top-down process: Ball milling method- Bottom –up process: Chemical vapour deposition method- Carbon Nanotubes- Preparation by pulsed laser deposition method, properties and applications.

L :45　　T: 0　　P: 0　　T: 45 PERIODS

TEXT BOOKS
1　　Charles Kittel, Introduction to Solid State Physics, Wiley Publications, 2006.
2　　Ragavan V, "Materials Science and Engineering:, PHI Learning Private, 2012.

REFERENCES
1　　Rajendran.V, Engineering Physics,Tata Mcgraw-Hill Publishing Company Limited,New Delhi.2009.
2　　Neil W.Ashcroft, N.David Mermin, Solid state physics, Cengage Publication, 2011.
3　　S.O.Pillai, Solid State Physics, New Age International, New Delhi, 2005.
4　　William D.Callister, Material Science and Engineering, Wiley Publications, 2006.
5　　Dr.G.Senthil kumar, Engineering Physics-II, VRB Publishers Pvt.Ltd.Chennai.(2013).

COURSE OUTCOMES :
At the end of the course student should be able to:
　CO1　　Understand the properties and applications of conducting, super conducting materials
　CO2　　Identify the electrical properties of semiconducting materials.
　CO3　　Classify the magnetic materials based on the properties and employ it to act as an memory storage device.
　CO4　　Understand the various types of polarisation and applications of dielectric materials.
　CO5　　Comprehend the preparation and properties of advanced engineering materials for industrial applications.

16CH102   **ENVIRONMENTAL SCIENCE AND ENGINEERING**   L   T   P   C
                  (Common to All B.E. / B. Tech. Courses)   3   0   0   3

UNIT I   ENVIRONMENT & BIODIVERSITY   9

Definition, scope and introduction –planet earth (atmosphere, lithosphere & hydrosphere) of environment. Introduction to biodiversity definition: genetic, species and ecosystem diversity –Values of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values–threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.

UNIT II   AIR &NOISE POLLUTION   9

Air pollution - Atmospheric chemistry - Chemical composition of the atmosphere-Definition- causes, effects and control measures. Control of particulate and gaseous emission - Electrostatic precipitator – automobile emission - catalytic convertor - Acid rain- Green house effect - Global warming- -Air (Prevention & control of pollution act) - Noise pollution – Definition, effects & control of noise pollution.

UNIT III   WATER & SOIL POLLUTION   9

Water and their environment significance-Water quality parameters-Physical, chemical and biological parameters-Dissolved Oxygen-Biological Oxygen demand – Chemical Oxygen Demand (Definition only) - Water pollution- causes, effect & control measures-Sewage water treatment – Water (prevention & control of pollution act) - Soil pollution-Definition, causes, effects of soil pollution

UNIT IV   CONVENTIONAL   &   NON   CONVENTIONAL   ENERGY   9
**   RESOURCES**

Conventional – Coal – Gross net calorific value (Definition only) – Coke – Manufacture of coke – Otto Hoffmann method **–** Petroleum- Fractional distillation - Natural gas - LPG and CNG-Need for alternative energy resources –Nuclear energy- Fission and fusion reactions- Light water nuclear reactor for power generation (block diagram only) – Solar energy – Wind energy-H_2O_2 fuel cell. Role of an individual in conservation of energy resources

UNIT V   GREEN CHEMISTRY & ENVIRONMENTAL MANAGEMENT   9

Green chemistry- Principles of green chemistry – Water conservation – Rain water harvesting - Solid waste management: causes, effects and control measures of municipal solid wastes. Disaster management – Floods, Earthquake – Population growth – Population explosion and its consequences - Role of information technology in environment and human health.

                                        L :45   T: 0   P: 0   T: 45 PERIODS

TEXT BOOKS
1   Dr.A.Ravikrishnan, "Environmental Science & Engineering"Sri Krishna Hitech Pub.Co.Pvt.Ltd.2013
2   Benny Joseph, "Environmental Science & Engineering" Tate McGraw-Hill Pub.Co.Ltd, New Delhi.2009.

REFERENCES

1   G.Tyler Miller, "Environmental Science" Cengage Learning India Pvt. Ltd.New Delhi.2011
2   Dr. Debang Solanki, "Principles of EnvironmentalChemistry" Prateeksha Pub.Jaipur.2011.
3   Gilbert M. Masters and Wendell. P.Ela, "Introduction to Environmental Engineering and Science" PHI Learning Pvt. Ltd. New Delhi.2010
4   Deeksha Dave and S.S. Katewa, "Environmental Science & Engineering" Learning India Pvt. Ltd.New Delhi.2011
5   Benny Joseph "Environmental Science & Engineering" Tata McGraw-Hill Pub.Co.Ltd, New Delhi. 2009 .

COURSE OUTCOMES :

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

CO1   Understand the importance of fossil fuels as energy sources, development of alternative   sources of energy like solar, wind etc
CO2   Aware on green house effect, various types of pollutions and global warming
CO3   Know about the effects of automobile emission and its control measures
CO4   Gain knowledge about the protection of environment
CO5   Conscious on water conservation, rapid growth of population and advantages of green chemistry

16IT101	ADVANCED C PROGRAMMING	L	T	P	C
	[Common to CSE & IT]	4	0	0	4

UNIT I   **POINTERS & DYNAMIC MEMORY ALLOCATION**   **12**

C fundamentals - Pointers – Pointers expression-Pointers & Arrays –Multiple indirection-Pointers to functions- Function Pointers- Dynamic allocation functions-restrict qualified pointers- problem with pointers

UNIT II   **USER DEFINED DATA TYPES**   **12**

Structures-Array of Structures-Passing Structure to functions-Function Pointers-Arrays and Structures within structures - Unions- Bit fields – Type definition-Enumerations.

UNIT III   **FILE HANDLING**   **12**

Files in C- File Pointer- Opening, Closing &Flushing Files - Writing a Character- Reading a Character- Using fopen, getc, putc, and fclose- Working with Strings: fputs and fgets- rewind- ferror- fread-fwrite-fseek and Random-Access- fprintf and fscanf- The Standard streams

UNIT IV   **ADVANCED FEATURES**   **12**

Introduction-Bitwise operators-Command Line Arguments-C-Preprocessor-The # and ## preprocessor operators-Type Qualifier-Variable Length argument list –Memory models and pointers.

UNIT V   **LINEAR DATA STRUCTURES**   **12**

Abstract Data Types (ADT) – List ADT – array-based implementation – linked list implementation: singly linked list –doubly linked list-circular linked list -applications of lists

                                 L : 60   T: 0   P: 0   Total: 60 PERIODS

TEXT BOOKS
1   Herbert Schildt, "The Complete Reference C",TMH, Fourth edition,2008

2.   M. A. Weiss, "Data Structures and Algorithm Analysis in C", Pearson Education, 2nd Edition, 2005.

REFERENCES
1   Brian W. Kernighan, Dennis Ritchie "The C Programming Language" Pearson Education India; Second edition 2015
2   E. Balagurusamy, "Programming In Ansi C", TMH, Fifth edition, 2011
3   Byron Gottfried, Jitender Chabra ," Programming with C"McGraw Hill Education; Third edition 2010
4   Pradip Dey,Manas Ghosh, "Computer Fundamental & Programming in C", Oxford Higher education,Oxford University Press,2006
5   Harry, Chris James   Data Structures In C: Beginner's Easy Guide Kindle Edition , Programmers Mind Inc 2014

COURSE OUTCOMES

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

CO1   Demonstrate the dynamics of memory by the use of pointers
CO2   Apply the concepts of data using primitive & structured types
CO3   Use different data structures and create/update basic data files.
CO4   Understand the applications of pre-processors and memory models in C
CO5   Design a linked list using C

16ME104	ENGINEERING GRAPHICS	L	T	P	C
	(Common to CSE, ECE, EEE, EIE, IT and BIO)	3	0	2	4

UNIT I   PROJECTION OF POINTS, LINES AND PLANE SURFACES   9+6

Projection of points, Projection of straight lines located in the first quadrant – Determination of true lengths and true inclinations – Projection of polygonal surface and circular lamina inclined to both reference planes.

UNIT II   PROJECTION OF SOLIDS   9+6

Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by change of position method.

UNIT III   SECTION OF SOLIDS   9+6

Sectioning of above solids in simple vertical position by cutting planes inclined to one reference plane and perpendicular to the other – Obtaining true shape of section.

UNIT IV   ISOMETRIC PROJECTIONS & FREE HAND SKETCHING   9+6

Principles of isometric projection – isometric scale – isometric drawings of simple solids, truncated prisms, pyramids, cylinders and cones.

Free hand sketching:

Representation of Three Dimensional objects – General principles of orthographic projection – Need for importance of multiple views and their placement – First angle projection – layout views – Developing visualization skills through free hand sketching of multiple views from pictorial views of objects.

UNIT V   BUILDING DRAWING   9+6

Drawing of a plan, Elevation and sectioning of security room and residential building (Two bed rooms, kitchen, hall, etc.)

L : 45   T: 0   P: 30   Total: 75 PERIODS

TEXT BOOKS

1   N.D. Bhatt and V.M. Panchal, "Engineering Drawing" Charotar Publishing House, 53rd Edition, (2016).

2   K. R. Gopalakrishnan, "Engineering Drawing" (Vol.I & II), Subhas Publications (2014).

REFERENCES

1   K. V. Natarajan, "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai (2016).

2   M.S. Kumar, "Engineering Graphics", D.D. Publications, (2016).

3   M.B. Shah and B.C. Rana, "Engineering Drawing", Pearson Education (2015).

4   CADD Centre, Solid Edge, Reference Guide 14, 2015.

COURSE OUTCOMES

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

CO1   Draw projections of points, straight lines and plane surfaces.

CO2   Illustrate top view and front view of the solids.

CO3   Outline Sectioned Views of the solids.

CO4   Exhibit knowledge about isometric, perspective and orthographic projections.

CO5   Design simple residential and office buildings.

16GE112   **CAREER DEVELOPMENT PROGRAMME - II**   L   T   P   C

                               (Common to All B.E. / B. Tech. Courses)   1   0   2   2*

UNIT I   LINGUISTIC SKILLS II   **15**

Goal Settings, Insights into pre-placement requisites, SWOT Analysis, LSRW Skills

UNIT II   QUANTITATIVE ABILITY III   **8**

Time, speed and distance -Train problems-Boats and streams, Time and work – Pipes and cisterns, Calendars, Venn diagram.

UNIT III   QUANTITATIVE ABILITY IV   **7**

Probability, Permutation &Combination, Mixtures & Allegation, Mensuration, Data Interpretation.

UNIT IV   PERSONALITY DEVELOPMENT   **8**

Personality, Presentation Skills – stages, selection of topic, content & aids, Minutes of meeting, Public speaking.

UNIT V   COMMUNICATION SKILLS   **7**

Power point presentation, Speak for three minutes, Online typing, Passage reading.

                               L :15   T: 0   P: 30   T: 45 PERIODS

TEXT BOOKS

   1   John Eastwood, "Oxford Practice Grammar", Oxford, 2006.

   2   Rajesh Varma, "Fast Track Objective Arithmetic", Arihant Publications, 2010.

   3   Barun K. Mithra, 2016, "Personality Development & Soft Skills", Oxford.

REFERENCES

   1   R.V.Praveen, "Quantitative Aptitude and Reasoning" PHI Publication, 2012.

   2   R.S.Agarwal, "Quantitative Aptitude for Competitive Examinations", S.Chand & Company Pvt Limited, 2016.

COURSE OUTCOMES

At the end of the course students should be able to

CO1   Understand the field Linguistic techniques.

CO2   Communicate at the basic level in public speaking and write reports.

CO3   Solve time related problems.

CO4   Get the critical concepts through the mixture & allegation & data interpretation sums.

CO5   Write minutes of meeting and versatile presentations.

16IT103   **CAREER DEVELOPMENT PROGRAMME II**   **L   T   P   C**
                          (Problem Solving Using C)

                                                              1   0   2   2*
Module I: **15**

File and String: File Pointer, File Operations, File handling function, Error Handling during I/O Operations, Command Line Arguments. String: String operations, String Arrays, sorting, searching, Inline Functions, Inline Recursive Functions

Module II: **15**

Pointer: pointer to const data –const pointer –const pointer to const data –Void pointer or Generic Pointer –Null pointer –wild pointer, Recursion

Module III: **15**

Dynamic memory allocation –Core dump –Memory leak –Dynamic 1D and 2D Arrays, Dangling Pointers, Stiring .**Storage Classes:** Register, Auto, Static, Extern

                                    L:15 P: 30 T: 0   Total: 45 Periods

TEXT BOOKS
1.   Herbert Schildt, "The Complete Reference C",TMH, Fourth edition,2008

2.   M. A. Weiss, "Data Structures and Algorithm Analysis in C", Pearson Education, 2nd Edition, 2005.

REFERENCES
1.   Brian W. Kernighan, Dennis Ritchie "The C Programming Language" Pearson Education India; Second edition 2015
2.   E. Balagurusamy, "Programming In Ansi C", TMH, Fifth edition, 2011
3.   Byron Gottfried, Jitender Chabra ," Programming with C"McGraw Hill Education; Third edition 2010
4.   Pradip Dey,Manas Ghosh, "Computer Fundamental & Programming in C", Oxford Higher education,Oxford University Press,2006
5.   Harry, Chris James   Data Structures In C: Beginner's Easy Guide Kindle Edition , Programmers Mind Inc 2014

COURSE OUTCOMES

At the end of the course students should be able to

CO1   Write simple programs using basic C Concepts

CO2   Write C programs using concepts in control statements.

CO3   Write C programs to solve problems using Arrays, Functions, Pointers, Unions, and Structures

CO4   Demonstrate the dynamics of memory by the use of pointers

CO5   Apply the concepts of data using primitive & structured types

16EN103   **COMMUNICATION SKILLS LABORATORY**   L   T   P   C
                    (Common to all B.E. / B. Tech. Courses)   0   0   4   2

UNIT I   LISTENING   15

Listening and Responding -Listening to fill up information gaps-Listening to announcements at Railway stations, Airport, etc. - Listening to News on the radio/TV – listening to songs – writing lyrics.

UNITII   SPEAKING   15

Phonetics: Intonation - Correct Pronunciation- Tongue twisters/pronunciation drills - Introducing oneself -Creative thinking and speaking-Group Discussion-Conversation techniques – Negotiating others- Discussing as a group and making an oral report on the points discussed- Presentation of problems & solutions-Presentation skills-Interview techniques -Master of ceremony.

UNIT III   READING   10

Reading for pleasure - Reading for specific information- Reading and reviewing books, articles, projects-Cloze exercises.

UNIT IV   WRITING   15

Writing reviews on articles, stories - Letter Writing –Resume & cover letter, resume, Joining letter & Resignation letter - Picture Perception - Preparing projects.

UNIT V   SOFT SKILLS   5

Emotional Intelligence- Inter & Intra personal skills-Teamwork -Time & Stress management-Leadership skills.

                                    L :0   T: 0   P:60   Total: 60 PERIODS

TEXT BOOKS
 1   Anderson, P.V, Technical Communication, Thomson Wadsworth, Sixth Edition, New
      Delhi, 2007.
 2.   John Seely, The Oxford Guide to Writing and Speaking, Oxford University Press, New
      Delhi, 2004.

REFERENCES
 1   Prakash, P, Verbal and Non-Verbal Reasoning, Macmillan India Ltd., Second Edition,
      New Delhi, 2004.
 2   Anderson, Paul V. Technical Communication: A Reader-Centered Approach. Cengage.
      New Delhi. 2008
 3   Department of English, Anna University. Mindscapes: English for Technologists and
      Engineers. Orient Blackswan, Chennai. 2012
 4   Raman, Meenakshi & Sangeetha Sharma. Technical Communication: Principles and
      Practice.Oxford University Press, New Delhi. 2011
 5   Viswamohan, Aysha. English for Technical Communication. Tata McGraw-Hill, New
      Delhi. 2008

COURSE OUTCOMES

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

CO1   Face the challenges of the globalized world with confidence and with the best communicative
        skills.
CO2   Make learners imbibe listening and speaking skills in both formal and informal contexts.
CO3   Help them develop their reading skills by familiarizing them with different types of reading
        strategies.
CO4   Make them acquire language skills at their own pace by using e-materials and language lab
        components.
CO5   Enrich their creative and critical thinking and get through interviews successfully.

16CH103	**CHEMISTRY LABORATORY**	**L**	**T**	**P**	**C**
	(Common to All B.E. / B. Tech. Courses)	**0**	**0**	**2**	**1**

LIST OF EXPERIMENTS

1. Estimation of hardness of Water by EDTA.
2. Determination of DO in water (Winkler's method)
3. Estimation of Chloride in Water sample (Argentometric).
4. Conductometric titration (Simple acid base).
5. Conductometric titration (Mixture of weak and strong acids vs strong base).
6. Potentiometric Titration (Fe^{2+} / $KMnO_4$ or $K_2Cr_2O_7$).
7. pH titration (acid & base).
8. Determination of inhibitor efficiency on the corrosion rate of steel in acid media by weight loss method.
9. Anodizing of aluminum and determination of thickness of anodic film.
10. Determination of cathode efficiency of nickel plating.

MAJOR EQUIPMENTS / SOFTWARE REQUIRED

- Electronic balance
- pH meter
- Potentiometer
- Conductivity bridge
- Spectro Photometer
- Colorimeter
- IC regulated power supply
- Hot air oven

L : 0   T: 0   P: 30   **Total:30 PERIODS**

COURSE OUTCOMES

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

CO1	Gain the experimental knowledge of testing the water.
CO2	Carry out titration using conductivity meter, potentiometer and pH meter.
CO3	Estimate the metal ions in industrial effluents.
CO4	Set up mini electroplating unit.
CO5	Determine the inhibitor efficiency on the corrosion rate of steel.

16IT102   **ADVANCED C PROGRAMMING LABORATORY**   **L   T   P   C**

(Common to CSE & IT)   **0   0   2   1**

LIST OF EXPERIMENTS

1. POINTERS

a. Implementation of Pointer to Function

b. Implementation of Pointer to Array

c. Implementation of Function Pointers

2. ARRAYS AND STRUCTURES

a. Implementation of Pointer using Array

b. Implementation of Structure, Nested Structure & Array of Structure

3. FILES

a. Implementation of Binary and Text Files

b. Implementation of File Management Functions

c. Implementation of File Operations

4. PREPROCESSOR

a. Implementation of Macros and Compiler Directives

5.LINKED LIST

 a. Implementation of singly linked and doubly linked list

b .Implementation of polynomial addition using linked list

MAJOR EQUIPMENTS / SOFTWARE REQUIRED

Hardware
- 30 PCs
- Processor-2.0 GHz or Higher
- RAM-256 MB or Higher
- Hard disk-20 GB or Higher

Software
- Turbo C / C
- Windows

L : 0   T: 0   P: 30   Total:30 PERIODS

COURSE OUTCOMES

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

CO1   Apply the Programming Knowledge in Arrays, Structures, Pointers and Files.

CO2   Write a C program to solve specified problems

CO3   Create and use objects from predefined class libraries

CO4   Formulate problems and implement algorithms in C.

CO5   Choose programming components that efficiently solve computing problems in real-world

16MA201   **TRANSFORMS AND PARTIAL DIFFERENTIAL**   L   T   P   C
EQUATIONS

(Common to all B.E. / B. Tech. Courses)   **3   1   0   4**

UNIT I   FOURIER SERIES   9+3

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series –Parseval's identity – Harmonic Analysis.

UNIT II   FOURIER TRANSFORMS   9+3

Fourier transform pair – Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem– Parseval's identity.

UNIT III   PARTIAL DIFFERENTIAL EQUATIONS   9+3

Formation of partial differential equations – Lagrange's linear equation –Solution of standard types of first order partial differential equations – Linear partial differential equations of second order with constant coefficients (Homogeneous Problems).

UNIT IV   APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS   9+3

Solutions of one dimensional wave equation – One dimensional equation of heat Conduction – Steady state solution of two-dimensional equation of heat conduction (Insulated edges excluded) – Fourier series solutions in Cartesian coordinates.

UNIT V   Z -TRANSFORMS AND DIFFERENCE EQUATIONS   9+3

Z- Transforms – Elementary properties – Inverse Z - Transform – Convolution theorem – Formation of difference equation – Solution of difference equations using Z - Transform.

L:45   T:15   P: 0   Total: 60 PERIODS

TEXT BOOKS
1 Grewal, B.S., "Higher Engineering Mathematics", 43rd Edition, Khanna Publications, Delhi, 2014.
2. Ramana, B.V., "Higher Engineering Mathematics", Tata McGraw Hill Publishing Company, New Delhi, 2014.

REFERENCES
1 Bali, N.P. and Manish Goyal, "A Textbook of Engineering Mathematics", Fifth Edition, Laxmi Publications (P) Ltd., 2014.
2 Glyn James, "Advanced Modern Engineering Mathematics", Fourth Edition, Pearson Education, 2013.
3 Erwin Kreyszig, "Advanced Engineering Mathematics", Tenth Edition, Wiley India, 2015.
4 Ronald Bracewell, "The Fourier transforms & its Applications" 3rd Edition, 2012.
5 Zachmanoglou, E.C., "Introduction to partial differential Equations with Application", 2012.

COURSE OUTCOMES
At the end of the course student should be able to:
CO1 Know how to find the Fourier Series and half range Fourier Series of a function given explicitly or to find Fourier Series of numerical data using harmonic analysis.
CO2 Find the Fourier transform, sine and cosine transform of certain functions and use Parseval's identity to evaluate integrals.
CO3 Form partial differential equations and solve certain types of partial differential equations.
CO4 Solve one dimensional wave equation, one dimensional heat equation and two dimensional heat equation in steady state using Fourier Series.
CO5 Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems.

16CS201   **OBJECT ORIENTED PROGRAMMING**   **L   T   P   C**
                               [Common to CSE & IT]   **3   0   0   3**

UNIT I   INTRODUCTION   9

Introduction – Tokens, Keywords, Identifiers and Constants, Data types, control statements, functions, structures – overview of core C++ Languages. Classes – access specifiers – function and data members – default arguments – function overloading – friend functions – const and volatile functions – static members – Objects – pointers and objects – constant objects.

UNITII   CONSTRUCTORS & OPERATOR OVERLOADING   9

Constructors - default constructor – Parameterized constructors – Constructor with dynamic allocation – copy constructor – destructors – operator overloading – overloading through friend functions – overloading the assignment operator – type conversion – explicit constructor.

UNIT III   TEMPLATES & EXCEPTION HANDLING   9

Function and class templates – Exception handling – try-catch-throw paradigm – exception specification – terminate and unexpected functions – Uncaught exception.

UNIT IV   INHERITANCE & I/O   9

Inheritance – public, private, and protected derivations – multiple inheritance – virtual base class – abstract class – Runtime polymorphism – Virtual functions – Pure virtual functions – Streams and formatted I/O – I/O with multiple object – I/O manipulators – Error handling in File I/O – file handling.

UNIT V   JAVA BASICS   9

Java Basics – Structure of Java program – Java vs. C++ – Data types – Type Conversions and Casting – Arrays – Operators – Control statements in Java. Class fundamentals: Declaring Objects – Assigning Object Reference Variables –Introducing methods – Constructors-Case Study Traffic Simulation.

                                          L : 45   T: 0   P: 0   Total: 45 PERIODS

TEXT BOOKS
 1   B. Trivedi, "Programming with ANSI C++", Second edition, Oxford University Press, 2012.
 2.   D.Norton and H. Schildt, "Java 2 the complete Reference", Fifth edition, TMH, 2002.

REFERENCES
 1   Ira Pohl, "Object Oriented Programming using C++", Pearson Education, Fourth edition 2005.
 2   S. B. Lippman, JoseeLajoie, Barbara E. Moo, "C++ Primer", Fourth Edition, Pearson Education, 2005.
 3   B. Stroustrup, "The C++ Programming language", Fourth edition, Pearson Education, 2013.
 4   Herbert Schildt, "C++: The Complete Reference", Fourth Edition Tata McGraw Hill Publishing Company, New Delhi, 2011.
 5   Cay S. Horstmann and Gary Cornell, "Core Java: Volume I – Fundamentals", Eighth Edition, Sun Microsystems Press, (2008).

COURSE OUTCOMES
At the end of the course student should be able to:
CO1   Explain the principles of the object oriented programming paradigm namely abstraction, encapsulation, inheritance and polymorphism
CO2   Implement memory operators and apply to problems.
CO3   Design, develop, test, debug, handle unexpected errors in programs using object oriented principles in conjuncture with an integrated development environment
CO4   Visualize the modularity of a problem and ways to handle classes and files.
CO5   Contribute to a good object oriented solution for basic problems in Java

16EC231	DIGITAL ELECTRONICS	L	T	P	C
	(Common to CSE,IT, Mech and Auto)	3	0	0	3

UNIT I   MINIMIZATION TECHNIQUES AND LOGIC GATES   9

Minimization Techniques: Boolean postulates and laws – De-Morgan"s Theorem - Principle of Duality - Boolean expression - Minimization of Boolean expressions — Minterm – Maxterm - Sum of Products (SOP) – Product of Sums (POS) – Karnaugh map Minimization – Don't care conditions – Quine - Mc Cluskey method of minimization.

Logic Gates: AND, OR, NOT, NAND, NOR, Exclusive–OR and Exclusive–NOR Implementations of Logic Functions using gates, NAND–NOR implementations

UNIT II   COMBINATIONAL CIRCUITS   9

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 - Multiplexer/ Demultiplexer – decoder - encoder – parity checker – parity generators – code converters - Magnitude Comparator.

UNIT III   SEQUENTIAL CIRCUITS   9

Latches, Edge triggered Flip flops SR, JK, T, D and Master slave – Characteristic table and equation, Application table, Synchronous counters, Design of synchronous counters, up/down counter, Modulo–n counter, Decade counters.

UNIT IV   DESIGN OF SEQUENTIAL CIRCUITS   9

Register, shift registers, Universal shift register, Ring counters, Classification of sequential circuits: Moore and Mealy, Design of synchronous sequential circuits, state diagram, State table, State minimization, State assignment, Introduction to Hazards: Static, Dynamic

UNIT V   DIGITAL LOGIC FAMILIES AND PLD   9

Memories: ROM, PROM, EEPROM, RAM, Programmable Logic Devices: Programmable Logic Array (PLA), Programmable Array Logic (PAL), Implementation of combinational logic using PROM , PLA and PAL, Digital logic families: TTL, ECL and CMOS.

L:45   T: 0   P: 0   Total: 45 PERIODS

TEXT BOOKS
1. M. Morris Mano, "Digital Design", 4th Edition, Prentice Hall of India Pvt. Ltd., 2008 / Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2003.
2. John.M Yarbrough, "Digital Logic Applications and Design", Thomson Learning, 2006.

REFERENCES
1. John F.Wakerly, "Digital Design", Fourth Edition, Pearson/PHI, 2008
2. Charles H.Roth. "Fundamentals of Logic Design", 6th Edition, Thomson Learning, 2013.
3. Donald P.Leach and Albert Paul Malvino, "Digital Principles and Applications", 6th Edition, TMH, 2006.
4. S.Salivahanan and S.Arivazhagan,―Digital Circuits and Design‖,Third Edition, Vikas Publishing House Pvt. Ltd, New Delhi,2007
5. Donald D.Givone, ―Digital Principles and Design‖, Tata Mc-Graw Hill Publishing company limited, New Delhi, 2002.

COURSE OUTCOMES
At the end of the course student should be able to:
CO1 Understand the different methods used for simplification of Boolean expressions.
CO2 Analyze the Combinational circuits.
CO3 Describe the Sequential building blocks & Memory elements.
CO4 Design a sequential circuits
CO5 Classify the different memories and implement the digital circuits.

| 16EE202 | ELECTRONIC DEVICES AND CIRCUITS | L | T | P | C |
| | (Common to EEE,EIE,BME, CSE & IT) | 3 | 0 | 0 | 3 |

UNIT I   PN JUNCTION DEVICES   9

Overview of Semiconductors – PN junction diode : Structure, Operation and V-I Characteristics, Diffusion and Transition capacitance, Zener diode – Characteristics – Diode Applications : Rectifiers, Clipper and Clamper. LED, Laser diode, Photodiode - PV Cells

UNITII   TRANSISTORS   9

BJT- JFET - MOSFET – Structure, Operation, Characteristics and Biasing. UJT, SCR, TRIAC: Structure and Characteristics. Photo transistor - Opto-isolators.

UNIT III   SMALL SIGNAL AMPLIFIERS   9

BJT small signal model – Analysis of CE, CB, CC amplifiers – Gain and frequency response. Multistage Amplifiers – Cascade connection, Darlington connection – Differential amplifier : Dual input balanced output – Common mode and differential mode analysis. (Qualitative Treatment only)

UNIT IV   POWER AMPLIFIERS AND SWITCHING CIRCUITS   9

Transformer coupled Class A, Class B push pull, Class AB push pull & Class C amplifiers – crossover distortion. Multivibrator – Monostable, astable and bistable multivibrator – Schmitt triggers.

UNIT V   FEEDBACK AMPLIFIERS AND OSCILLATORS   9

Advantages of negative feedback – voltage / current-series /shunt feedback –positive Feedback – Condition for oscillations, phase shift – Wien bridge, Hartley, Colpitts and Crystal oscillators.

L : 45   T: 0   P: 0   Total: 45 PERIODS

TEXT BOOKS

1   David A. Bell , "Electronic Devices and Circuits", Prentice Hall of India, 5th Edition, 2008.
2.   Jacob Millman, Christo C Halkies and Sathyabarath Jit "Electronic Devices and Circuits", Tata McGraw Hill, 2008.

REFERENCES

1   Floyd, "Electronic Devices" Pearson Asia 7th Edition, 2009.
2   Vinoth Kumar Khanna, "Insulated Gate Bipolar Transistor IGBT Theory and Design", Wiley-IEEE Press, 2004.
3   Donald A Neamen, "Electronic Circuit Analysis and Design" Tata McGraw Hill, 3rd Edition, 2006.
4   S.Poornachandra, B.Sasikala, "Electronic Devices and Circuits", Scitech Publications India, (P) Ltd, Chennai, 2010,
5   Salivahanan.S, Vallavaraj.A and Kumar.N.S, "Electronic Devices and Circuits" Tata McGraw Hill, 2012.

COURSE OUTCOMES

At the end of the course student should be able to:
CO1   Explain the structure of the basic electronic devices
CO2   Analyze the switching characteristics of transistors
CO3   Model the different configuration of Small signal amplifier
CO4   Construct the power amplifiers and switching circuits
CO5   Design the applications of electronic gadgets using the basic electronic devices

16IT201	DATA STRUCTURES	L	T	P	C
	[Common to CSE & IT]	3	0	0	3

UNIT I   LINEAR STRUCTURES & TREES   9

Stack ADT – Queue ADT – circular queue implementation – Applications of stacks and queues- Tree ADT – tree traversals – left child right sibling data structures for general trees – Binary Tree ADT – expression trees

UNIT II   ADVANCED TREES   9

Binary search tree ADT – AVL trees – binary heaps – B trees-B+ trees –Red Black trees- Applications of trees

UNIT III   GRAPHS   9

Definitions – Topological sort – Breadth-first traversal - shortest-path algorithms –minimum spanning tree – Prim's and Kruskal's algorithms – Depth-first traversal –bi connectivity – Euler circuits – applications of graphs.

UNIT IV   HASHING AND SETS   9

Hashing – Separate chaining – open addressing – rehashing – extendible hashing –Disjoint Set ADT – dynamic equivalence problem – smart union algorithms – path compression – applications of Sets

UNIT V   SORTING AND SEARCHING   9

Introduction to Algorithm analysis: Asymptotic notation- Sorting: Bubble sort- Selection sort- Insertion sort- Shell sort- Heap sort- Quick sort- Merge sort – Searching: Linear search- Binary search.

L : 45   T: 0   P: 0   Total: 45 PERIODS

TEXT BOOKS

1   M. A. Weiss, "Data Structures and Algorithm Analysis in C", Pearson Education, 2nd Edition, 2002

2.   A. V. Aho, J. E. Hopcroft and J. D. Ullman, "Data Structures and Algorithms", Pearson Education, 2nd Edition, 2007

REFERENCES

1   Robert Kruse, Cl Tondo, "Data Structures and Program Design in C", Pearson Education India, 2nd Edition, 2007

2   A.M.Tenenbaum, Y. Langsam and M. J. Augenstein, "Data Structures using C", Pearson Education, 1st Edition, 2003

3   Reema Thareja, "Data Structures Using C" Oxford Second Edition, 2014.

4   Sahni Horowitz, "Fundamentals of Data Structures in C" Universities Press; Second edition 2008

5   Ashok Kamthane, " Data Structures Using C ", Pearson Education, 2nd Edition, 2012

COURSE OUTCOMES

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

CO1   Understand and apply various data structure such as stacks, queues, trees and graphs to solve various computing problems using C-programming language.

CO2   Implement and know when to apply standard algorithms for searching and sorting

CO3   Describe the hash function and concepts of collision and its resolution methods

CO4   Solve problem involving graphs, trees and heaps

CO5   Choose the data structure that efficiently model the information in a problem

16IT202   **COMPUTER ORGANIZATION AND ARCHITECTURE**   **L**   **T**   **P**   **C**
[Common to CSE & IT]   **3**   **0**   **0**   **3**

UNIT I   **BASIC STRUCTURE OF COMPUTERS**   **9**

Functional units - Basic operational concepts - Performance – Bus Structures - Power wall – Uniprocessors to multiprocessors – Memory locations and addresses – Memory operations – Instruction and instruction sequencing – Additional instructions - Addressing modes – Assembly language

UNIT II   **ARITHMETIC OPERATIONS**   **9**

Addition and subtraction of signed numbers – Design of fast adders – Multiplication of positive numbers - Signed operand multiplication- fast multiplication – Integer division – Floating point numbers and operations

UNIT III   **PROCESSOR AND PARALLELISM**   **9**

Fundamental concepts – Execution of a complete instruction – Multiple bus organization – Hardwired control – Micro programmed control – Pipelining: Basic concepts – Data hazards – Instruction hazards – Influence on Instruction sets – Data path and control consideration.

UNIT IV   **MEMORY SYSTEM**   **9**

Basic concepts – Semiconductor RAMs - ROMs – Speed - size and cost – Cache memories - Performance consideration – Virtual memory- Memory Management requirements – Associative memories – Secondary storage – Case Study: Multi core processor and its memory

UNIT V   **I/O ORGANIZATION**   **9**

Accessing I/O devices – Interrupts – Direct Memory Access – Buses – Interface circuits – Standard I/O Interfaces (PCI, SCSI, USB) – Case study: ARM interrupt structure

L : 45   T: 0   P: 0   Total: 45 PERIODS

TEXT BOOKS

1. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, "Computer Organization", McGraw-Hill, 5th Edition 2011.
2. David A. Patterson and John L. Hennessey, "Computer organization and design", MorganKauffman /Elsevier, 4th edition, 2012

REFERENCES

1. William Stallings, "Computer Organization and Architecture designing for Performance", Pearson Education 8th Edition, 2010
2. David A.Patterson and John L.Hennessy, "Computer Organization and Design: The hardware /Software interface", Morgan Kaufmann, 4th Edition, 2008
3. John P.Hayes, "Computer Architecture and Organization", McGraw Hill, 3rd Edition, 2002
4. M. Morris R. Mano "Computer System Architecture" 3rd Edition 2007
5. David A. Patterson "Computer Architecture: A Quantitative Approach", Morgan Kaufmann; 5th edition 2011

COURSE OUTCOMES

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

CO1 Apply the knowledge in performance metrics to find the performance of systems
CO2 Analyze and evaluate various processor and control unit
CO3 Apply knowledge about memory and I/O systems in practical problems
CO4 Discuss about the memory organization
CO5 Describe the operations in register transfer, micro operations and input-output organization

16GE211	CAREER DEVELOPMENT PROGRAMME - III	L	T	P	C

(Common to All B.E. / B. Tech. Courses)   1   0   2   2*

UNIT I   PERSONALITY DEVELOPMENT & SOFT SKILLS   8

Body Language – Introduction, Grooming, Postures and Gestures, Dressing Etiquettes, Hygiene & Cleanliness, Time Management. Resume Building – Introduction, difference between Resume and CV, Strategy of resume writing Body of the resume, Clarity and Crispness, Format and Content, Code of Conduct.

UNIT II   LINGUISTIC SKILLS III   15

Synonyms & Antonyms, Error Spotting , Paragraph Writing ,Word Substitution, Jumbled words, Spellings, Dialogue Writing, Presentation.

UNIT III   VERBAL REASONING   I   8

Analytical reasoning - Linear, Circular & Complex arrangement, Blood relation, Direction Problems.

UNIT IV   VERBAL REASONING   II   7

Logical reasoning – Number and Alpha series, Odd man out, Element series, Logical series, Coding and decoding, Syllogisms, Alphabets.

UNIT V   PRACTICALS   7

Extempore speech, Online typing, Mock Interview, Case based interview, Passage writing.

L :15   T: 0   P: 30   T: 45 PERIODS

TEXT BOOKS
     1   Barun K. Mithra, "Personality Development & Soft Skills", Oxford, 2006.
     2   S.P.Bakshi, "Objective English" Arihant Publications, 2014.
     3   R.V.Praveen, "Quantitative Aptitude and Reasoning" PHI Publication, 2012.

REFERENCES
     1   R.V.Praveen, "Quantitative Aptitude and Reasoning" PHI Publication, 2013.

COURSE OUTCOMES
At the end of the course students should be able to
CO1   Improves their personality through non-verbal communication and write good resume.
CO2   Write sentences and dialogues through paragraph & dialogue writing.
CO3   Apply their analytical thinking.
CO4   Think logically in critical situations.
CO5   Face the interviews confidently through attending the mock interview sessions.

16GE213   **CAREER DEVELOPMENT PROGRAMME - III**   **L   T   P   C**

                    (Common to All B.E. / B. Tech. Courses)   **1   0   2   2***

UNIT I   LINGUISTIC SKILLS I   8

Parts of speech, Transformation of sentences-simple, complex, compound, Homonyms, Question tags.

UNIT II   LINGUISTIC SKILLS II   15

Synonyms, Antonyms, Cloze Test ,Voice, Idioms & Phrases. Verbal Analogies.

UNIT III   VERBAL ABILITY I   8

Logical sequence of words, Jumbled Words, Spellings, One word substitution.

UNIT IV   VERBAL ABILITY II   7

Comparison, Paragraph formation, Error spotting

UNIT V   VERBAL ABILITY III   7

Comprehension-comprehend and understand a passage, Dialogue Writing, Power point Presentation.

                              L :15   T: 0   P: 30   T: 45 PERIODS

TEXT BOOKS
1   Dr. Aggarwal R.S and Monika Agarwal, "Objective General English", New Delhi, Sultan Chand and Company Ltd., 1999.
2   Arun Sharma & Meenakshi Upadhay,"Verbal ability and Reading comprehension".Mc Graw Hill Education.

REFERENCES
1   "Aptimithra" , McGraw Hill Publications, 2012.
2   Ajaysingh," ,"Verbal ability and Reading comprehension", Arihant publication.

COURSE OUTCOMES
At the end of the course students should be able to
CO1   Understand the importance & fundamentals of communication.
CO2   Start speaking and writing in English without making any mistakes.
CO3   Develop presentation skills.
CO4   Think logically in critical situations.
CO5   Prepare the questionnaire.

16CS203   **OBJECT ORIENTED PROGRAMMING LAB**   **L   T   P   C**

[Common to CSE & IT]   **0   0   4   2**
LIST OF EXPERIMENTS

1. Implementation of a class with User-defined Data types, Derived Data Types, Manipulators, Expressions and Control Structures.
2. Implementation of the concept of array of objects.
3. Design a class with access specifiers with static members, methods and default arguments.
4. Design C++ classes using friend functions with any instance.
5. Implementation of a class with Constructor, default constructor, Parameterized constructors, Constructor with dynamic allocation , copy constructor ,destructors
6. Overload the new and delete operators to provide custom dynamic allocation of memory.
7. Develop a Templates and overloading of function templates,
8. Design a C++ class for Exception handling with try-catch-throw paradigm –exception specification and uncaught exception.
9. Design a class using dynamic polymorphism with Virtual Functions.
10. Implementation of Abstract Class using C++
11. Implementation of a class for Inheritance with public, private, and protected derivations and   multiple inheritance using C++
12. Implementation of class with constructor using Java

MAJOR EQUIPMENTS / SOFTWARE REQUIRED
Hardware
- LAN System with 33 nodes (OR) Standalone PCs – 33 Nos.
- Printers – 3 Nos.

Software
- OS – Windows XP
- Turbo C (freeware)
- Compiler – C++ , Java

L : 0   T: 0   P:60   Total:60 PERIODS

COURSE OUTCOMES
At the end of the course student should be able to:

CO1	Strengthen the problem solving ability by applying the characteristics of an object-oriented approach
CO2	Implements fundamental constructs of OOP- classes, objects friend function, inline functions and dynamic programming
CO3	Apply critical thinking skills and creativity to solve the problems
CO4	To design and implement object oriented software to solve moderately complex problems
CO5	Implement programs using memory operations in java

16EC232	DIGITAL ELECTRONICS LABORATORY	L	T	P	C
	(Common to CSE,IT, Mech and Auto)	0	0	2	1

LIST OF EXPERIMENTS

1. Verification of Boolean Theorems using digital logic gates.
2. Design and implementation of Adder and Subtractor using logic gates.
3. Design and implementation of code converters using logic gates
4. Design and implementation of odd/even parity generator / checker.
5. Design and implementation of 2 bit magnitude comparator.
6. Design and implementation of encoder and decoder.
7. Design and implementation of application using multiplexers/ demultiplexers.
8. Implementation of SISO, SIPO, PISO and PIPO shift registers using Flip- flops.
9. Design and implementation of 3 bit synchronous and asynchronous counters.
10. Construction and verification of 4 bit ripple counter and Mod-10 / Mod-12 Ripple Counters
11. Simulation of combinational circuits using Verilog Hardware Description Language.
12. Simulation of Sequential circuits using Verilog HDL.

MAJOR EQUIPMENTS / SOFTWARE REQUIRED

   Hardware
   - Digital trainer kit
   - ICs

L : 0   T: 0   P: 30   Total:30 PERIODS

COURSE OUTCOMES

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

CO1   Do the simplification of Boolean expressions
CO2   Analyze and Design the Combinational circuits.
CO3   Implement the Sequential building blocks
CO4   Design a sequential circuits using registers and flipflops
CO5   Simulate the digital circuits

16IT203	**DATA STRUCTURES LABORATORY**	**L**	**T**	**P**	**C**
	(Common to CSE & IT)	**0**	**0**	**4**	**2**

LIST OF EXPERIMENTS

1. Implement a program that uses stack operations to convert a given infix expression into its postfix Equivalent, Implement the stack using an array.
2. Implement array-based circular queue and use it to simulate a producer consumer problem
3. Implement an expression tree. Produce its pre-order, in-order, and post-order traversals
4. Implement Binary search tree algorithm for finding maximum and minimum element in tree structure
5. Implement a program to perform Insertion, Deletion and Searching using B tree
6. Implement a program to construct min or max heap to perform insertion and delete operations.
7. Implement a program to perform all the functions of a dictionary (ADT) using hashing
8. Implement the following sorting methods to arrange a list of integers in ascending order:
    - Insertion sort
    - Bubble sort
9. Implement Heap sort algorithm for sorting a given list of integers in ascending order.
10. Implement the following sorting methods to arrange a list of integers in ascending order:
    - Quick sort
    - Merge sort
11. Implement a program to find shortest path in graph using Dijkstra's algorithm
12. Implement a program to find minimum cost spanning tree in graph using prim's algorithm

MAJOR EQUIPMENTS / SOFTWARE REQUIRED

Hardware
- 30 PCs
- Processor-2.0 GHz or Higher
- RAM-256 MB or Higher
- Hard disk-20 GB or Higher

Software
- TURBO C version 3 (or) GCC version 3.3.4

OS-Windows2000/Windows XP/NT

L : 0   T: 0   P: 60   Total:60 PERIODS

COURSE OUTCOMES

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

CO1	Design algorithms and employ appropriate advanced data structures for solving Problems efficiently
CO2	Understand various data structure such as stacks, queues, trees, graphs, etc
CO3	Implement various hashing techniques to avoid collision
CO4	Implement various kinds of searching and sorting techniques, and know when to choose which technique
CO5	Construct a suitable data structure and algorithm to solve a real world problem

16MA202   **STATISTICS AND NUMERICAL METHODS**   **L   T   P   C**

(Common to AERO, AUTO, CIVIL, C&P, EEE, E&I, IT, MECH,   **3   1   0   4**
MCT, MAE, BME)

UNIT I   TESTING OF HYPOTHESIS   9+3

Sampling distributions – Tests for single mean, proportion, Difference of means (large and small samples) – Tests for single variance and equality of variances – Chi square test for goodness of fit- Independence of attributes.

UNIT II   DESIGNS OF EXPERIMENTS   9+3

Completely Randomized Design – Randomized block design – Latin square Design – 2^2 factorial design.

UNIT III   SOLUTIONS OF EQUATIONS AND EIGEN VALUE PROBLEMS   9+3

Newton Raphson method – Gauss Elimination method – Pivoting Gauss Jordan methods – Iterative methods of Gauss - Jacobi and Gauss - Seidal – Matrix Inversion by Gauss - Jordan method – Eigen values of a matrix by power method.

**UNIT IV   INTERPOLATION, NUMERICAL DIFFERENTIATION AND   9+3
          NUMERICAL INTEGRATION**

Lagrange's and Newton's divided difference interpolation – Newton's forward and backward difference interpolation – Approximation of derivatives using interpolation polynomials – Numerical integration using Trapezoidal and Simpson's 1/3rd rules.

**UNIT V   NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL   9+3
          EQUATIONS**

Taylor's series method – Euler's method – Modified Euler's Method – Fourth order Runge-Kutta method for solving first and second order equations – Milne's Predictor – corrector methods for solving first order equations.

L:45   T:15   P: 0   Total: 60 PERIODS

TEXT BOOKS

1. Johnson, R.A., and Gupta,C.B., Miller and Freund's, "Probability and statistics for Engineers", Pearson Education Asia,8th Edition, 2011.
2. Grewal, B.S and Grewal, J.S, "Numerical methods in Engineering and Science", 9th Edition, Khanna Publishers, New Delhi, 2012 .

REFERENCES

1. Spiegel,M.R., Schiller, J. and Srinivasan,R.A., "Schaum's Outlines Probabilty and Statistics", Tata McGraw Hill edition, 3rd Edition, 2011.
2. Chapra, S.C and Canale, R.P., "Numerical Methods for Engineers", 6th Edition, Tata McGraw Hill Edition, 2014 .
3. Gerald, C.F. and Wheatley, P.O. "Applied Numerical Analysis", 8th Edition, Pearson Education, Asia, New Delhi, 2014.
4. Walpole. R.E., Myers. R.H., Myers. S.L., and Ye. K., "Probability and Statistics for Engineers and Scientists", 8th Edition, Pearson Education, Asia, 2007.
5. Kandasamy, P., Thilagavathy. K and Gunavathy, K., "Numerical Methods", 3rd Edition, S.Chand & Company Pvt. Ltd, 2013.

COURSE OUTCOMES

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

CO1   Apply the statistical concepts and tools for engineering applications and to use different types of research methodology techniques for decision making under uncertainty.
CO2   Perform the ANOVA calculation which is needed for engineering research and project management.
CO3   Solve a set of algebraic equations representing steady state models formed in engineering problems
CO4   Find the trend information from discrete data set through numerical differentiation and summary information through numerical integration.
CO5   Predict the system dynamic behaviour through solution of ODEs modeling the system.

16CS204	OPERATING SYSTEMS	L	T	P	C
	[Common to CSE & IT]	3	0	0	3

UNIT I   OVERVIEW AND PROCESS MANAGEMENT   9

Introduction: Computer System Organization, Architecture, Operation, Process Management – Memory Management – Storage Management – Operating System – Process concept – Process scheduling – Operations on processes – Cooperating processes – Inter process communication – Threads: Multi-threading Models – Threading issues.

UNITII   PROCESS SCHEDULING AND SYNCHRONIZATION   11

CPU Scheduling: Scheduling criteria – Scheduling algorithms – Multiple-processor scheduling – Real time scheduling – Algorithm Evaluation. Process Synchronization: The critical-section problem – Synchronization hardware – Semaphores – Classical problems of synchronization. Deadlock: System model – Deadlock characterization – Methods for handling deadlocks – Deadlock prevention – Deadlock avoidance – Deadlock detection – Recovery from deadlock.

UNIT III   STORAGE MANAGEMENT   9

Memory Management: Background – Swapping – Contiguous memory allocation – Paging – Segmentation – Segmentation with paging. Virtual Memory: Background – Demand paging – Process creation – Page replacement – Allocation of frames – Thrashing.

UNIT IV   FILE SYSTEMS   8

File concept – Access methods – Directory structure – Files System Mounting – File Sharing – Protection. File System Implementation: Directory implementation – Allocation methods – Free-space management – Efficiency and Performance. Case study: File system in Linux.

UNIT V   I/O SYSTEMS   8

I/O Systems – I/O Hardware – Application I/O interface – Kernel I/O subsystem – Streams – performance. Mass-Storage Structure: Disk scheduling – Disk management – Swap-space management – RAID – disk attachment – stable storage – teritiary storage. Case study: I/O in Linux. Case Study – Cryptography as an Operating System Service.

L : 45   T: 0   P: 0   Total: 45 PERIODS

TEXT BOOKS
1. Silberschatz, Galvin, and Gagne, "Operating System Concepts", Eighth Edition, Wiley India Pvt Ltd, 2009.
2. Andrew S. Tanenbaum, "Modern Operating Systems", Fourth Edition, Pearson Education, 2010.

REFERENCES
1. Gary Nutt, "Operating Systems", Third Edition, Pearson Education, 2004.
2. Harvey M. Deitel, "Operating Systems", Third Edition, Pearson Education, 2004.
3. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", 9th Edition, John Wiley and Sons Inc., 2012.
4. William Stallings, "Operating Systems – Internals and Design Principles", 7th Edition, Prentice Hall, 2011.
5. D M Dhamdhere, "Operating Systems: A Concept-Based Approach", Second Edition, Tata McGraw-Hill Education, 2007.

COURSE OUTCOMES

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

CO1   know the difference between various types of operating systems, virtual machines and their structure and analyze various process management concepts

CO2   learn concepts in scheduling, synchronization and deadlocks

CO3   Understand multiprogramming and multithreaded systems

CO4   Know the issues related to file system interface and directory implementation

CO5   Be familiar with types of I/O management, disk scheduling, protection and security issues

16CS205	DATABASE MANAGEMENT SYSTEMS	L	T	P	C
	[Common to CSE & IT]	3	0	0	3

UNIT I INTRODUCTION 9

File Systems versus Database Systems – Data Models – Database system architecture – Entity Relationship Model – Introduction to NoSQL: Context and a bit of History – Introduction to Big Data and Scalability - Column oriented stores, Key-Value stores, Document Databases, Graph Databases

UNITII RELATIONAL MODEL 9

The relational Model – The Catalog Types – Keys – Relational Algebra – Fundamental Operations – Additional operations – SQL Fundamentals – Integrity – Triggers – Security – Advanced SQL Features – Functional Dependencies – Non-loss decomposition – Normalization: First, Second, Third Normal Forms, Dependency preservation – Boyce /CoddNormal Form, Multivalued Dependencies Fourth Normal Form – Join Dependencies Fifth Normal Form

UNIT III NoSQL 9

Working with Column oriented Databases – Hbase distributed storage architecture – Document store internals – Understanding Key-Value Stores in Memcache and Redis – Eventually consistent Non-Relational Databases – Performing CRUD operations : Creating Records, Accessing Data, updating and deleting Data

UNIT IV INDEXING 9

Indexing and Hashing – Ordered Indices – B+ Tree Index Files – B Tree Index Files – Static Hashing – Dynamic Hashing – Query Processing Overview – Indexing Ordering in MongoDB – Creating and using Indexes in MongoDB – Indexing and Ordering in CouchDB – Indexing in Apache Cassandra

UNIT V PHYSICAL STORAGE AND CLOUD 9

Overview of Physical Storage Media – Magnetic Disks – RAID – Tertiary Storage – Using NoSQL in Cloud: Google App Engine Datastore, Amazon SimpleDB – Installing and Setting up MongoDB, CouchDB and Redis.

L : 45   T: 0   P: 0   Total: 45 PERIODS

TEXT BOOKS

1 Silberschatz, Abraham, Henry F. Korth, and ShashankSudarshan. Database system concepts. Vol. 4. New York: McGraw-Hill, 1997.
2. Tiwari, Shashank. Professional NoSQL. John Wiley & Sons, 2011.

REFERENCES

1 RamezElmasri, Shamkant B. Navathe, "Fundamentals of Database Systems",Fifth Edition, Pearson / Addision Wesley, 2007.
2 Raghu Ramakrishnan, "Database Management Systems", Third Edition, McGraw Hill, 2003.
3 S.K.Singh, "Database Systems Concepts, Design and Applications", First Edition, Pearson Education, 2009.
4 Abraham Silberschatz, Henry F. Korth and S. Sudharshan, "Database System Concepts", Sixth Edition, Tata McGraw Hill, 2011 .
5 C.J.Date, A.Kannan and S.Swamynathan, "An Introduction to Database Systems", Eighth Edition, Pearson Education, 2006.

COURSE OUTCOMES

At the end of the course student should be able to:
CO1 Understand the data models and their support for designing a database.
CO2 Use the concept of Normalization to maintain consistency.
CO3 Work with column oriented databases.
CO4 Understand indexing and hashing techniques to enhance the utilization of data.
CO5 Identify the type of storage for real time applications.

16EC233/16EC242   MICROPROCESSORS AND MICROCONTROLLERS   L   T   P   C
(Common to CSE,IT ,MCT and Mech Auto)   3   0   0   3

UNIT I   ARCHITECTURE OF 8085 MICROPROCESSOR   9

Functional Block Diagram - Registers, ALU, Bus systems - Timing and control signals - Machine cycles and timing diagrams - Interrupts -Programming of 8085 - Instruction formats - Addressing modes – Instruction set - Assembly language programs.

UNIT II   ARCHITECTURE OF 8086 MICROPROCESSOR   9

Intel 8086 Internal Architecture - 8086 addressing modes- Instruction set - Assembler Directives -8086 assembly language Programming - Interrupts.

UNIT III   PERIPHERAL INTERFACING   9

Interfacing requirements - Memory mapped I/O, I/O mapped I/O, 8255 PPI, 8279 keyboard and display controller, 8257 DMA controller, 8251 USART - Interrupt controller 8259 -Serial I/O standards RS232C, RS422A and IEEE 488.

UNIT IV   MICROCONTROLLERS   9

Functional block diagram of 8051 - Instruction format and addressing modes – Timer –I/O ports – Serial communication - Inter facing -keyboard, LCD,ADC & DAC.

UNIT V   SYSTEM DESIGN USING MICROPROCESSOR &   9
**   MICROCONTROLLER**

Case studies – Traffic light control, washing machine control, Standard- Motor Control- Relay, PWM, DC & Stepper Motor.

L:45   T: 0   P: 0   Total: 45 PERIODS

TEXT BOOKS
1   Soumitra Kumar Mandal, "Microprocessors and Microcontrollers",Tata McGraw Hill Education Private Limited, Fourth reprint 2012.
2   Krishna Kant, "Microprocessors and Microcontrollers", Prentice Hall of India, 2013.

REFERENCES
1   Ramesh S. Gaonkar ,"Microprocessor – Architecture, Programming and Applications with the 8085" , Penram International Publisher , 5th Ed.,2006
2   Douglas V.Hall, " Microprocessors and Inter facing : Programming and Hardware", Second Edition, Tata Mc Graw Hill ,2006
3   Kenneth J.Ayala, "The   8051 microcontroller   Architecture,   Programming   and Applications", Second Edition , Penram international.
4   Mohamed Ali Mazidi, Janice Gillispie Mazidi, "The 8051 Microcontroller and Embedded Systems: Using Assembly and C", Second Edition, Pearson Education / Prentice Hall of India, 2007.
5   A.K.Ray & K.M. Bhurchandi, "Advanced Microprocessor and Peripherals – Architecture, Programming and Inter facing", Tata Mc Graw Hill, 2006.

COURSE OUTCOMES
At the end of the course student should be able to:
CO1   Understand the different methods used for simplification of Boolean expressions.
CO2   Analyze the Combinational circuits.
CO3   Describe the Sequential building blocks & Memory elements.
CO4   Design a sequential circuits
CO5   Classify the different memories and implement the digital circuits.

16IT204	JAVA PROGRAMMING	L	T	P	C
		3	0	0	3

UNIT I INTRODUCTION TO JAVA PROGRAMMING 9

Java history, OOPs concepts, Comparison with C++, Introduction to Java data types, class objects, constructors, access specifies, static members, this , Super , final keyword, JVM, finalize method, Arrays.

UNIT II POLYMORPHISM & INHERITANCE 9

Inheritance, types of inheritance, polymorphism, overloading, overriding, interfaces, Abstract class, abstract methods, final, reflection, dynamic proxies.

UNIT III I/O STREAMS & COLLECTIONS 9

I/O Streams, Files, Exception handing, exception hierarchy, finally block, String operations, String Buffers, Collection class- Array List, vectors, lists.

UNIT IV THREADS 9

Threads, Multi thread models, synchronizers, Executors, Generic programming, MVC architecture.

UNIT V GUI PROGRAMMING 9

Applets, swing, swing components, Layout managers, Event Handling, Listerner classes, Adapter class.

L : 45   T: 0   P: 0   Total: 45 PERIODS

TEXT BOOKS
1. Herbert Schildt, "The Complete Reference", 9th Edition, McGraw-Hill Osborne Media, March 11, 2017
2. Herbert Schildt ,"Java A Beginner's Guide", 6th Edition, McGraw-Hill Osborne Media, 2014

REFERENCES
1. Cay S. Horstmann and Gary Cornell, "Core Java: Volume I – Fundamentals", 9/e, Sun Microsystems Press, 2012.
2. K. Arnold and J. Gosling, "The JAVA programming language", fourth edition, Pearson Education, 2005
3. Paul Deitel and Harvey Deitel , "Java How to Program", 9/e, Prentice Hall, 2011
4. Benjamin J Evans and David Flanagan , "Java in a Nutshell", 6th edition, OReilly, November 2014
5. James Gosling, Bill Joy, Guy Steele and Gilad Bracha, " The Java Language Specification" 3rd Edition, Addison-Wesley Professional , 2005

COURSE OUTCOMES
At the end of the course student should be able to:

CO1 Know-how to design, write, compile, test and execute a java program
CO2 Design and write reusable programs
CO3 Choose available IO streams , write file programs with proper exception handling features
CO4 Write programs that impose task level parallelism using threads and write generic programs using MVC Architecture
CO5 Write GUI programs with event handling capability.

16CS202 **SOFTWARE ENGINEERING** **L T P C**
[Common to CSE & IT] **3 0 0 3**

UNIT I INTRODUCTION 9

Introduction – S/W Engineering Paradigm – Verification – Validation –Clean room Software Engineering– Life Cycle models (Waterfall, Incremental, Spiral, Agile, Prototype) – System Engineering – Computer Based System – Business Process Engineering Overview – Product Engineering Overview.

UNITII SOFTWARE REQUIREMENTS 9

Functional and Non-Functional – Software Document – Requirement Engineering Process – Feasibility Studies – Software Prototyping – Prototyping in the Software Process – Data – Functional and Behavioral Models – Structured Analysis and Data Dictionary – Structured Methods.

UNIT III ANALYSIS, DESIGN CONCEPTS AND PRINCIPLES 9

Systems Engineering - Analysis Concepts - Design Process And Concepts – Modular Design – Design Heuristic – Architectural Design – Data Design – User Interface Design – Real Time Software Design – System Design – Real Time Executives – Data Acquisition System – Monitoring And Control System.

UNIT IV TESTING 9

Taxonomy of Software Testing – Types of S/W Test – Black Box Testing – Testing Boundary Conditions – Structural Testing – Test Coverage Criteria Based On Data Flow Mechanisms – Regression Testing – Unit Testing – Integration Testing – Validation Testing – System Testing And Debugging – Software Implementation Techniques.

UNIT V SOFTWARE PRODUCT AND PROCESS 9

Measures And Measurements – Legal and Ethical Issues – Software Reuse - Software Cost Estimation – Function Point Models – COCOMO Model – Delphi Method – Scheduling – Earned Value Analysis – Error Tracking – Software Configuration

Management – Software Maintenance – Project Planning – Project Scheduling– Risk Management – CASE Tools.

L : 45 T: 0 P: 0 Total: 45 PERIODS

TEXT BOOKS
1 Ian Sommerville, "Software Engineering", Seventh Edition, Pearson Education Asia, (2007).
2. Roger S. Pressman, "Software Engineering – A practitioner's Approach", Sixth Edition, McGraw-Hill International Edition, (2005)

REFERENCES
1 Watts S. Humphrey, "A Discipline for Software Engineering", Second Edition, Pearson Education, (2007).
2 James F. Peters and WitoldPedrycz, "Software Engineering, An Engineering Approach", Third Edition, Wiley-India, (2007).
3 Stephen R.Schach, "Software Engineering", Second Edition , Tata McGraw-Hill Publishing Company Limited, (2007).
4 S.A.Kelkar, "Software Engineering", Second Edition, Prentice Hall of India Pvt. Ltd., (2007).
5 Deven N. Shah ,DilipMotwani, "Software Engineering Paperback" , Third Edition, Wiley India Private Limited, (2010).

COURSE OUTCOMES
At the end of the course student should be able to:
CO1 Apply suitable process model for developing software systems.
CO2 Identify various requirements and analyze models for system development
CO3 Analyze and design real-time system and its components
CO4 Apply the types of Testing for identifying software defects
CO5 Orient toward software project management activities to reduce the effort for building quality software system

16GE212   **CAREER DEVELOPMENT PROGRAMME IV**   **L   T   P   C**

(Common to all B.E. / B. Tech. Courses)   **1   0   2   2***

UNIT I   COMMUNICATION & SOFT SKILLS   7

Group Discussion – Types, guidelines, roles, Do's and Don'ts during GD, Mock GD. Interview Etiquettes – Meaning, Purpose, Interview Process and Types, Checklist – Do's and Don'ts, Preparation of Self Introduction.

UNIT II   LINGUISTIC SKILLS IV   15

Cloze test, Direct & Indirect speech, Question Tags, Homonyms, HIGH LEVEL- Synonyms, Antonyms, Idioms and Phrases.

UNIT III   VERBAL REASONING - III   7

Logical reasoning - Machine Input & Output, Coded Inequalities, Puzzles, Cubes, Data sufficiency, Analogy.

UNIT IV   VERBAL &NON VERBAL REASONING - IV   8

Critical reasoning- Statement – Argument & Assumption, Courses of Action, Inferences.

Non Verbal reasoning- Insert the missing character, Figure series, Odd man out, Cubes & Dices, Logical Venn diagram.

UNIT V   PRACTICALS   8

Group Discussion, Online typing, Mock Interview, Company website references.

L:15   T:0   P:30   Total: 45 PERIODS

TEXT BOOKS

1   Barun K. Mithra, "Personality Development & Soft Skills", Oxford, 2006.

2   S.P.Bakshi, "Objective English" Arihant Publications, 2014.

3   R.V.Praveen, "Quantitative Aptitude and Reasoning" PHI Publication, 2012.

REFERENCES

1   Dr. R.S.Agarwal, "A modern approach to Verbal & Non-verbal Reasoning", S.Chand & Company Pvt Limited, 2013.

COURSE OUTCOMES

At the end of the course students should be able to

CO1   Bring behavioral changes through interview etiquettes & communicate well.

CO2   Improve their thinking ability.

CO3   Solve the puzzles through their lateral thinking ability.

CO4   Think critically and attain solutions for the problems.

CO5   Speak better in GD and thorough with the company details.

16GE214	CAREER DEVELOPMENT PROGRAMME IV	L	T	P	C
	(Common to all B.E. / B. Tech. Courses)	1	0	2	2*

UNIT I   **BODY LANGUAGE**   **9**

Body Language – Introduction, Elements, Grooming, Body Language –Postures and Gestures, Dressing Etiquette, Hygiene and Cleanliness, Time Management, Body Language - Positive and Negative ,Importance of body language in Communication.

UNIT II   **INTERVIEW ETIQUETTE**   **9**

Interview Etiquettes – Meaning, Purpose, Process, Types, Do's and Dont's, Dress Code, Self Introduction, Code of Conduct for Interviews, Mock Interview

UNIT III   **RESUME BUILDING**   **9**

Resume Building –Introduction, difference between Resume and CV, Strategy of resume writing, Body of the resume, clarity and crispness, format and content, Resume Etiquettes – Do's and Dont's, model resume writing.

UNIT IV   **GROUP DISCUSSION**   **9**

Group Discussion – Types, Key steps to succeed in GD, Skills required for GD, Importance of GD, Guidelines – Do's and Dont's during GD, the technique of Summing up, Mock GD.

UNIT V   **PRACTICALS**   **9**

Extempore Speech, Company website References, Short speech.

L:15   T:0   P:30   Total: 45 PERIODS

TEXT BOOKS

1.   John Eastwood, "Oxford Practice Grammar", Oxford.
2.   Barun K. Mithra, "Personality Development & Soft Skills", Oxford.
3.   R.V.Praveen, "Quantitative Aptitude and Reasoning" PHI Publication, 2012.

REFERENCES

1.   Sanjay Kumar " Communication Skills", Oxford University 2015.

COURSE OUTCOMES

At the end of the course students should be able to

CO1   Exhibit appropriate body language and interview skills.

CO2   Speak effectively in group discussion and acquire interpersonal skills.

CO3   Acquire the professional skills of Group discussion and Resume writing.

CO4   Improve thinking, listening and speaking skills.

CO5   Demonstrate an understanding of the principles of active listening.

16CS207   **OPERATING SYSTEMS LABORATORY**   **L   T   P   C**
                                                          0   0   4   2

LIST OF EXPERIMENTS

1. Basic UNIX Commands
2. Simple Shell program - Conditional Statements - Testing and Loops
3. Write programs using the following system calls of UNIX operating system: fork, exec, getpid, exit, wait, close, stat, opendir, readdir, open, read, write,
4. Write C programs to simulate UNIX commands ls and grep
5. 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.
6. Given the list of processes, their CPU burst times and arrival times, display/print
7. the Gantt chart for Priority and Round robin. For each of the scheduling policies,
8. Compute and print the average waiting time and average turnaround time.
9. Developing Application using Inter Process communication (using shared memory, pipes or message queues)
10. Implementation of the Producer – Consumer problem using semaphores (using UNIX system calls).
11. Implementation of some memory management schemes.
12. Implementation of any file allocation technique (Linked, Indexed or Contiguous)
13. Simulate an Algorithm for Dead Lock Detection.
14. Implementation of Remote Procedure Call (RPC).

MAJOR EQUIPMENTS / SOFTWARE REQUIRED

Hardware

- LAN System with 33 nodes (OR) Standalone PCs – 33 Nos.
- Printers – 3 Nos.

Software

Ubuntu / OpenSUSE / Fedora / Red Hat / Debian / Mint OS
Linux could be loaded in individual PCs.
                    (OR)
- A single server could be loaded with Linux and connected from the individual PCs.

L : 0   T: 0   P:60   Total:60 PERIODS

COURSE OUTCOMES

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

CO1   Understand different scheduling algorithms.
CO2   Uunderstand synchronization process and implement it.
CO3   Understand the implementation of different Memory Management scheme.
CO4   Aware of the OS support for I/O.
CO5   Develop application for Inter Process & Remote Process communication

16CS209	DATABASE MANAGEMENT SYSTEMS LABORATORY	L	T	P	C
	[Common to CSE & IT]	0	0	4	2

LIST OF EXPERIMENTS

1. Installing and configuring – Relational DB
2. Creation, Insertion, Updation, Retrieval and Deletion operations on Relational DB
3. Indexing and Sorting on Relational DB
4. Installing and configuring –Cassandra DB
5. Creation, Insertion, Updation, Retrieval and Deletion operations on Cassandra DB
6. Indexing and Sorting on Cassandra DB
7. Installing and configuring –Mongo DB
8. Creation, Insertion, Updation, Retrieval and Deletion operations on Mongo DB
9. Indexing and Sorting on Mongo DB
10. Installing and configuring –Redis DB
11. Creation, Insertion, Updation, Retrieval and Deletion operations on Redis DB
12. Indexing and Sorting on Redis DB
13. Implement software projects with back end connectivity.

MAJOR EQUIPMENTS / SOFTWARE REQUIRED

Hardware
- LAN System with 33 nodes (OR) Standalone PCs – 33 Nos.
- Printers – 3 Nos.

Software
- Front End: Java, PHP, C#.Net
- Back End: Postgres, Cassandra, MongoDB, Redis
- Platform: Windows 8 and above

L : 0   T: 0   P:60   Total:60 PERIODS

COURSE OUTCOMES

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

CO1 Installing and Configuring different databases

CO2 Creating, Inserting and Manipulating data in different databases.

CO3 Updating, deleting and retrieving data in different databases.

CO4 Indexing and Sorting data in different databases.

CO5 Implement software projects

16IT205 **JAVA PROGRAMMING LABORATORY** **L T P C**

0 0 4 2

LIST OF EXPERIMENTS

1. Practice java classes and objects
2. Practice constructors
3. Apply the static and this keyword in a suitable scenario
4. Demonstrate the application of arrays
5. Practice Inheritance with Final keyword
6. Demonstrate the concept of dynamic polymorphism
7. Practice method overloading and overriding
8. Demonstrate the application of interfaces in implementing Linked Lists
9. Analyze the usage of files handling techniques in java.
10. Implement a double linked list using list in java
11. Implement a java program that demonstrates all string and string buffer class operations
12. Implement a java program to simulate server-client communication using threads.
13. Implement a java graphic program
14. Implement a data structure using Array and Vector classes

MAJOR EQUIPMENTS / SOFTWARE REQUIRED

Hardware
- PCs
- Processor-2.0 GHz or Higher
- RAM-256 MB or Higher
- Hard disk-20 GB or Higher

Software
- J2SDK

L : 0   T: 0   P: 60   Total:60 PERIODS

COURSE OUTCOMES
At the end of the course student should be able to:

CO1 A competence to design, write, compile, test and execute a java program

CO2 Design and write reusable programs with abstraction

CO3 Choose available IO streams, write file programs with proper exception handling features , also able to implement data structures with collection classes

CO4 Write programs that impose task level parallelism using threads and write generic programs using MVC Architecture

CO5 Write GUI programs with event handling capability

16MA301   **PROBABILITY AND QUEUEING THEORY**   **L**   **T**   **P**   **C**
                        (Common to CSE & IT)   **3**   **1**   **0**   **4**

UNIT I   **PROBABILITY AND RANDOM VARIABLE**   **9+3**

Axioms of probability - Conditional probability - Total probability - Baye's theorem-Random variable – Probability mass function - Probability density functions – Properties - Moments - Moment generating functions and their properties.

UNIT II   **STANDARD DISTRIBUTIONS**   **9+3**

Binomial- Poisson –Geometric – Uniform – Exponential - Gamma - Normal distributions and their properties– Function of Random Variables.

UNIT III   **TWO DIMENSIONAL RANDOM VARIABLES**   **9+3**

Joint distributions - Marginal and conditional distributions – Covariance - Correlation and Regression - Transformation of random variables.

UNIT IV   **RANDOM PROCESSES AND MARKOV CHAINS**   **9+3**

Classification - Stationary process - Markov process - Markov chains – Transition probabilities Limiting distributions- Birth and Death process - Poisson process.

UNIT V   **QUEUEING THEORY**   **9+3**

Markovian models – M/M/1, M/M/C, Finite and infinite capacity - Pollaczek- Khintchine formula and Problems.

                                 L:45   T:15   P: 0   Total: 60 PERIODS

TEXT BOOKS
1. Ibe, O.C., "Fundamentals of Applied Probability and Random Processes", Elsevier, 1st Indian Reprint, 2016.
2. Gross and Harris, C.M., "Fundamentals of Queueing Theory", John Wiley& Sons., 3rd edition, 2011.

REFERENCES
1. Allen, A.O., "Probability, Statistics and Queueing Theory with Computer Applications", Elsevier, 2nd edition, 2011.
2. Taha,H.A., "Operations Research", Pearson Education, Asia, 9th edition, 2010.
3. Trivedi, K.S., "Probability and Statistics with Reliability, Queuing and Computer Science Applications", PHI Learning Private limited , New Delhi ,2011.
4. Charles Therrien and Murali Tummala, "Probability and Random Processes for Electrical and Computer Engineers", CRC Press, Taylor & Francis Group, Second Edition,2011.
5. Allen, A.O., "Probability, Statistics and Queueing Theory with Computer Applications", Elsevier, 2nd edition, 2011.

COURSE OUTCOMES
At the end of the course student should be able to:
CO1   Apply the fundamental knowledge of the Probability concepts in real world.
CO2   Utilize the skills in handling more than one random variable, standard distributions and functions of random variables.
CO3   Discern the bivariate distributions and know how to calculate basic two- variable statistics (covariance, correlation).
CO4   Know about random processes, in particular about Markov chains which have applications in engineering.
CO5   Analyze and demonstrate the knowledge of various Queuing models.

16IT301	COMPUTER NETWORKS	L	T	P	C
	(Common to CSE & IT,EEE)	3	0	0	3

UNIT I   **FUNDAMENTALS AND PHYSICAL LAYER**   **9**

Building a network, Requirements ,Data communication Components , Data representation and Data flow ,Networks , Types of Connections , Topologies , Protocols and Standards, Layering and protocols ,Internet Architecture , Network software , Performance , Transmission Media.

UNIT II   **DATA LINK LAYER AND MEDIA ACCESS**   **9**

Link layer Services, Framing, Error Detection and Error Correction, Flow control, Media access control ,Random Access, CSMA/CD,CDMA/CA, Ethernet (802.3) ,Wireless LANs, 802.11 , Virtual LANs

UNIT III   **INTERNETWORKING   AND ROUTING**   **9**

Logical addressing, Basic Internetworking (IP, CIDR, ARP, BOOTP DHCP, ICMP), Routing algorithms, Routing (RIP, OSPF, metrics), Global Internet (Areas, BGP, IPv6), Multicast, addresses, multicast routing (DVMRP, PIM), SDN.

UNIT IV   **TRANSPORT LAYER**   **9**

Overview of Transport layer , UDP , Reliable byte stream (TCP), SCTP, Connection management , Flow control , Retransmission , TCP Congestion control ,Congestion avoidance (DECbit, RED) , QoS , Application requirements .

UNIT V   **APPLICATION LAYER**   **9**

Traditional applications, Electronic Mail (SMTP, POP3, IMAP, MIME) , HTTP , Web Services , DNS, DDNS , TELNET , File transfer Protocol, SNMP-Cryptography , Basic concepts.

L : 45   T: 0   P: 0   Total: 45 PERIODS

TEXT BOOKS
1   Larry L. Peterson, Bruce S. Davie, "Computer Networks: A systems approach", Fifth Edition, Morgan Kaufmann Publishers, 2011.
2.   Behrouz A. Forouzan, "Data communication and Networking", Fourth Edition, Tata McGraw – Hill, 2011.

REFERENCES
1   James F. Kurose, Keith W. Ross, "Computer Networking - A Top-Down Approach Featuring the Internet", Fifth Edition, Pearson Education, 2009.
2   Nader. F. Mir, "Computer and Communication Networks", Pearson Prentice Hall Publishers, 2010
3   Ying-Dar Lin, Ren-Hung Hwang, Fred Baker, "Computer Networks: An Open Source Approach", Mc Graw Hill Publisher, 2011.
4   William Stallings, "Data and Computer Communication", Eighth Edition,Pearson Education, 2007.
5   A.S. Tanenbaum, "Computer Networks", Pearson Education, Fourth Edition, 2003

COURSE OUTCOMES
At the end of the course student should be able to:
CO1   Recognize network components, topologies, Transmission media used in distributed networks.
CO2   Gain knowledge in functions of each layer in OSI, TCP/IP Reference Model.
CO3   Identify, compare and contrast different techniques and design issues of core functions such as addressing, routing, internetworking, switching, multiplexing, error and flow control, medium access and coding.
CO4   Implement internet protocols and congestion control algorithms
CO5   Apply various networking concepts to real time applications

16IT302   **DESIGN AND ANALYSIS OF ALGORITHMS**   **L   T   P   C**

                                                                        3   2   0   4

UNIT I   INTRODUCTION   9+6
Notion of an Algorithm – Fundamentals of Algorithmic Problem Solving – Important Problem Types – Fundamentals of the Analysis of Algorithm Efficiency – Analysis Framework – Asymptotic Notations and its properties – Mathematical analysis for Recursive and Nonrecursive algorithms.

UNIT II   BRUTE FORCE AND DIVIDE-AND-CONQUER   9+6
Brute Force: Insertion Sort, Bubble Sort, Sequential Search, Closest-Pair and Convex-Hull Problems-Traveling Salesman Problem – Knapsack Problem - Assignment problem. Divide and conquer methodology: Merge sort – Quick sort – Binary search – Multiplication of Large Integers – Strassen's Matrix Multiplication

UNIT III   DYNAMIC PROGRAMMING AND GREEDY TECHNIQUE   9+6
Dynamic Programming: Computing a Binomial Coefficient – Warshall's and Floyd's algorithm – Optimal Binary Search Trees – Knapsack Problem and Memory functions. Greedy Technique Prim's algorithm- Kruskal's Algorithm - Dijkstra's Algorithm-Huffman Trees – Job Sequence Scheduling

UNIT IV   ITERATIVE IMPROVEMENT   9+6
The Simplex Method-The Maximum-Flow Problem – Maximum Matching in Bipartite Graphs- The Stable marriage Problem.

UNIT V   COPING WITH THE LIMITATIONS OF ALGORITHM   9+6
Limitations of Algorithm - Lower-Bound Arguments-Decision Trees-P, NP and NP-Complete Problems – Coping with the Limitations – Backtracking: n-Queens problem – Hamiltonian Circuit Problem – Subset Sum Problem-Branch and Bound: Assignment problem – Knapsack Problem – Traveling Salesman Problem- Approximation Algorithms for NP Hard Problems

                              L : 45   T: 30   P: 0   Total: 75 PERIODS
TEXT BOOKS
 1   Anany Levitin, "Introduction to the Design and Analysis of Algorithms", Pearson Education, 3rd Edition, 2012.
REFERENCES
 1   Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction to Algorithms", PHI Learning Private Limited, 3rd Edition, 2012.
 2   Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, "Data Structures and Algorithms", Pearson Education, 2nd Edition, 2007.
 3   Donald E. Knuth, "The Art of Computer Programming", Pearson Education, 2nd Edition , 2009
 4   Steven S. Skiena, "The Algorithm Design Manual", Springer, 2nd Edition, 2008.
COURSE OUTCOMES
At the end of the course student should be able to:
CO1   Demonstrate how the worst-case time complexity of an algorithm is defined
CO2   Compare the efficiency of algorithms using asymptotic complexity
CO3   Design efficient algorithms using standard algorithm design techniques
CO4   Analysis real time problems with efficient methodology
CO5   Compare different solutions for the problems and identify suitable methodology based on the environment

16IT303   **SYSTEM SOFTWARE AND COMPILER DESIGN**

L	T	P	C
3	0	2	4

UNIT I   SIC AND ASSEMBLERS   **9+6**

System software and machine architecture – The Simplified Instructional Computer (SIC) – SIC Machine architecture –CISC VAX Architecture – Basic Assembler Function, machine dependent assembler, Machine Independent Assembler, Basic Loader function, Machine dependent loader, Machine Independent Loader

UNIT II   FINITE AUTOMATA AND REGULAR EXPRESSION SYNTAX   9+6
**   ANALYSIS**

Definition   of Grammar – Construction of DFA and NFA from a given Regular Expression Implementation of Conversion of NFA-to-DFA –Construction of Parser tree – Ambiguity, Eliminating Ambiguity, Elimination of Left Recursion , left factoring

UNIT III   LEXICAL ANALYSIS   **9+6**

Introduction: process of compilation - phases of compiler - grouping of phases - cousins of compiler - compiler construction tools

Lexical Analyzer: role of the lexical analyzer - Input buffering - specification of tokens - recognition of tokens - language for specifying lexical analyzer

UNIT IV   SYNTAX ANALYSIS   **9+6**

Top down parser – Recursive-Descent parsing, predictive parser, Bottom-Up parser- shift Reduce parser, Operator Precedence parser, LR parser, SLR parser, canonical LR Parser, LALR parser

UNIT V   SYNTHESIS PHASES OF COMPILER   **9+6**

 Intermediate Code Generation: Variants of Syntax Tree- Three address code - Implementation of code optimization techniques - Generation of code for a given intermediate code - Types and Declarations- Type Checking - Backpatching

L : 45   T: 0   P:30   Total: 75 PERIODS

TEXT BOOKS
1   Leland L. Beck, "System Software – An Introduction to Systems Programming", 3rd Edition, Pearson Education Asia, 2008.
2   Alfred V Aho, Monica S. Lam, Ravi Sethi and Jeffrey D Ullman, "Compilers – Principles, Techniques and Tools", 1stEdition, Pearson Education, 2007.

REFERENCES
1   David Galles, "Modern Compiler Design", Pearson Education, 2009
2   John R. Levine, Linkers & Loaders – Harcourt India Pvt. Ltd., Morgan Kaufmann Publishers, 2000
3   Randy Allen, Ken Kennedy, "Optimizing Compilers for Modern Architectures: A Dependence-based Approach", Morgan Kaufmann Publishers, 2002
4   Steven S. Muchnick, "Advanced Compiler Design and Implementation", Morgan Kaufmann Publishers - Elsevier Science, India, Indian Reprint 2003
5   Keith D Cooper and Linda Torczon, "Engineering a Compiler", Morgan Kaufmann Publishers Elsevier Science, 2004

COURSE OUTCOMES
At the end of the course student should be able to:
CO1   Know the design and implementation of assemblers, linkers and loaders
CO2   Recognize different Phases of compiler
CO3   Conversion of Regular Expression to code
CO4   Use code optimization techniques
CO5   Analyze the complexity of code

	L	**T**	**P**	**C**
16IT399 **CAREER DEVELOPMENT PROGRAMME V**	**1**	**0**	**2**	**2***

UNIT I   **PYTHON PROGRAMMING CONCEPTS**   **3+6**

Introduction To Python- Data Types-Program Flow-Functions, Modules And Packages-String, List And Dictionary Manipulations-Exception Handling- -Regular Expression-Multithreading -File Operation

UNIT II   **PYTHON OOP CONCEPTS AND CGI PROGRAMMING**   **3+6**

Concept of OOP Terminology class object instance in- Real time use of class in live projects. **CGI Programming** Introduction CGI programming – architecture- web server support and configuration-parsing information using GET POST method – using cookies in CGI – retrieving – setting up the cookies – file uploading example

UNIT III   **PYTHON – DATABASE ACCESS**   **3+6**

Introduction to MySQL Database- Installation-Database connection- operation on database- Network Programming- Multithreading- sending an email (performing attachment) example.

UNIT IV   **WEB SERVICE CONCEPTS**   **3+6**

Introducing to client side-Accessing the web- **Services** REST+XML- REST+JSON- SOAP _REST API concepts.

UNIT V   **PHP**   **3+6**

Introduction to MySQL ,Getting started with PHPMyAdmin Panel ,MySQLi Library, Connecting to Database in PHP ,Basic CRUD with database, Database - OOPS way, Program, Inserting the value of form to table, Reading the created / inserted value in list, Reading the value individually, Update / Editing the item, Delete the value, Inner, Outer Joins,Mini Project using PHP

                                  L : 15   T: 0   P:30   Total: 45 PERIODS

TEXT BOOKS

1. Guido van Rossum and Fred L. Drake Jr, ―An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.
2. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist'', 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016 (http://greenteapress.com/wp/think-python/)

REFERENCES

1. Jeffrey C and Jackson, "Web Technologies A Computer Science Perspective", Second Edition, Pearson Education, (2011)
2. Chris Bates, Web Programming – Building Intranet Applications, Third Edition, Wiley Publications,(2009)
3. Y.DanielLiang,"Introduction to Programming using Python", 1ˢᵗ Edition, Pearson Education,(2017)
4. Steven Holzner,"PHP-The Complete Reference",TataMcGrawHill Edition 2008

COURSE OUTCOMES

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

CO1   Decompose a Python program into functions.
CO2   Represent compound data using Python lists, tuples, and dictionaries.
CO3   Understand the internet standards and recent web technologies and build websites.
CO4   Develop concurrent applications based on desired data structure and database.
CO5   Implement applications using PHP and MySQL

16GE313   **CAREER DEVELOPMENT PROGRAMME V**   **L**   **T**   **P**   **C**

(Common to all B.E. / B. Tech. Courses)   **1**   **0**   **2**   **2***

UNIT I   **QUANTITATIVE ABILITY I**   **9**

Number theory- Shortcuts, Divisibility criteria- Unit place deduction-LCM &HCF, Square root and Cube Root, Decimal & Fraction, Percentage.

UNIT II   **QUANTITATIVE ABILITY II**   **9**

Profit, loss and discount, Simple and compound interest, Ratio & Proportions, Mixtures & Allegation, Partnership.

UNIT III   **QUANTITATIVE ABILITY III**   **9**

Problems on Ages, Average, Venn diagram, Clocks, Calendar, Data Interpretation- Bar chart- Pie chart-Line chart-Tables chart.

UNIT IV   **VERBAL REASONING I**   **9**

Analytical reasoning - Linear, Circular & Complex arrangement, Blood relation, Direction Problems, Puzzle.

UNIT V   **VERBAL REASONING II**   **9**

Logical reasoning - Number and Alpha series, Odd man out, Element series, Logical series, Coding and decoding, Analogy, Alphabets, Logical sequence of words.

L : 15   T:0   P:30   Total: 45 PERIODS

TEXT BOOKS
1.   Rajesh Varma, "Fast Track Objective Arithmetic", Arihant Publications.
2.   BS Sijwali- Indu Sijwali, A New Approach to "Reasoning Verbal, Non-Verbal & Analytical", Arihant Publications.

REFERENCES
1.   R.V.Praveen, "Quantitative Aptitude and Reasoning" PHI Publication.
2.   R.S.Agarwal, "Quantitative Aptitude for Competitive Examinations", S.Chand & Company Pvt Limited

COURSE OUTCOMES

At the end of the course students should be able to

CO1   Know the both analytical and logical reasoning

CO2   Apply the shortcut methods in quantitative aptitude.

CO3   Solve application orientated concepts in quantitative aptitude.

CO4   Improve the quality of the student as a finished product for their corporate life.

CO5   Understand and practice Logical reasoning.

16IT304   **NETWORK PROGRAMMING LABORATORY**   **L   T   P   C**

                                                                                0   0   4   2
LIST OF EXPERIMENTS

1. Study of Different types of Network cables and practically implement the cross wired cable and straight through cable using clamping tool.
2. Study of network devices and network Internet Protocol in detail.
3. Demonstration of Connecting the personal computers in LAN.
4. Implement a Program to obtain the Information about the (A) Host (B) Network (C) Protocols (D) domains
5. Implementation of Subnetting.
6. Implementation of stop and wait protocol and sliding window protocol.
7. Write a code simulating ARP /RARP protocols.
8. Write a code simulating PING and TRACEROUTE commands.
9. Write a program to implement RPC (Remote Procedure Call).
10. Implementation of CSMA CD and CSMA CA protocol.
11. Implementation of Socket Programming and Client Server model.
12. Applications using TCP Sockets like
*   Echo client and echo server.
*   File Transfer.
13. Applications using TCP and UDP Sockets like DNS, SNMP and File Transfer.
14. Trace a protocol using Ethereal and Wireshark software.

MAJOR EQUIPMENTS / SOFTWARE REQUIRED
   Hardware
*   PC 30nos
   Software
   *   C++compiler,J2SDK,Linux,NS2/Glomosim/OPNET(Freeware),Wiresharkand Ethereal(Freeware)
                              L : 0   T: 0   P: 60   Total:60 PERIODS
COURSE OUTCOMES
At the end of the course student should be able to:
CO1 Understand the use of client/server architecture in application development

CO2 Get acquainted with unix system internals like Socket files, IPC structures

CO3 Design reliable servers using both TCP and UDP sockets

CO4 Analyze various protocols using simulations

CO5 Demonstrate various real time applications

16IT305	DESIGN AND ANALYSIS OF ALGORITHMS LABORATORY	L	T	P	C
		0	0	2	1

LIST OF EXPERIMENTS

1. Implement a program to find GCD of two and three numbers using Euclidean algorithm and plot a graph for time taken versus n.
2. Implement a program to sort a given set of elements using the following sorting methods and determine the time required to sort the elements. The elements can be generated using the random number generator. Repeat the experiment for different values of n, the number of elements in the list to be sorted and compare the algorithms in terms of time.
   i.   Merge Sort
   ii. Quick Sort
Insertion Sort or Bubble Sort
3. Implement a program to compute the transitive closure of a given directed graph using Warshall's algorithm and compare time complexity for different input.
4. Develop a program for All-Pairs Shortest Paths Problem using Floyd's algorithm and plot a graph to compare time complexity.
5. Implement a program for 0/1 Knapsack problem using Dynamic Programming.
6. Implementation of 8-queen problem using backtracking and plot a graph for the time taken versus n.
7. Implement a program for travelling salesperson problem using dynamic programming.
8. Implement a program to find matrix multiplication using following techniques:
   i.   Ordinary matrix multiplication
   ii. Strassen's matrix multiplication
Compare the performance of algorithms in terms of time taken for execution for different input values plot graph.
9. Develop a program to find solution for Knapsack problem using backtracking.
10. Implement Kruskal's algorithm to find minimum cost spanning tree of undirected graph.
11. Implement a program for Prim's algorithm to find minimum cost spanning tree of undirected graph and compare it with Kruskal's algorithm in terms of time complexity.

MAJOR EQUIPMENTS / SOFTWARE REQUIRED
   Hardware
   - PC 30nos
   Software
   - C++compiler,J2SDK

	L : 0 T: 0 P: 60	**Total:60 PERIODS**

COURSE OUTCOMES
At the end of the course student should be able to:
CO1	Demonstrate the appropriate algorithmic design technique to specific problems
CO2	Prove the correctness and analyze the running time of the basic algorithms for the problems in various domains
CO3	Compare, contrast, and choose appropriate algorithmic design techniques to implement an algorithm that solves a given problem.
CO4	Implement algorithms using the dynamic programming, greedy method, Backtracking, Branch and Bound, and recite algorithms that employ this strategy
CO5	Develop the efficient algorithms for the new problem with suitable designing techniques

16IT306	INTERNSHIP /INDUSTRIAL TRAINING	L	T	P	C
		-	-	-	1

PROCEDURE TO FOLLOW

1. Students should opt for summer internship that would provide to gain ample field knowledge in the relevant field of engineering such that theoretical knowledge gained in the class can be applied to solve the practical/ field problem.

2. Students should take a challenging task, may be small portion, and apply the knowledge gained to solve it. Summer internship can also involve data collection from different sources including generating experimental data, collection of data from field etc. Later on the student is required to analyze the data collected and arrive at meaningful conclusions.

3. Summer internship shall be aimed at solving some of the problems of the society/ local region that should have practical applications and benefit the society.

1 Week

COURSE OUTCOMES
At the end of the course student should be able to:
CO1 : Learn and practices on recent technologies in research area

16CS306	COMPOSING MOBILE APPS. (Offered by Infosys) (Common to CSE & IT)	L	T	P	C
		3	0	0	3

UNIT I   GETTING STARTED WITH MOBILITY   9

Mobility landscape, Mobile platforms, Mobile apps development, Overview of Android platform, setting up the mobile app development environment along with an emulator, a case study on Mobile app development.

UNIT II   BUILDING BLOCKS OF MOBILE APPS – I   9

App user interface designing – mobile UI resources (Layout, UI elements, Draw-able, Menu), Activity- states and life cycle, interaction amongst activities. App functionality beyond user interface - Threads, Async task, Services – states and lifecycle, Notifications.

UNIT III   BUILDING BLOCKS OF MOBILE APPS - II   9

Broadcast receivers, Telephony and SMS APIs , Native data handling – on-device file I/O, shared preferences, mobile databases such as SQLite, and enterprise data access (via Internet/Intranet)

UNIT IV   SPRUCING UP MOBILE APPS   9

Graphics and animation – custom views, canvas, animation APIs, multimedia – audio/video playback and record, location awareness, and native hardware access (sensors such as accelerometer and gyroscope)

UNIT V   TESTING MOBILE APPS AND TAKING APPS TO MARKET   9

Debugging mobile apps, White box testing, Black box testing, and test automation of mobile apps, JUnit for Android, Robotium, MonkeyTalk, Versioning, signing and packaging mobile apps, distributing apps on mobile market place.

L : 45   T: 0   P: 0   Total: 45 PERIODS

TEXT BOOKS

1   Anubhav Pradhan, Anil V Deshpande, "Mobile Apps Development", First Edition, Wiley India,(2013)

REFERENCES

1   Barry Burd , "Android Application Development All in one for Dummies", First Edition , Wiley India ,(2011).
2   Lauren Darcey , Shane Conder, "Teach Yourself Android Application Development In 24 Hours", Second Edition, Wiley India , (2012).
3   Jeffrey C and Jackson, "Web Technologies A Computer Science Perspective", Second Edition, Pearson Education, (2011)
4   Mahesh P. Matha, "Core Java A Comprehensive Study", Second Edition , Prentice Hall of India, (2011)

COURSE OUTCOMES

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

CO1   Familiarize with Mobile apps development aspects
CO2   Design and develop mobile apps, using Android as development platform, with key focus on user experience design, native data handling and background tasks and notifications
CO3   Perform testing , signing, packaging and distribution of mobile apps
CO4   Understand the limitations and features of developing for mobile devices.
CO5   Infer the existing state of mobile app development via researching existing apps.

16IT307	WEB TECHNOLOGY	L	T	P	C
	(Common to CSE & IT)	3	0	0	3

UNIT I   INTRODUCTION   9

Web Essentials: Clients, Servers, and Communication. The Internet - Basic Internet Protocols - The World Wide Web - HTTP Request Message - HTTP Response Message - Web Clients Web Servers . Markup Languages-XHTML: An Introduction to HTML History - Versions - Basic XHTML Syntax and Semantics - Some Fundamental HTML Elements - Relative URLs - Lists - Tables - Frames – Forms.

UNIT II   CASCADING STYLE SHEETS AND JAVASCRIPT   9

Style Sheets CSS: Introduction to Cascading Style Sheets - Features - Core Syntax - Style Sheets and HTML - Style Rule Cascading and Inheritance - Text Properties – CSS Box Model - Normal Flow Box Layout - Beyond the Normal Flow - Other Properties - Case Study. Client- Side Programming: The JavaScript Language: History and Versions - Introduction - JavaScript in Perspective - Syntax - Variables and Data Types - Statements - Operators - Literals - Functions - Objects - Arrays - Built-in Objects - JavaScript Debuggers.

UNIT III   SERVER SIDE PROGRAMMING   9

Introduction to active server pages (ASP), Introduction to Java Server Page (JSP), JSP Application Design, JSP objects, Conditional Processing, Declaring variables and methods, Sharing data between JSP pages, Sharing Session and Application Data, Database Programming using JDBC, development of java beans in JSP, Introduction to Servlets, Lifecycle, JSDK, Servlet API, Servlet Packages.

UNIT IV   XML AND JSON   9

Introduction to XML and XSLT–XSLT design principles- XML Schema-Introduction to JSON-JS Forms-JS Objects-JS Functions-Introduction to JS HTML DOM-Developing web APIs for XML and JSON data-Accessing XML and JSP web service from JS code-AJAX.

UNIT V   PHP AND   PYTHON   9

Introduction and basic syntax of PHP, decision and looping with examples, PHP and HTML, Arrays, Functions, Browser control and detection, string, Form processing, Files, Advance Features: Cookies and Sessions, Object Oriented Programming with PHP,Basic commands with PHP examples. Introduction to Python-Writing a simple Python script.

                                         L : 45   T: 0   P:0   Total: 45 PERIODS

TEXT BOOKS

  1   Jeffrey C.Jackson, Web Technologies-A Computer Science Perspective, Pearson Education, 2007.
  2   Developing Web Applications in PHP and AJAX, Harwani, McGrawHill, 2010
  3   Deven N.Shah, A Complete Guide to Internet And Web Programming, Dream Tech, 2009

REFERENCES

  1   John Pollock, JavaScript - A Beginners Guide, 3rd Edition, Tata McGraw-Hill Edition, 2009.
  2   Keyur Shah, Gateway to Java Programmer Sun Certification, Tata McGraw Hill, 2002
  3   Chris Bates, Web Programming: Building Internet Applications, Wiley India, 3rd Ed, 2009
  4   Robert. W. Sebesta, Programming the World Wide Web, Fourth Edition, Pearson Education, 2007.

COURSE OUTCOMES

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

CO1   Dynamic web pages and choose appropriate HTML Tags
CO2   Use different CSS and choose appropriate need , use controls using Java Script
CO3   Implement the advanced concepts of java such as servlets & JSP to create dynamic web pages & add functionality to the WebPages
CO4   Write XML documents and use JSON in appropriate places.
CO5   Use server side scripting with PHP to generate the web pages dynamically using the database connectivity.

16GE302   ENGINEERING ECONOMICS AND COST ANALYSIS   L   T   P   C
(Common to all B.E. / B. Tech. Courses)   3   0   0   3

UNIT I   BASIC ECONOMICS   9

Definition of economics - nature and scope of economic science - nature and scope of managerial economics - basic terms and concepts - goods - utility - value - wealth - factors of production - land - its peculiarities - labour - economies of large and small scale - consumption -wants - its characteristics and classification - law of diminishing marginal utility – relation between economic decision and technical decision.

UNIT II   DEMAND AND SCHEDULE   9

Demand - demand schedule - demand curve - law of demand - elasticity of demand - types of elasticity - factors determining elasticity - measurement – its significance - supply – supply schedule - supply curve - law of supply - elasticity of supply - time element in the determination of value - market price and normal price - perfect competition - monopoly – monopolistic competition.

UNIT III   ORGANISATION   9

Forms of business - proprietorship - partnership - joint stock company - cooperative organization - state enterprise - mixed economy - money and banking - banking - kinds - commercial banks - central banking functions - control of credit - monetary policy - credit instrument.

UNIT IV   FINANCING   9

Types of financing - Short term borrowing - Long term borrowing – Internal generation of funds - External commercial borrowings - Assistance from government budgeting support and international finance corporations - analysis of financial statement – Balance Sheet - Profit and Loss account - Funds flow statement.

UNIT V   COST AND BREAK EVEN ANALYSES   9

Types of costing – traditional costing approach - activity base costing - Fixed Cost – variable cost – marginal cost – cost output relationship in the short run and in long run – pricing practice– full cost pricing – marginal cost pricing – going rate pricing – bid pricing – pricing for a rate of return – appraising project profitability –internal rate of return – pay back period – net present value – cost benefit analysis – feasibility reports – appraisal process – technical feasibility economic feasibility – financial feasibility. Break even analysis - basic assumptions – break even chart – managerial uses of break even analysis.

L:45   T: 0   P:0   Total: 45 PERIODS

TEXT BOOKS
1   Dewett K.K. & Varma J.D., Elementary Economic Theory, S Chand & Co., 2006.
2.   Sharma JC "Construction Management and Accounts" Satya Prakashan, New Delhi, 2006.

REFERENCES
1   Barthwal R.R., Industrial Economics - An Introductory Text Book, New Age, 2007.
2   Jhingan M.L., Micro Economic Theory, Konark,1989.
3   Samuelson P.A., Economics - An Introductory Analysis, McGraw Hill.

COURSE OUTCOMES
At the end of the course student should be able to:
CO1   Know the basic terms and concepts of economic.
CO2   Understand the major capability and limitations of cash flow analysis for   proposed   capital investment.
CO3   Recognize, formulate, analyze and solve cash flow models in practical   situations.
CO4   Develop the ability to account for time value of money using engineering economy factors and formulas, as well as implication and importance of considering taxes, depreciation and inflation.
CO5   Evaluate engineering alternatives by economic analysis techniques and   models.

16GE312   **CAREER DEVELOPMENT PROGRAMME VI**   L   T   P   C
                     (Common to all B.E. / B. Tech. Courses)   1   0   2   2*

UNIT I   LINGUISTIC SKILLS   10

Parts of Speech, Sentences - Simple, Compound & Complex sentences, Logical sequence of words, Reading Comprehension, Paragraph writing, Jumbled words, Jumbled sentences, Error Spotting, Idioms & Phrases, Word Substitution, Synonyms & Antonyms.

UNIT II   QUANTITATIVE ABILITY   10

Number theory, Percentage, Profit loss and discount, Simple and compound interest, Problems on Average & Ages, Ratio & Proportions, Partnership, Mixtures and allegation, Time speed and distance, Time and work, Probability, Permutation and combination, Mensuration, Clocks, Calendars.

UNIT III   VERBAL & NON-VERBAL REASONING   10

Analytical reasoning - Linear, Circular & Complex arrangement, Blood relation, Direction Problems, Decision making.

Logical reasoning - Number and Alpha series, Odd man out, Element series, Logical series, Coding and decoding, Syllogisms, Alphabets Machine Input & Output Coded Inequalities, Puzzles, Cubes, Data sufficiency, Analogy.

Critical reasoning - Statement – Argument & Assumption, Causes & effects, Courses of Action, Inferences.

Non-Verbal reasoning - Insert the missing character, Figure series, Cubes & Dices, Logical Venn diagram.

UNIT IV   PERSONALITY DEVELOPMENT & SOFT SKILLS   8

Body Language – Introduction, Grooming, Body Language - Postures and Gestures, Dressing Etiquettes, Hygiene & Cleanliness, Time Management

Interview Etiquettes – Meaning, Purpose, Interview process and types, checklist – do's and don'ts, Dress code, Self-Introduction.

Resume Building – Introduction, transformation between Resume and CV, Strategy of Resume Writing, Body of the resume, clarity and crispness, format and content.

Group Discussion – Types, Key steps to succeed in Group Discussion, Guidelines – Do's and Don'ts during Group Discussion, the technique of summing up.

UNIT V   COMPANY SPECIFIC TRAINING   7

Company specific training.

                              L:15   T:0   P:30   Total: 45 PERIODS

TEXT BOOKS
  1   John Eastwood, "Oxford Practice Grammar", Oxford.
  2   Rajesh Varma, "Fast Track Objective Arithmetic", Arihant Publications.
  3   M.K.Panday, "Analytical Reasoning", Magical Series.
REFERENCES
  1   R.V.Praveen, "Quantitative Aptitude and Reasoning" PHI Publication.
  2   R.S.Agarwal, "Quantitative Aptitude for Competitive Examinations", S.Chand & Company Pvt Limited.
  3   S.P.Bakshi, "Objective English" Arihant Publications.
  4   Edgar Thorpe & Showick Thorpe, "Winning Interviews", Pearson Publications.
COURSE OUTCOMES
At the end of the course students should be able to
CO1   Communicate well both in oral and written English.
CO2   Solve the complicated problems with the thorough knowledge on the basics.
CO3   Think both critical and logical to solve the problems.
CO4   Be a better personality in their professional and social life.
CO5   Face the recruitment challenges.

16GE314   **CAREER DEVELOPMENT PROGRAMME VI**   **L**   **T**   **P**   **C**
                    (Common to all B.E. / B. Tech. Courses)   **1**   **0**   **2**   **2***

UNIT I   **QUANTITATIVE ABILITY IV**   **9**

Time, speed & distance-Average speed- Relative speed- Train problems- Boats and streams- Races, Chain rule, Time and work -Pipes and cisterns.

UNIT II   **QUANTITATIVE ABILITY V**   **9**

Permutation & Combination, Probability, Mensuration, Data sufficiency (Quants).

UNIT III   **VERBAL REASONING   III**   **9**

Machine Input and Output, Coded Inequalities, syllogisms, Problems on Cubes, Data sufficiency(Reasoning).

UNIT IV   **CRITICAL REASONING**   **9**

Statement and Argument, Statement and Assumption, Statement and Conclusion, Course of action, Inference, Decision Making.

UNIT V   **NON- VERBAL REASONING**   **9**

Figure series, Odd man out, Mirror Image, Water image, Embedded Image, Cubes and Dices, shape construction, Insert the Missing Characters, Analytical reasoning, Logical venn diagram.

                                        L:15   T:0   P:30   Total: 45 PERIODS

TEXT BOOKS
   1   Rajesh Varma, "Fast Track Objective Arithmetic", Arihant Publications.
   2   BS Sijwali- Indu Sijwali, A New Approach to "Reasoning Verbal, Non-Verbal & Analytical", Arihant Publications.

REFERENCES
   1   R.V.Praveen, "Quantitative Aptitude and Reasoning" PHI Publication.
   2   R.S.Agarwal, "Quantitative Aptitude for Competitive Examinations", S.Chand & Company Pvt Limited.

COURSE OUTCOMES
At the end of the course students should be able to
CO1   Increase the students knowledge in both analytical and logical reasoning
CO2   Apply the shortcut methods in quantitative Aptitude
CO3   Solve application orientated concepts in quantitative aptitude.
CO4   Improve the quality of the student as a finished product for their corporate life
CO5   Use their logical thinking and analytical abilities to solve Quantitative aptitude questions.

16IT308	WEB TECHNOLOGY LABORATORY	L	T	P	C
		0	0	4	2

LIST OF EXPERIMENTS

1. Write html program for Creation of web site with forms, frames, links, tables etc.
2. Using Cascading Style Sheets (CSS) for creating web sites.
3. Design a web site using HTML and DHTML. Use Basic text formatting.
4. Create a script that asks the user for a name, then greets the user with "Hello" and the user name on the page.
5. Creating event handler that respond to mouse and keyboard event: Onload, onmouseover, onmouseout, onfocus, onblur, onsubmit, onresult, onclick, onchange.
6. Creating simple application to access data base using JDBC Formatting HTML with CSS.
7. Program for manipulating Databases and SQL.
8. Write a web application that functions as a simple hand calculator, but also keeps a "Paper trail" of all your previous work
9. Create a PHP program to demonstrate the different predefined function in array, Math, Data & Regular Expression.
10. Create a PHP program for Regular Expression, Array, Math, Date functions
11. Reading and Writing the files using .Net
12. Develop a web application using PHP and Web Server
13. Experiments in AJAX Programming.
14. Implement RMI concept for building any remote method of your choice

MAJOR EQUIPMENTS / SOFTWARE REQUIRED
   Hardware
   - PC 30nos
   Software
   - NETBEANS IDE7.3,.NET 2012

                    L : 0   T: 0   P: 60   Total:60 PERIODS

COURSE OUTCOMES
At the end of the course student should be able to:
CO1 Design Web pages using HTML/DHTML and style sheets
CO2 Gain knowledge in database applications
CO3 Create dynamic web pages using server side scripting
CO4 Implement applications using RPC and AJAX
CO5 Develop web page for organizations

16CS308	**MOBILE APPLICATION DEVELOPMENT LABORATORY**	**L**	**T**	**P**	**C**
	(Common to CSE & IT)	**0**	**0**	**4**	**2**

LIST OF EXPERIMENTS

1. Understand the app idea and design user interface/wireframes of mobile app
2. Set up the mobile app development environment
3. Develop and debug mobile app components – User interface, services, notifications, broadcast receivers, data components
4. Using emulator to deploy and run mobile apps
5. Testing mobile app - unit testing, black box testing and test automation

MAJOR EQUIPMENTS / SOFTWARE REQUIRED

Hardware
- Pentium P4, 2.8 GHz or higher
- 4 GB (or higher) RAM, 120 GB (or higher) HD
- Platform : Windows 8 and higher with SP2 (or higher)

Software
- Android ADT bundle,
- MonkeyTalk, Robotium,
- Tomcat (or any other J2EE web container)

L : 0   T: 0   P:60   Total:60 PERIODS

COURSE OUTCOMES
At the end of the course student should be able to:

CO1   Design mobile apps, using Android as development platform with key focus on user experience design.

CO2   Develop mobile apps, using Android as development platform, with key focus on native data handling and background tasks and notifications.

CO3   Perform testing, signing, packaging and distribution of mobile apps.

CO4   Display proficiency in coding on a mobile programming platform.

CO5   Save state information across important operating system events.

16IT309	MINI PROJECT	L	T	P	C
		0	0	4	2

LIST OF EXPERIMENTS

Design and Implement of the following Applications:

1. Campus Online Help desk
2. Exam Server
3. Feedback based Self Configuring System
4. Gaming Software
5. Multiuser Chatting System
6. Network Vigilator
7. Online Bulletin Board
8. Online Counseling System
9. Query Builder
10. Time Table Management System etc.,

L : 0   T: 0   P: 60   Total:60 PERIODS

COURSE OUTCOMES

At the end of the course students should be able to

CO1: design and implement the recent trends in the computer based Research areas.

16IT401   **CRYPTOGRAPHY AND NETWORK SECURITY**   L   T   P   C
                     (Common to CSE & IT)   3   0   0   3

UNIT I   INTRODUCTION & NUMBER THEORY   9

OSI security architecture – Attacks, Services and Mechanisms -Network security model-Classical Encryption techniques (Symmetric cipher model, substitution techniques, transposition techniques, Steganography).Finite Fields **:** Groups, Rings, Fields- Congruences - Modular arithmetic - Euclidean algorithm- Polynomial Arithmetic- Finite fields– Number Theory: Prime numbers-Fermat's and Euler's theorem-Testing for primality -The Chinese remainder theorem- Discrete logarithms.

UNIT II   BLOCK CIPHERS & PUBLIC KEY CRYPTOGRAPHY   9

Block cipher principles - Data Encryption Standard- block cipher modes of operation- Triple DES- Advanced Encryption Standard (AES)-RC4 algorithm. Public key cryptography**:** Principles of public key cryptosystems-The RSA algorithm-Key management - Diffie Hellman Key exchange-Elliptic curve arithmetic-Elliptic curve cryptography

UNIT III   HASH FUNCTIONS AND DIGITAL SIGNATURES   9

Authentication requirements – Authentication function – MAC – Hash function – Security of hash function and MAC –MD5 - SHA - HMAC – CMAC - Digital signature and authentication protocols – DSS – Case Study ElGamal & Schnorr Algorithms

UNIT IV   SECURITY PRACTICE & SYSTEM SECURITY   9

Authentication applications – Kerberos – X.509 Authentication services – Firewalls: Internet Firewalls for Trusted System: Roles of Firewalls – Firewall related terminology- Types of Firewalls - Firewall designs – SET for E-Commerce Transactions -Intruder – Intrusion detection system – Malicious Software - Virus and related threats –Countermeasures –Distributed DoS Attacks - Trusted systems

UNIT V   E-MAIL, IP & WEB SECURITY   9

IPSecurity: IPSec - IP and IPv6-Authentication Header-Encapsulation Security Payload (ESP)-Internet Key Exchange (Phases of IKE, ISAKMP/IKE Encoding). Web Security: SSL/TLS Basic Protocol-computing the keys- client authentication-PKI as deployed by SSL Attacks fixed in V3-Exportability-Encoding-E-mail Security: Security Services for E-mail-attacks possible through. E-mail - establishing keys privacy-authentication of the source-Message Integrity-Non-repudiation -Pretty Good Privacy-S/MIME.

L : 45   T: 0   P:0   Total: 45 PERIODS

TEXT BOOKS
1   William Stallings, "Cryptography and Network Security", 6th Edition, Pearson Education, 2013.
2   Charlie Kaufman, Radia Perlman and Mike Speciner, "Network Security", 2nd Edition, Prentice Hall of India, 2002.

REFERENCES
1   Behrouz A. Ferouzan, "Cryptography & Network Security", 2nd Edition, Tata Mc Graw Hill,2011.
2   Man Young Rhee, "Internet Security: Cryptographic Principles", "Algorithms and   Protocols", 2nd Edition, Wiley Publications, 2003.
3   Charles Pfleeger, "Security in Computing", 4th Edition, Prentice Hall of India, 2006.
4   Ulysess Black, "Internet Security Protocols", 2nd Edition, Pearson Education Asia, 2000.
5   Bruce Schneier and Neils Ferguson, "Practical Cryptography", 1st Edition, Wiley   Dreamtech India Pvt Ltd, 2003

COURSE OUTCOMES
At the end of the course student should be able to:
CO1   Recognize the mathematical concepts used in Cryptography
CO2   Gain knowledge in Symmetric and Asymmetric Cryptosystems
CO3   Identify and Investigate Network Security Threats
CO4   Apply Security Principles to System Design
CO5   Develop knowledge on E-Mail, IP & Web Security over real time.

16GE301   **PROFESSIONAL ETHICS**   **L** **T** **P** **C**
                   (Common to all B.E. / B. Tech. Courses)   **3**   **0**   **0**   **3**

UNIT I   ENGINEERING ETHICS   9

Senses of Engineering ethics – Variety of moral issues – Types of inquiry- Moral dilemmas. Moral autonomy – Kolberg's theory – Gilligan's theory – consensus and controversy – professions and professionalism – professional ideals and virtues – theories about right action – self-interest – customs and religion – use of ethical theories.

UNIT II   ENGINEERING AS SOCIAL EXPERIMENTATION   9

Engineering as social experimentation – engineers as responsible experimenters – codes of ethics – a balanced outlook on law – Case studies.

UNIT III   ENGINEERS RESPONSIBILITY FOR SAFETY   9

Safety and risk – assessment of safety and risk – risk benefit analysis – reducing risk – Case studies.

UNIT IV   RESPONSIBILITIES AND RIGHTS   9

Collegiality and loyalty – respect for authority – collective bargaining – confidentiality – conflicts of interest –occupational crime – professional rights –employee right – discrimination – intellectual property rights, Case studies.

UNIT V   GLOBAL ISSUE   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 conduct, Case studies.

                                  L:45   T: 0   P: 0   Total: 45 PERIODS

TEXT BOOKS
 1   Mike Martin and Roland Schinzinger, "Ethics in Engineering" McGraw hill, NewYork, 2004.
 2. Govindarajan. M, Natarajan. S,Senthilkumar. V.S, "Engineering Ethics" Prentice Hall, New Delhi, 2004.

REFERENCES
 1   Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, "Engineering Ethics– Concepts and Cases", Cengage Learning, 2009 .
 2   Laura P. Hartman and Joe Desjardins, "Business Ethics: Decision Making for Personal Integrity and Social Responsibility" McGraw Hill education, India Pvt.Ltd., New Delhi 2013 .
 3   Charles B. Fleddermann, "Engineering Ethics", Pearson Prentice Hall, New Jersey, 2004.
 4   Prof. (Col) P S Bajaj and Dr. Raj Agrawal, "Business Ethics – An Indian Perspective", Biztantra, New Delhi, (2004).
 5   David Ermann and Michele S Shauf, "Computers, Ethics and Society", Oxford University Press, 2003.

COURSE OUTCOMES

At the end of the course student should be able to:
CO1   Understand the basic perception of profession, professional ethics, various moral issues and uses of ethical theories.
CO2   Identify various social issues, industrial standards, code of ethics and role of professional ethics in engineering field.
CO3   Realize the responsibilities of an engineer for safety and risk benefit analysis.
CO4   Recognize the professional rights and responsibilities of an engineer.
CO5   Acquire knowledge about various roles of engineers in variety of global issues and able to apply ethical principles to resolve situations that arise in their professional career.

16IT402	CRYPTANALYSIS LABORATORY	L	T	P	C
		0	0	4	2

LIST OF EXPERIMENTS

1. Implementation of Classical Encryption Techniques
   a) Substitution Ciphers (Caeser& Mono alphabetic Ciphers)
   b)Transposition ciphers (Rail fence & Columnar Methods)

2. Implementation of Symmetric Cryptosystems
   a) Data Encryption Standard(DES)
   b) Advanced Encryption Standard(AES)

3. Implementation of Asymmetric Cryptosystem
   a)RSA Algorithm

4. Implementation of Key Exchange Algorithm
   a)Diffie-Hellman Key Exchange

5. Implementation of Message Authentication Mechanisms
   a)Message Authentication Codes
   b)Hash functions

6. Implementation of Message Integrity
   a) Digital Signature Standard

7. Implementation of Steganography
   a)Hiding of confidential information within Image

MAJOR EQUIPMENTS / SOFTWARE REQUIRED

Hardware
- PC 30nos

Software
- Turbo C

L : 0   T: 0   P: 60   Total:60 PERIODS

COURSE OUTCOMES

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

CO1 Implement the Classical Encryption Techniques in secure networking environment

CO2 Identify and Investigate Symmetric Cryptosystems.

CO3 Familiarize in various Asymmetric Cryptosystems

CO4 Apply to test on different Key Exchange Algorithms & Message Authentication Mechanisms.

CO5 Formulate new algorithms for Secure Data Communication.

16IT403   **PROJECT PHASE I**   **L   T   P   C**
                                                           0   0   4   2

PROCEDURE TO FOLLOW

- Identification of the Project
- Literature survey
- Presenting review paper
- Report should summarize the methodology to be adopted, work plan for the proposed project work
- Chosen Existing System Implementation

L: 0   T:0   P:60   TOTAL:60 PERIODS

COURSE OUTCOMES

At the end of the course students should be able to

CO1: apply knowledge gained in identifying a project work.

CO2: execute and demonstrate chosen existing system

CO3: publish their work I reputed Journals.

16IT404	PROJECT PHASE -II	L	T	P	C
		0	0	20	10

PROCEDURE TO FOLLOW

- Proposed System Implementation
- Presenting review paper
- Report should summarize the Proposed methodology adopted
- Thesis Preparation

L: 0   T:0   P:300   TOTAL:300 PERIODS

COURSE OUTCOMES

At the end of the course students should be able to

CO1: fabricate a project.

CO2: execute and demonstrate the proposed system.

CO3: publish their work in reputed National /International Journals

16IT311	E-WASTE MANAGEMENT	L	T	P	C
		3	0	0	3

UNIT I   OVERVIEW AND MATERIALS USED IN MANUFACTURING   9
ELECTRICAL AND ELECTRONIC PRODUCTS

Electronic waste management: Introduction - producer responsibility legislation – Waste Electrical and Electronic equipment (WEEE) directive – RoHS directive – WEEE health and safety implications - Materials used in manufacturing electrical and electronic products: RoHS proscribed materials - soldering and the move to lead-free assembly – printed circuit board materials – materials composition of WEEE: mobile phones – television – washing machines.

UNIT II   RECYCLING ,RECOVERY AND INTEGRATED APPROACH TO   9
E-WASTE RECYCLING

Separation and Sorting - Treatment - Outputs and Markets - Emerging Technologies - Recycling and Recovery Technologies - Emerging Recycling and Recovery Technologies - Printed Circuit Boards - Sector-based Eco-design

UNIT III   LIQUID CRYSTAL DISPLAYS   9

Overview of Liquid Crystals - Liquid Crystal Displays Based on Nematic Mesophase - LCD Manufacturing Process-Environmental Legislation and Lifecycle Analysis - Potentially Hazardous Constituents - Toxicity of LCD Constituents.

UNIT IV   HAZARDS   9

RF Hazards: Wired and Wireless Communication – RF and Microwave Radiation Hazards - Occupational Exposure - Public Exposure - Reference Level Statutory Warning - Field Measurements - Wireless Networks- Bluetooth Transmission – Precautions - Non Ionizing Radiation - Biological Effects - Cause of Cancer - Safe Levels for Exposure – Guidelines - SAR- Emission due to Transmission Towers - HAM Radio – Access Points – Cardiac Pacemakers - Wi-Fi Routers - EMC and EMI - Laser And Light Energy – Standards - Preventive Measures – Signs - Typical Case Study

UNIT V   RESPONSIBILITY AND ASSESSMENT OF ELECTRONICS   9
ENCLOSURE PLASTICS

WEEE Directive - E-waste Laws and Voluntary Agreements in Other Countries - Recommendations to Implement IPR - Instrumental Techniques – Visible-NIR Spectroscopy of Engineering Thermoplastics - Analysis of Plastics Containing Flame - Retardant Additives

L : 45   T: 0   P:0   Total: 45 PERIODS

TEXT BOOKS
1 R. E. Hester and R. M. Harrison, "Electronic Waste Management", Royal Society of Chemistry, London, 2009.
2 Mackenzie L. Davis, and David A. Cornwell, "Introduction to Environmental Engineering", Tata McGraw Hill, New Delhi, 2010.

REFERENCES
1 William W. Nazarodd and Lisa Alvarez-Cohen, "Environmental Engineering Science", Wiley-India, New Delhi, 2010.
2 Gilbert M Masters, "Introduction to Environmental Engineering and Science", Prentice Hall of India, New Delhi, 2004.
3 Klaus Hieronymi ,Ramzy Kahhat and Eric Williams "E-Waste management: From Waste to Resource ", Routledge,2012.

COURSE OUTCOMES
At the end of the course student should be able to:
CO1 Analyze the materials used in manufacturing electrical and electronic products
CO2 Apply the concept of Recycling and Recovery to e-Waste
CO3 Implement the various solution to handle waste
CO4 Identify the methods to handle RF Hazards
CO5 Realize the Responsibility in e-Waste Management

16IT312	OBJECT ORIENTED ANALYSIS AND DESIGN	L	T	P	C
	(Common to CSE & IT)	3	0	0	3

UNIT I INTRODUCTION TO OOAD 9

An Overview of Object Oriented Systems Development - Object Basics- object oriented methodologies - Rumbaugh Methodology - Booch Methodology - Jacobson Methodology - Patterns -Frameworks - Unified Approach- Unified Modeling Language

UNIT II OBJECT ORIENTED ANALYSIS 9

Identifying use cases - Object Analysis - Classification - Identifying Object relationships - Attributes and Methods. Elaboration - Domain Models - Finding conceptual classes and description classes - Associations - Domain model refinement - Aggregation and Composition- UML activity diagrams and modeling.

UNIT III OBJECT ORIENTED DESIGN 9

Design axioms - Designing Classes - Access Layer - Object Storage - Object Interoperability- GRASP: Designing objects with responsibilities - Creator - Information expert - Low Coupling - High Cohesion – Controller

UNIT IV APPLYING DESIGN PATTERNS 10

System sequence diagrams - Relationship between sequence diagrams and use cases Logical architecture and UML package diagram - Logical architecture refinement - UML class diagrams - UML interaction diagrams - Applying GoF design patterns- adapter, singleton, factory and observer patterns

UNIT V GUI PROGRAMMING 8

Mapping design to code – Testing: Issues in OO Testing – Class Testing – OO Integration Testing – GUI Testing – OO System Testing. Case study- the Next Gen POS system.

L : 45   T: 0   P:0   Total: 45 PERIODS

TEXT BOOKS
1. Ali Bahrami, "Object Oriented Systems Development", Tata McGraw-Hill, New Delhi,2008.
2. Craig Larman, "Applying UML and Patterns: An Introduction to object-oriented Analysis and Design and iterative development", Third Edition, Pearson Education, 2005

REFERENCES
1. Mike O'Docherty, "Object-Oriented Analysis & Design: Understanding System Development with UML 2.0", John Wiley & Sons, 2005

2. James W- Cooper, Addison-Wesley, "Java Design Patterns – A Tutorial", 2000.
3. Micheal Blaha, James Rambaugh, "Object-Oriented Modeling and Design with UML", Second Edition, Prentice Hall of India Private Limited, 2007.
4. Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides, **"**Design patterns Elements of Reusable object-oriented software", Addison-Wesley, 1995.
5. John Deacon, "Object Oriented Analysis and Design", Pearson Education,2009.

COURSE OUTCOMES
At the end of the course student should be able to:

CO1 Demonstrate basic object-oriented concepts and relationship between objects.
CO2 Apply an iterative, use case-driven process to the development of a robust design model
CO3 Use UML diagrams to represent the analysis, design and visual design model
CO4 Identify the design pattern to refine the model and to apply in complex problems.
CO5 Design a software system using object-oriented software engineering paradigm.

16IT313	**EMBEDDED SYSTEM DESIGN**	**L**	**T**	**P**	**C**
	(Common to CSE & IT)	**3**	**0**	**0**	**3**

UNIT I   EMBEDDED COMPUTING   9

Challenges of Embedded Systems – Embedded system design process. Embedded processors – 8051 Microcontroller, ARM processor – Architecture, Instruction sets and programming.

UNIT II   MEMORY AND INPUT / OUTPUT MANAGEMENT   9

Programming Input and Output – Memory system mechanisms – Memory and I/O devices and interfacing – Interrupts handling.

UNIT III   PROCESSES AND OPERATING SYSTEMS   9

Multiple tasks and processes – Context switching – Scheduling policies – Interprocess communication mechanisms – Performance issues- Examples of Embedded Operating Systems – RT Linux, µC/OS.

UNIT IV   EMBEDDED SOFTWARE   9

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

UNIT V   EMBEDDED SYSTEM DEVELOPMENT   9

Design issues and techniques – Security issues in embedded systems- Case studies – Intruder Alarm System, Automatic Chocolate Vending Machine, Washing Machine, Elevator Controller.

L : 45   T: 0   P:0   Total: 45 PERIODS

TEXT BOOKS
1   Wayne Wolf, "Computers as Components: Principles of Embedded Computer System Design", Elsevier, 2006.
2   Michael J. Pont, "Embedded C", Pearson Education, 2007.

REFERENCES
1   Steve Heath, "Embedded System Design", Elsevier, 2005.
2   Muhammed Ali Mazidi, Janice GillispieMazidi and Rolin D. McKinlay, "The 8051 Microcontroller and Embedded Systems", Pearson Education, Second edition, 2007.
3   Arnold S Berger, "Embedded system design: An introduction to processors, Tools, Techniques", 4th edition, CMP Books, 1st Edition, 2001.
4   Qing Li and Carolyn, "Real-Time Concepts for Embedded Systems", CMP Books, 2003.
5   Dr.K.V.K. Prasad, "Embedded / Real-Time Systems: Concepts, Design & Programming" – Dreamtech Press, New Delhi, 2009

COURSE OUTCOMES
At the end of the course student should be able to:

CO1   Design architecture of embedded systems and know some programming Concepts to control and coordinate with the system.

CO2   Describe the concepts of inter-process communication and multiple task concepts.
CO3   Understand real time design issues of embedded systems.
CO4   Develop an application using embedded software platforms
CO5   Analyze various case studies of embedded systems

16IT314	**INFORMATION THEORY AND CODING**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

UNIT I   INFORMATION THEORY   9

Uncertainty, Information and Entropy- Joint and conditional entropies, Mutual information- Kraft McMillan inequality, Source coding theorem, Shannon-Fano coding, Huffman coding - Discrete memory less channels Channel capacity, Channel coding Theorem, Channel capacity theorem

UNIT II   SOURCE CODING: TEXT AND SPEECH   9

Differential Pulse code Modulation –Adaptive Differential Pulse Code Modulation –Adaptive subband coding –Delta Modulation –Adaptive Delta Modulation –Coding of speech signal at low bit rates (Vocoders, LPC)

UNIT III   SOURCE CODING: AUDIO AND VIDEO   9

Audio: Perceptual coding, Masking techniques, Psychoacoustic model, MEG Audio layers I,II,III, Dolby AC3 -– Video Compression: Principles- H.261, MPEG standard

UNIT IV   COMPRESSION TECHNIQUES   9

Text: Adaptive Huffman Coding, Arithmetic Coding, LZW algorithm, Image and Video Formats – GIF, TIFF, SIF, CIF, QCIF – Image compression: READ, JPEG

UNIT V   ERROR CONTROL CODING AND TURBO CODES   9

Linear Block codes –Syndrome Decoding–Minimum distance consideration –cyclic codes –Generator Polynomial –Parity check polynomial–Encoder for cyclic codes –calculation of syndrome – Convolutional codes- Turbo codes-Turbo decoding

                              L : 45   T: 0   P:0   Total: 45 PERIODS

TEXT BOOKS
 1   R Bose, "Information Theory, Coding and Crptography", TMH

 2   Fred Halsall, "Multidedia Communications: Applications, Networks, Protocols and Standards", Perason Education Asia, 2002

REFERENCES
 1   Simon Haykin, "Communication Systems", 4thEdition, John Wiley and Sons, 2001.
 2   John Proakis & Masoud Salehi ,"Digital Communications", 5th edition, McGraw- Hill, 2008.
 3   K Sayood, "Introduction to Data Compression" 3/e, Elsevier 2006
 4   S Gravano, "Introduction to Error Control Codes", Oxford University Press 2007
 5   Amitabha Bhattacharya, "Digital Communication", TMH 2006

COURSE OUTCOMES
At the end of the course student should be able to:

CO1   Demonstrate the Information Theory and Calculate entropy, channel capacity, bit error rate, and code rate
CO2   Encode and decode the information in various formats
CO3   Use error correcting codes in data transmission
CO4   Enumerate compression and decompression techniques
CO5   Implement the encoder and decoder of block code or convolution code

		L	T	P	C
16IT315	**SERVICE ORIENTED ARCHITECTURE**				
	(Common to CSE & IT)	3	0	0	3

UNIT I   **INTRODUCTION TO XML**   **9**

XML document structure – Well formed and valid documents – Namespaces – DTD – XML Schema – X-Files.

UNIT II   **BUILDING XML- BASED APPLICATIONS**   **9**

Parsing XML – using DOM, SAX – XML Transformation and XSL – XSL Formatting – Modeling Databases in XML.

UNIT III   **SERVICE ORIENTED ARCHITECTURE**   **9**

Characteristics of SOA, Comparing SOA with Client-Server and Distributed architectures – Benefits of SOA - Principles of Service orientation – Service layers.

UNIT IV   **WEB SERVICES**   **9**

Service descriptions – WSDL – Messaging with SOAP – Service discovery – UDDI – Message Exchange Patterns – Orchestration – Choreography –WS Transactions.

UNIT V   **BUILDING SOA-BASED APPLICATIONS**   **9**

Service Oriented Analysis and Design – Service Modeling – Design standards and guidelines - Composition – WS-BPEL – WS-Coordination – WS-Policy – WS-Security – SOA support in J2EE- Case Study: Service Oriented Architecture (SOA) and Cloud Computing

                                     L : 45   T: 0   P:0   Total: 45 PERIODS

TEXT BOOKS
1. Ron Schmelzer et al. " XML and Web Services", Pearson Education, 2002.
2. Thomas Erl, "Service Oriented Architecture: Concepts, Technology, and Design", Pearson Education, 2005

REFERENCES
1. Frank P.Coyle, "XML, Web Services and the Data Revolution", Pearson Education, 2002.
2. Eric Newcomer, Greg Lomow, "Understanding SOA with Web Services", Pearson Education, 2005.
3. Sandeep Chatterjee and James Webber, "Developing Enterprise Web Services: An Architect's Guide", Prentice Hall, 2004.
4. James McGovern,Sameer Tyagi, Michael E.Stevens, Sunil Mathew, "Java Web Services Architecture", Morgan Kaufmann Publishers, 2003.
5. Nicolai M.Josuttis, "SOA in Practice", O'Reilly Media, 2007.

COURSE OUTCOMES

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

CO1   Illustrate XML fundamentals.

CO2   Enumerate and build applications based on XML.

CO3   Develop web services using technology elements.

CO4   Build SOA-based applications for intra-enterprise and inter-enterprise applications

CO5   Understand the web service interoperability, security, and future of web services with the implementation of cloud computing

16IT316	BUSINESS INTELLIGENCE - DATA WAREHOUSING AND ANALYTICS	L	T	P	C
	(Offered by Infosys)				
	(Common to CSE & IT)	3	0	0	3

UNIT I   INTRODUCTION TO BUSINESS INTELLIGENCE   9

Introduction to digital data and its types – structured, semi-structured and unstructured, Data warehouse architecture Introduction to OLTP and OLAP (MOLAP, ROLAP, HOLAP), BI Definitions & Concepts, BI Framework, Data Warehousing concepts and its role in BI, BI Infrastructure Components – BI Process, BI Technology, BI Roles & Responsibilities, Business Applications of BI, BI best practices

UNIT II   BASICS OF DATA INTEGRATION (EXTRACTION   9
**   TRANSFORMATION LOADING)**

Concepts of data integration, needs and advantages of using data integration, introduction to common data integration approaches, Data preprocessing Meta data – types and sources, Introduction to data quality, data profiling concepts and applications, introduction to ETL using Pentaho data Integration (formerly Kettle)

UNIT III   INTRODUCTION TO MULTI-DIMENSIONAL DATA   8
**   MODELING**

Multi dimensional data modeling , basis, types, techniques, fact table, dimensional table, dimensional model, life cycle, Measures, metrics, KPI and performance management, introduction to business metrics and KPIs, creating cubes using Microsoft Excel

UNIT IV   BASICS OF ENTERPRISE REPORTING   8

A typical enterprise, reporting perspective, enterprise reporting characteristics, balanced score boards, dash boards, creating dashboards, scorecard vs. enterprise dashboard, Buzz behind analysis.

UNIT V   ASSOCIATION RULE MINING AND CLASSIFICATION   11

Classification and Prediction - Basic Concepts - Decision Tree Induction - Bayesian Classification, Support Vector Machines -Role of statistics in analytics –data, data description and summarization, statistical test, hypothesis tests , correlation analysis, regression test, ANOVA, F test, Time series analysis,

**   L : 45   T: 0   P:0   Total: 45 PERIODS**

TEXT BOOKS
 1 R.N.Prasad and Seema Acharya , "Fundamentals of Business Analytics", Amazon , 2011
 2 Jiawei Han and Micheline Kamber, "Data Mining Concepts and Techniques", Morgan Kaufmann , 2011

REFERENCES
 1 D Loshin ," Business Intelligence, The Savvy Manager's Guide" 2nd Edition, Morgan Kaufmann, October 2012
 2 Mike Biere ,"Business Intelligence for the Enterprise (IBM DB2 Certification Guides)", IBM Press, Jan 2003.
 3 Larissa Terpeluk Moss, ShakuAtre , "Business intelligence roadmap- The Complete Project Lifecycle for Decision-support Applications" Addison-Wesley Professional, 2003
 4 An introduction to Building the Data Warehouse – IBM PRESS
 5 Swain Scheps, " Business Intelligence For Dummies ",Addison-Wesley Professional, 2007

COURSE OUTCOMES
At the end of the course student should be able to:
CO1 Analyze the problem and apply data mining techniques and methods to large data sets.
CO2 Preprocess the data using available options
CO3 Discuss about multi dimensional data and assess the performance
CO4 Elaborate about enterprise reporting and
CO5 Classify and predict the data, and perform statistical analysis

16CS318	ARTIFICIAL INTELLIGENCE	L	T	P	C
		3	0	0	3

UNIT I   PROBLEM SOLVING   9

Introduction – AI problems – Problem Characteristics –Agents – Structure of an agent – Problem formulation – uninformed search strategies – heuristics – informed search strategies – constraint satisfaction.

UNIT II   LOGICAL REASONING   9

Logical agents – propositional logic – inferences – first-order logic – inferences in first order logic – propositional Vs. first order inference –   unification &lifts – forward chaining – backward chaining – resolution.

UNIT III   PLANNING   9

Planning with state-space search – partial-order planning – planning graphs – planning and acting in the real world.

UNIT IV   UNCERTAIN KNOWLEDGE AND REASONING   9

Uncertainty – review of probability - probabilistic Reasoning – Semantic networks – Bayesian networks – inferences in Bayesian networks – Temporal models – Hidden Markov models.

UNIT V   LEARNING   9

Learning from observation – Inductive learning – Decision trees – Explanation based learning – Statistical Learning methods –Reinforcement Learning– Neural net learning & Genetic learning.

L : 45   T: 0   P: 0   Total: 45 PERIODS

TEXT BOOKS
1   S. Russel and P. Norvig, "Artificial Intelligence – A Modern Approach", Third Edition, Pearson Education, 2013.
2. David Poole, Alan Mackworth, Randy Goebel, "Computational Intelligence: a logical approach", Second Edition, Oxford University Press, 2004.

REFERENCES
1   G. Luger, "Artificial Intelligence: Structures and Strategies for complex problem solving", Fourth Edition, Pearson Education, 2002.
2   Elaine Rich , Kevin Knight, "Artificial Intelligence", Third Edition, Tata McGraw Hill, 2009.
3   Anindita Das, "Artificial Intelligence & Soft Computing for Beginners", First Edition, Shroff Publishers & Distributors Pvt Ltd, 2013.
4   Stuart Russell ,Peter Norvig, "Artificial Intelligence: A Modern Approach", Third Edition,Pearson Education, 2009 .

COURSE OUTCOMES
At the end of the course student should be able to:

CO1   Learn the basics of AI, intelligent agents.
CO2   Understand the logical reasoning approaches to Artificial Intelligence programming.
CO3   Recognize classical planning methods in real world.
CO4   Apply knowledge representation techniques and problem solving strategies to common AI applications.
CO5   Implement appropriate algorithm to real world problems.

PROFESSIONAL ELECTIVE II

16IT317	REAL TIME SYSTEM DESIGN	L	T	P	C
		3	0	0	3

UNIT I   INTRODUCTION   9

Introduction – Issues in Real Time Computing – Structure of a Real Time System – Task Classes – Performance Measures for Real Time Systems – Estimating Program Runtimes – Task Assignment and Scheduling – Classical Uniprocessor Scheduling Algorithms – Uniprocessor Scheduling of IRIS Tasks – Task Assignment - Mode Changes – Fault Tolerant Scheduling

UNIT II   PROGRAMMING LANGUAGES AND TOOLS   9

Desired Language characteristics- Data Typing- Control structures- Facilitating Hierarchical Decomposition- Packages- Run-time Exception- Error handling- Overloading and Generics- Multitasking- Low Level Programming- Task scheduling- Timing Specifications- Programming Environments- Run-time Support- Brief survey of languages

UNIT III   REAL TIME DATABASES   9

Basic Definition- Real time Vs General Purpose Databases- Main Memory Databases- Transaction priorities- Transaction Aborts- Concurrency Control Issues- Disk Scheduling Algorithms- Two-Phase Approach to improve Predictability- Maintaining Serialization Consistency- Databases for Hard Real Time systems

UNIT IV   COMMUNICATION   9

Real-Time Communication – Communications Media- Network Topologies Protocols- Fault Tolerant Routing. Fault Tolerance Techniques – Fault Types- Fault Detection – Fault Error containment Redundancy- Data Diversity- Reversal Checks- Integrated Failure handling.

UNIT V   EVALUATION TECHNIQUES   9

Reliability Evaluation Techniques – Obtaining Parameter Values- Reliability Models for Hardware Redundancy- Software Error Models – Clock Synchronization – Clock Impact of Faults- Fault Tolerant Synchronization in Hardware - Fault Tolerant Synchronization in Software

L : 45   T: 0   P:0   Total: 45 PERIODS

TEXT BOOKS
 1   C.M. Krishna, Kang G. Shin, "Real-Time Systems", McGraw-Hill International Editions, Third Reprint, 2010
 2   Phillip A. Laplante, Seppo J. Ovaska, **"**Real-Time Systems Design and Analysis: Tools for the Practitioner**"** John Wiley & Sons, Third Edition, 2011

REFERENCES
 1   Rajib Mall, "Real-time systems: theory and practice", Pearson Education, 2007
 2   Philip.A.Laplante "Real Time System Design and Analysis" PHI, Third Edition, April 2004.
 3   Stuart Bennett, "Real Time Computer Control-An Introduction", Prentice Hall PTR, Second edition, 2009.
 4   Peter D. Lawrence, "Real time Micro Computer System Design – An Introduction", McGraw Hill, 1988.
 5   S.T. Allworth and R.N. Zobel, "Introduction to real time software design", Macmillan, Second Edition, 1987

COURSE OUTCOMES
At the end of the course student should be able to:
CO1   Apply different scheduling algorithms
CO2   Apply suitable programming constructs according to the specification
CO3   Use real time databases for efficient storage
CO4   Apply real time communication techniques and Fault tolerance techniques in networks
CO5   Exploit reliability in real time applications

16IT318   **SOFTWARE   REQUIREMENT ENGINEERING**   L   T   P   C
                                                             3   0   0   3

UNIT I   INTRODUCTION   9

Introduction - Software Requirement Overview - Requirements Problem – Requirements management – Requirements and software life cycle-software team- Requirements workshops

UNIT II   ANALYSING THE PROBLEM   9

The five steps in problem analysis– business modeling – Systems engineering of software intensive systems – Understanding user and stakeholders needs – Features of a product or system –Interviewing -Brain storming and Idea reduction- storyboarding

UNIT III   DEFINING THE SYSTEM   9

Use case primer-Organizing requirement Information-Vision Document-Product Management-Managing scope-Establishing Project scope-Managing customer

UNIT IV   REFINING THE SYSTEM DEFINITION   9

Software requirement-Refining the use cases-developing the supplementary specification- Ambiguity and specificity -Technical methods for specifying requirements

UNIT V   BUILDING THE RIGHT SYSTEM   9

From use cases to Implementation-From use Cases to Test cases-Tracing requirements-Managing Change-Assessing Requirements Quality in Iterative Development-Agile Requirement methods. Case Study - Requirements Engineering as a Success Factor in Software Project.

                    L : 45   T: 0   P:0   Total: 45 PERIODS

TEXT BOOKS
 1   Leffingwell, D., Widrig , D., "Managing Software Requirements A Use case approach",   third Edition, Pearson Education, second edition, 2011.
 2   Swapna Kishore, Rajesh Naik, "Software Requirements and Estimation", Tata McGraw Hill, Second Edition ,2009

REFERENCES
 1   Phillip A. Laplante, "Requirements Engineering for Software and Systems", Second Edition, 2005
 2   K.Weigers, "Software Requirements", Microsoft Press, Second edition 2003.
 3   Ian Sommerville and P Sawyer, "Requirements engineering a good practice Guide", Wiley India, 1997.
 4   Ian K. Bray, "An Introduction to Requirements Engineering", Pearson Addison Wesley; second edition , 2007
 5   Pankaj Jalote, "Software Engineering, A Precise Approach", Wiley India, Second Edition 2010.

COURSE OUTCOMES
At the end of the course student should be able to:

CO1   Gain knowledge in Requirements Engineering
CO2   Analyze the problems in software requirement specifications using an industry standard.
CO3   Examine the requirement based on system definition
CO4   Enrichment of knowledge in software requirements engineering concepts
CO5   Develop the right system using variety of notations and techniques

	L	**T**	**P**	**C**

16IT319   **CLIENT SERVER COMPUTING**   **L   T   P   C**
                                                                 3   0   0   3

UNIT I   **INTODUCTION**   **9**

Client Server Computing, Benefits, Evolution of client server computing, Client Server Applications, Components, Classes of Client Server Computing – Categories of Client Server Computing

UNIT II   **CLIENT/SERVER OPERATING SYSTEMS**   **9**

Dispelling the myths, Obstacles upfront and hidden, open systems and standards, factors needed for success. Standards setting organizations, Case study: Terra Flora

UNIT III   **THE CLIENT**   **9**

Client Hardware and software, Client components, Client Operating Systems, GUI, Xwindows and Windowing, Database Access Application Logic, Client Software Products, Client Requirements

UNIT IV   **THE SERVER**   **9**

Server Hardware, Categories, Features classes of Server Machines, Server Environment, Network management environment, network Computing Environment, Network Operating Systems, Server requirements, Platform Independence, Transaction Processing, Connectivity- Server Data Management and Access Tools

UNIT V   **CLIENT SERVER AND INTERNET**   **9**

Client server and internet, Web client server, 3 tier client server web style, CGI , the server side of web, CGI and State, SQL database servers, Middleware and federated databases, data warehouses, EIS/DSS to data mining, GroupWare Server , what is GroupWare, components of GroupWare

                                       L : 45   T: 0   P:0   Total: 45 PERIODS

TEXT BOOKS
1. Dawana Travis Dewire, "Client Server Computing", Tata Mc-Graw Hill Education Pvt. Ltd., New Delhi, 2003
2. Robert Orfali, Dan Harkey & Jeri Edwards, "Essential Client/Server Survival Guide", 3rd edition, John Wiley & Sons, Singapore, 2011

REFERENCES
1. Eric J Johnson, "A complete guide to Client / Server computing", first edition, Prentice Hall, New Delhi, 2001.
2. Smith & Guengerich, "Client /Server Computing", Prentice Hall, New Delhi, 2011.
3. James E. Goldman, Phillip T. Rawles, Julie R. Mariga, "Client/Server Information Systems, A Business Oriented Approach", John Wiley & Sons, Singapore, 2000.
4. Subhāsha Candra Yādava, S K Singh, "Introduction to Client Server Computing", New Delhi, New Age International (P) Ltd., Publishers, 2009.
5. Alan R. Simon, Tom Wheeler, "Open Client/Server Computing and Middleware", AP Professional, 2009.

COURSE OUTCOMES

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

CO1   Describe the client server application and categories of client/server computing.
CO2   Demonstrate the concepts of a typical client/server operating system.
CO3   Implement typical client software.
CO4   Analyze and apply the features of server in networking environment
CO5   Use client server and web technology for retrieving information

16IT320	GRID AND CLOUD COMPUTING	L	T	P	C
		3	0	0	3

UNIT I   INTRODUCTION   9

Introduction - Characterization– Grid-related Standard bodies - Architecture –Web Services: SOAP - WSDL – UDDI – OGSA - Globus Toolkit 3 – WSRF

UNIT II   GRID SECURITY AND MONITORING   9

Grid Security: Introduction -Brief Security Primer- Grid security Infrastructure(GSI)-Authorization modes in GSI-Possible vulnerabilities – Grid Monitoring: Architecture(GMA)-Review Criteria -Grid Monitoring Systems: GridICE – JAMM – MDS3 - Ganglia – GridMon

UNIT III   JOB MANAGEMENT AND USER INTERACTION   9

Scheduling Paradigms – Scheduling works – Condor – SGE – PBS – LSF – Grid Scheduling with QoS – Grid Portals – First Generation – Second Generation.

UNIT IV   CLOUD COMPUITNG   9

Introduction – Evolution of cloud computing – Hardware evolution – Internet software evolution – Server virtualization – Web services overview –Communication as a Service- Infrastructure as a Service – Monitoring as a Service – Platform as a Service –Software as a Service.

UNIT V   SECURITY AND STANDARDS   9

Cloud Security Challenges – Software as Service Security – The Open Cloud Consortium – Distributed Management Task Force – Standards for Application Developers - Standards for Messaging – Standards for Security

L : 45   T: 0   P:0   Total: 45 PERIODS

TEXT BOOKS
1   Maozhen Li, Mark Baker, "The Grid: Core Technologies", John Wiley & Sons, 2010
2   John W.Rittinghouse & James F.Ransome, "Cloud Computing – Implementation, Management, and Security", CRC Press Taylor & Francis Group, 2012.

REFERENCES
1   Ian Foster & Carl Kesselman, The Grid 2 – Blueprint for a New Computing Infrastructure, Morgan Kaufman – 2009.(UNIT – I, II)
2   Joshy Joseph & Craig Fellenstein, Grid Computing, Pearson Education 2006. (UNIT – I, III)
3   Fran Berman, Geoffrey Fox, Anthony J.G.Hey, Grid Computing: Making the Global Infrastructure a Reality", John Wiley and Sons, 2004. (UNIT – III)
4   Michael Miller, " Cloud Computing", Pearson Education, New Delhi, 2009. (UNIT – IV)
5   Toby Velte, Anthony Velte and Elsenpeter, Robert, "Cloud Computing - A Practical Approach", Tata McGraw Hill, 2010. (UNIT – IV, V)

COURSE OUTCOMES
At the end of the course student should be able to:

CO1   Use the grid and cloud tool kits.
CO2   Apply the security models of the grid and the cloud environment.
CO3   Perform Job Management in Grid environment
CO4   Compare Grid and Cloud technologies
CO5   Apply grid and cloud computing techniques to solve large scale scientific problems.

16IT321	BIG DATA ANALYTICS	L	T	P	C

BIG DATA ANALYTICS
(Offered by Infosys)
(Common to CSE & IT)

		L	T	P	C
		3	0	0	3

UNIT I   INTRODUCTION TO BIG DATA AND ANALYTICS   9

Classification of Digital Data, Structured and Unstructured Data - Introduction to Big Data: Characteristics – Evolution – Definition - Challenges with Big Data - Other Characteristics of Data - Why Big Data - Traditional Business Intelligence versus Big Data - Data Warehouse and Hadoop Environment .Big Data Analytics: Classification of Analytics – Challenges - Big Data Analytics important - Data Science - Data Scientist - Terminologies used in Big Data Environments - Basically Available Soft State Eventual Consistency - Top Analytics Tools

UNIT II   INTRODUCTION TO TECHNOLOGY LANDSCAPE   9

NoSQL, Comparison of SQL and NoSQL, Hadoop -RDBMS Versus Hadoop - Distributed Computing Challenges – Hadoop Overview - Hadoop Distributed File System - Processing Data with Hadoop - Managing Resources and Applications with Hadoop YARN - Interacting with Hadoop Ecosystem

UNIT III   INTRODUCTION TO MONGODB AND CASSANDRA   9

MongoDB: Why Mongo DB - Terms used in RDBMS and Mongo DB - Data Types - MongoDB Query Language

Cassandra: Features - CQL Data Types – CQLSH – Keyspaces - CRUD Operations – Collections - Using a Counter - Time to Live - Alter Commands - Import and Export - Querying System Tables

UNIT IV   INTRODUCTION TO MAPREDUCE PROGRAMMING AND   9
**   HIVE**

MapReduce: Mapper – Reducer – Combiner – Partitioner – Searching – Sorting – Compression
Hive: Introduction – Architecture - Data Types - File Formats - Hive Query Language Statements – Partitions – Bucketing – Views - Sub- Query – Joins – Aggregations - Group by and Having - RCFile Implementation - Hive User Defined Function - Serialization and Deserialization - Hive Analytic Functions

UNIT V   INTRODUCTION TO PIG & JASPERREPORTS   9

Pig: Introduction - Anatomy – Features – Philosophy - Use Case for Pig - Pig Latin Overview - Pig Primitive Data Types - Running Pig - Execution Modes of Pig - HDFS Commands - Relational Operators - Eval Function - Complex Data Types - Piggy Bank - User-Defined Functions - Parameter Substitution - Diagnostic Operator - Word Count Example using Pig - Pig at Yahoo! - Pig Versus Hive - JasperReport using Jaspersoft.

L : 45   T: 0   P:0   Total: 45 PERIODS

TEXT BOOKS
1   Seema Acharya, SubhashiniChellappan, "Big Data and Analytics", Wiley Publications, First Edition,2015
REFERENCES
1   Judith Huruwitz, Alan Nugent, Fern Halper, Marcia Kaufman, "Big data for dummies", John Wiley & Sons, Inc. (2013)
2   Tom White, "Hadoop The Definitive Guide", O'Reilly Publications, Fourth Edition, 2015
3   Dirk Deroos, Paul C.Zikopoulos, Roman B.Melnky, Bruce Brown, Rafael Coss, "Hadoop For Dummies", Wiley Publications, 2014
4   Robert D.Schneider, "Hadoop For Dummies", John Wiley & Sons, Inc. (2012)
5   Paul Zikopoulos, "Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data, McGraw Hill, 2012
6   Chuck Lam, "Hadoop In Action", Dreamtech Publications, 2010
COURSE OUTCOMES
At the end of the course student should be able to:
CO1   Explore the big data landscape and analytics
CO2   Demonstrate the Hadoop platform for processing massive volume of data
CO3   Implement CRUD operations using MongoDB and Cassandra
CO4   Work on MapReduce framework and Hive
CO5   Analyze big data using pig and Prepare Reports using Jaspersoft studio

16CS315	UNIX INTERNALS	L	T	P	C
		3	0	0	3

UNIT I   **INTRODUCTION**   **9**

General Review of the System – Architecture of Unix Operating System – History – System structure – User Perspective – Operating System Services – Assumptions About Hardware. Introduction to the Kernel – Architecture System Concepts – Data Structures – System Administration.

UNIT II   **BUFFER MANAGEMENT**   **9**

The Buffer Cache – Headers – Buffer Pool – Buffer Retrieval – Reading and Writing Disk Blocks – Advantages and Disadvantages – Internal Representation of Files – Inodes –Structure – Directories – Path Name to Inode – Super Block – Inode Assignment – Allocation of Disk Blocks – Other File Types.

UNIT III   **SYSTEM CALLS**   **9**

System Calls for the File System – Open-Read-Write-Lseek-Close-Create – Special files Creation – Change Directory and Change Root – Change Owner and Change Mode – Stat- Fstat – Pipes – Dup – Mount-Unmount – Link-Unlink-File System Abstraction –Maintenance.

UNIT IV   **PROCESS MANAGEMENT**   **9**

The System Representation of Processes – States-Transitions – System Memory – Context of a Process-Saving the Context – Manipulation of a Process Address Space – Sleep Process Control – Process Creation – signals – Process Termination – Awaiting-Invoking other Programs – Changing the size of a process –TheShell System Boot and the INIT Process.

UNIT V   **MEMORY MANAGEMENT**   **9**

Memory Management Policies-Swapping – Demand Paging – Data structures for demand paging – a Hybrid System – I/O Subsystem – Driver Interfaces – Disk Drivers –Terminal Drivers.

L : 45   T: 0   P: 0   Total: 45 PERIODS

TEXT BOOKS

1   Maurice J. Bach, "The Design of the Unix Operating System", Fourth Edition , Prentice Hall of India, 2002.

2.   UreshVahalia "Unix Internals: The New Frontiers", First Edition,Pearson Education, 2006.

REFERENCES

1   William Stallings, "Operating Systems: Internals and Design Principles", Fifth Edition, Prentice Hall, 2005.

2   Daniel P. Bovet and Marcocesati, "Understanding the LINUX Kernel", Second Edition ,O'reilly Publications, 2005.

3   Steve D Pate, "UNIX Internals: A Practical Approach",Second Edition,Addison-Wesley, 2006.

4   Kumar Saurabh, A S Murty, "Unix Programming: The First Drive", First Edition Unique Color Carton , 2008.

5   Mike Gancarz ,"The UNIX Philosophy", Second Edition, Addison-Wesley,2005.

COURSE OUTCOMES

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

CO1   Illustrate the major components and describe the architecture of the UNIX operating system.

CO2   Understand the data structures and internal representation of files.

CO3   Understand the system calls that provide the user interface to the file system.

CO4   Understand the context of a process with system calls that manipulates and control process context.

CO5   Outline the memory management policies used in Unix OS.

		L	T	P	C
16IT322	**DATA SCIENCES**				
		3	0	0	3

**UNIT I   HIGH-DIMENSIONAL SPACE AND BEST-FIT SUBSPACES AND   9
            SINGULAR VALUE DECOMPOSITION**

Properties of High-Dimensional Space - The Law of Large Numbers - The High-Dimensional Sphere - Volumes of Other Solids - Generating Points Uniformly at Random on the Surface of a Sphere - Gaussians in High Dimension - Bounds on Tail Probability - Applications of the tail bound - Random Projection and Johnson-Lindenstrauss Theorem - Singular Vectors - Singular Value Decomposition - Best Rank k Approximations - Left Singular Vectors - Power Method for Computing the Singular Value Decomposition - Applications of Singular Value Decomposition - Singular Vectors and Eigenvectors.

UNIT II   RANDOM GRAPHS   9

The G(n,p) Model - Phase Transitions - The Giant Component - Branching Processes - Cycles and Full Connectivity - Phase Transitions for Increasing Properties - Phase Transitions for CNF-sat - Nonuniform and Growth Models of Random Graphs - Growth Models - Small World Graphs.

**UNIT III   RANDOM WALKS, MARKOV CHAINS AND MACHINE   9
            LEARNING MODELS**

Stationary Distribution - Electrical Networks and Random Walks - Random Walks on Undirected Graphs with Unit Edge Weights - Random Walks in Euclidean Space - The Web as a Markov Chain - Markov Chain Monte Carlo - Areas and Volumes - Convergence of Random Walks on Undirected Graphs – Learning - Linear Separators, the Perceptron Algorithm, and Margins - Nonlinear Separators, Support Vector Machines, and Kernels - Strong and Weak Learning – Boosting - Number of Examples Needed for Prediction: VC-Dimension - Vapnik-Chervonenkis or VC-Dimension - The VC Theorem - Simple Learning.

**UNIT IV   ALGORITHMS FOR MASSIVE DATA PROBLEMS AND   9
            CLUSTERING**

Frequency Moments of Data Streams - Matrix Algorithms Using Sampling - Sketches of Documents - Some Clustering Examples - A k-means Clustering Algorithm - A Greedy Algorithm for k-Center Criterion Clustering - Spectral Clustering - Recursive Clustering Based on Sparse Cuts - Kernel Methods - Agglomerative Clustering - Dense Submatrices and Communities - Flow Methods - Finding a Local Cluster Without Examining the Whole Graph - Axioms for Clustering.

**UNIT V   TOPIC MODELS, HIDDEN MARKOV PROCESS, GRAPHICAL   9
            MODELS, AND BELIEF PROPAGATION**

Topic Models - Hidden Markov Model - Graphical Models, and Belief Propagation - Bayesian or Belief Networks - Markov Random Fields - Factor Graphs - Tree Algorithms - Message Passing in general Graphs - Graphs with a Single Cycle - Belief Update in Networks with a Single Loop - Maximum Weight Matching - Warning Propagation - Correlation Between Variables – Rankings - Hare System for Voting - Compressed Sensing and Sparse Vectors – Applications – Gradient - Linear Programming - Integer Optimization - Semi-Definite Programming.

                              L : 45   T: 0   P:0   Total: 45 PERIODS

TEXT BOOKS

1 John Hopcroft, Ravindran Kannan, "Foundations of Data Science", 2014.

REFERENCES

1 Nina Zumel, John Mount, "Practical Data Science with R", dreamtech press, Reprint Edition, 2015.

2 Anand Rajaraman, Juriji Leskovec and Jeffrey Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012.

3 Foster Provost, Tom Fawcett, "Data Science for Business: What You Need to Know about Data Mining and Data-analytic Thinking", O'Reilly Media, First Edition, 2013.

4 Trevor Hastie, Robert Tibshirani, Jerome Friedman, "The Elements of Statistical Learning: Data Mining, Inference and Prediction", Springer, Second Edition, 2008.

COURSE OUTCOMES

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

CO1 Represent the data using high-dimensional space and subspaces

CO2 Analyse the random graphs

CO3 Find solution using random walks, Markov chains and machine learning models

CO4 Examine the various algorithms for massive data problem and clustering

CO5 Use data models to represent the data

16IT323	IMAGE PROCESSING	L	T	P	C
	(Common to CSE & IT)	3	0	0	3

UNIT I   DIGITAL IMAGE FUNDAMENTALS   9

Introduction – Origin – Steps in Digital Image Processing – Components – Elements of Visual Perception – Image Sensing and Acquisition – Image Sampling and Quantization – Relationships between pixels - color models.

UNIT II   IMAGE ENHANCEMENT   9

Spatial Domain: Gray level transformations – Histogram processing – Basics of Spatial Filtering– Smoothing and Sharpening Spatial Filtering – Frequency Domain: Introduction to Fourier Transform – Smoothing and Sharpening frequency domain filters – Ideal, Butterworth and Gaussian filters.

UNIT III   IMAGE RESTORATION AND SEGMENTATION   9

Noise models – Mean Filters – Order Statistics – Adaptive filters – Band reject Filters – Band pass Filters – Notch Filters – Optimum Notch Filtering – Inverse Filtering – Wiener filtering Segmentation: Detection of Discontinuities–Edge Linking and Boundary detection – Region based segmentation- Morphological processing- erosion and dilation.

UNIT IV   WAVELETS AND IMAGE COMPRESSION   9

Wavelets – Subband coding - Multiresolution expansions - Compression: Fundamentals – Image Compression models – Error Free Compression – Variable Length Coding – Bit-Plane Coding – Lossless Predictive Coding – Lossy Compression – Lossy Predictive Coding – Compression Standards.

UNIT V   IMAGE REPRESENTATION AND RECOGNITION   9

Boundary representation – Chain Code – Polygonal approximation, signature, boundary segments – Boundary description – Shape number – Fourier Descriptor, moments- Regional Descriptors – Topological feature, Texture - Patterns and Pattern classes - Recognition based on matching.

L : 45   T: 0   P:0   Total: 45 PERIODS

TEXT BOOKS
1 Rafael C. Gonzales, Richard E. Woods, "Digital Image Processing", Third Edition, Pearson Education, 2010.

REFERENCES
1 Anil Jain K. "Fundamentals of Digital Image Processing", PHI Learning Pvt. Ltd., 2011

2 Willliam K Pratt, "Digital Image Processing", John Willey, 2002.

3 Malay K. Pakhira, "Digital Image Processing and Pattern Recognition", First Edition, PHI Learning Pvt. Ltd., 2011.

4 Abhishek Yadav, Poonam Yadav," Digital Image Processing" ,First Edition, 2009

5 Dr. Shashi Kr. Singh,"Digital Image Processing", First Edition, 2011

COURSE OUTCOMES
At the end of the course student should be able to:

CO1 Discuss digital image fundamentals

CO2 Apply image enhancement and restoration techniques

CO3 Use image compression and segmentation Techniques

CO4 Extract the features of images
CO5 Develop the Image Representation And Recognition

16IT324	BIO INFORMATICS	L	T	P	C
		3	0	0	3

UNIT I **INTRODUCTION** **9**

Need for Bioinformatics technologies – Overview of Bioinformatics technologies Structural bioinformatics – Data format and processing – Secondary resources and applications – Role of Structural bioinformatics - Biological Data Integration System

UNIT II **DATAWAREHOUSING AND DATAMINING IN** **9**
                       BIOINFORMATICS

Bioinformatics data – Data warehousing architecture – data quality – Biomedical data analysis – DNA data analysis – Protein data analysis – Machine learning – Neural network architecture and applications in bioinformatics.

UNIT III **MODELING FOR BIOINFORMATICS** **9**

Hidden markov modeling for biological data analysis – Sequence identification –Sequence classification – multiple alignment generation – Comparative modeling –Protein modeling – genomic modeling – Probabilistic modeling – Bayesian networks – Boolean networks - Molecular modeling – Computer programs for molecular modeling.

UNIT IV **PATTERN MATCHING AND VISUALIZATION** **9**

Gene regulation – motif recognition – motif detection – strategies for motif detection – Visualization – Fractal analysis – DNA walk models – one dimension – two dimension – higher dimension – Game representation of Biological sequences – DNA, Protein, Amino acid sequences.

UNIT V **MICROARRAY ANALYSIS** **9**

Microarray technology for genome expression study – image analysis for data extraction –preprocessing – segmentation – gridding – spot extraction – normalization, filtering – cluster analysis– gene network analysis – Compared Evaluation of Scientific Data Management Systems – Cost Matrix – Evaluation model - Benchmark – Tradeoffs.

                               L : 45 **T: 0** **P:0** **Total: 45 PERIODS**

TEXT BOOKS
1. Yi-Ping Phoebe Chen (Ed), "BioInformatics Technologies", First Indian Reprint, Springer Verlag, 2007.

REFERENCES
1. Arthur M Lesk, "Introduction to Bioinformatics", Second Edition, Oxford University Press, 2005
2. Zhumur Ghosh , Bibekanand Mallick,"Bioinformatics: Principles and Applications" Oxford University Press , April 2008
3. Donald Forsdyke," Evolutionary Bioinformatics ",Springer ,2009
4. Bryan Bergeron, "Bio Informatics Computing", Second Edition, Pearson Education, 2003
5. Jonathan Pevsner," Bioinformatics and Functional Genomics", Second Edition Wiley India Pvt Ltd, 2012

COURSE OUTCOMES
At the end of the course student should be able to:
CO1 Identify the roles and Structure of Biological Data
CO2 Develop models for biological data
CO3 Choose data warehouse architecture for storing the Bioinformatics data
CO4 Apply pattern matching techniques to bioinformatics data – protein data genomic data
CO5 Apply micro array technology for genomic expression study

16IT325	SOFTWARE QUALITY ASSURANCE	L	T	P	C
		3	0	0	3

UNIT I   **BASICS OF SOFTWARE QUALITY ASSURANCE**   **9**

Role of SQA – Software Quality in Business Context – SQA considerations – SQA people – Quality Management – Software Configuration Management

UNIT II   **SOFTWARE QUALITY MANAGEMENT**   **9**

Product Quality and Process Quality – Managing Software Quality – Defect Prevention –Software Quality Assurance Management.

UNIT III   **SOFTWARE QUALITY ASSURANCE**   **9**

Software Quality – Total Quality Management (TQM) – Quality Metrics – Software Quality Metrics Analysis.

UNIT IV   **SOFTWARE QUALITY CONCEPTS**   **9**

Software Quality Program Concepts – Establishment of a Software Quality Program –Software Quality Assurance Planning – An Overview.

UNIT V   **SOFTWARE QUALITY ASSURANCE MODELS**   **9**

Capability Maturity Model and the Role of SQA in Software Development Maturity – SEI CMM Level 5 – Comparison of ISO 9000 Model with SEI's CMM – Software CMM and other Process Improvement Models.

L : 45   T: 0   P:0   Total: 45 PERIODS

TEXT BOOKS
1. Watts S Humphrey, "Managing the Software Process", Fifth Edition, Pearson Education Inc. (2007)
2. Mordechai Ben-Menachem , Garry S Marliss, "Software Quality", Second Edition, Vikas Publishing House, Pvt, Ltd., New Delhi. (2008)

REFERENCES
1. Jonathan Pevsner," Bioinformatics and Functional Genomics", Second Edition Wiley India Pvt Ltd, 2012 (U Gordon G Schulmeyer, "Handbook of Software Quality Assurance", Third Edition, Artech House Publishers, (2007)
2. Nina S Godbole, "Software Quality Assurance: Principles and Practice", Second Edition, Alpha Science International, Ltd, (2004)
3. John W. Horch ,"Practical Guide to Software Quality Management", Second Edition, Artech House, (2003)
4. MilindLimaye , "Software Quality Assurance" , First Edition, Tata McGraw Hill, (2011)
5. MuraliChemuturi ,"Mastering Software Quality Assurance: Best Practices, Tools and Techniques", First Edition, Addison Wesley,(2011)

COURSE OUTCOMES
At the end of the course student should be able to:
CO1 Understand the concepts, techniques and the basics of software Quality Assurance to develop models for biological data
CO2 Develop a good understanding of issues, techniques in software Quality Management and the Defect Prevention.
CO3 Gain a working knowledge of techniques for management of testing projects and metric Analysis
CO4 Recognize the importance of Software Quality Concepts.
CO5 Develop the Knowledge in the area of different Software Quality Assurance Models and the ISO Standards

16CS404

INTERNET OF THINGS
(Offered by Infosys)
(Common to CSE & IT)

L	T	P	C
3	0	0	3

UNIT I   IoT INTRODUCTION AND APPLICATIONS   9

Overview and Motivations - IPv6 Role - IoT Definitions - Observations - ITU-T Views - Working Definition - IoT Frameworks - Basic Nodal Capabilities – Physical Design of IoT - Logical Design of IoT – Applications:- City Automation Automotive Applications - Home Automation - IoT Levels & Deployment Templates - IoT and M2M .

UNIT II   FUNDAMENTAL MECHANISMS & KEY TECHNOLOGIES   9

Identification of IoT Objects and Services- Structural aspects of IoT-Environment Characteristics-Traffic Characteristics-Scalability-Interoperability-Security and privacy -Key IoT Technologies : Device Intelligence - Communication Capabilities - Mobility Support - Device Power -Sensor Technology -RFID Technology - Satellite Technology - IoT Enabling Technologies- WSN, Cloud computing, BigdataAnalytics, communication protocols, embedded systems

UNIT III   EVOLVING IoT STANDARDS & PROTOCOLS   9

IETF IPv6 Routing Protocol for RPL Roll – Constrained Application Protocol (CoAP) – Representational State Transfer (REST) – Third Generation Partnership Project Service Requirements for Machine Type Communications- Over Low Power WPAN (6LoWPAN)- IP in Small Objects (IPSO) - WPAN Technologies for IoT/M2M – Zigbee/IEEE 802.15.4, RF4CE, Bluetooth and its Low-Energy Profile, WBANs, IEEE 802.15 WPAN TG4j MBANs, ETSI TR, NFC, DSRC and Related Protocols, Cellular and Mobile Network Technologies for IoT/M2M.

UNIT IV   IPv6 TECHNOLOGIES FOR THE IOT   9

Motivations - Address Capabilities - IPv6 Protocol Overview - IPv6 Tunneling - IPsec in IPv6 - Header Compression Schemes - Quality of Service in IPv6 - MOBILE IPv6 -Protocol Details - Generic Mechanisms - New IPv6 Protocol - Message Types - Destination Option - Modifications to IPv6 Neighbor Discovery - Requirements for Various IPv6 Nodes - Correspondent Node Operation - HA Node Operation-Mobile Node Operation Relationship to IPV4 Mobile IPV4(MIP)-IPV6 Over Low-Power WPAN-Goals-Transmission of IPV6 Packets Over IEEE 802.15.4.

UNIT V   DESIGN METHODOLOGY & FUTURE TRENDS   9

IoT System Management with NETCONF-YANG:Need for IoT Systems Management – Simple Network Management Protocol (SNMP) –Limitations of SNMP, Network Operator Requirements-NETCONF-YANG-IoT Systems Management with NETCONF-YANG -IoT Platforms Design Methodology – Python Packages of Interest for IoT - IoT Physical Devices & Endpoints - Raspberry Pi- Linux on Raspberry Pi - Raspberry Pi Interfaces - Programming Raspberry Pi with Python - Designing a RESTfulWebAPI - Amazon Web Services for IoT

L : 45   T: 0   P: 0   Total: 45 PERIODS

TEXT BOOKS

1. Daniel Minoli, Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications, Wiley Publications, First Edition, 2013.
2. Arsheep Bahga , Vijay Madisetti , Internet of Things: A Hands-On Approach, Universities Press, First Edition , 2014.

REFERENCES

1. Jean-Philippe Vasseur , Adam Dunkels, Interconnecting Smart Objects with IP: The Next Internet, Elsevier Publications, 2010
2. Adrian McEwen, Hakim Cassimally, Designing the Internet of Things, Wiley Publications, First Edition, 2013.

COURSE OUTCOMES

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

CO1 Understand application areas of IoT
CO2 Evaluate a variety of existing and developing architecture technologies for IoT
CO3 explain and demonstrate various protocols of Internet of Things (IoT)
CO4 Enumerate the working of IPV6 with IoT
CO5 Describe and evaluate different applications of the IoT.

16CS409   **TCP/IP DESIGN AND IMPLEMENTATION**   L   T   P   C
                                                                   3   0   0   3

UNIT I   INTRODUCTION   9

Architecture model – Networking - OSI Model and TCP/IP protocol suite – Classful Internet addresses –Subnetting and Super netting – TCP/IP: Routing Protocols.

UNIT II   TCP   9

Services – header – connection establishment and termination – CIDR – interactive data flow – bulk data flow – timeout and retransmission – persist timer – Karn's Algorithm and Timer Back off.

UNIT III   IP IMPLEMENTATION   9

Internet Protocols: IPV4 Address: Classful – Classless – CIDR – Special address – NAT – Delivery & forwarding of IP Packets – IP Datagram – Fragmentation – ARP – RARP. IPV6 Address: Addressing – Packet Format – Transition from IPV4 to IPV6. Keep alive timer – futures and performance.

UNIT IV   TCP IMPLEMENTATION I   9

Data structure and input processing – transmission control blocks – segment format –comparison – finite   state   machine   implementation   –   Output   processing   –   mutual exclusion – computing the TCP Data length.

UNIT V   TCP IMPLEMENTATION II   9

Timers – events and messages – timer process – deleting and inserting timer event – flow control and adaptive retransmission – congestion avoidance and control – urgent data processing and push function.

                                        L : 45   T: 0   P: 0   Total: 45 PERIODS

TEXT BOOKS
 1   Douglas E Comer, "Internetworking with TCP/IP Principles, Protocols and Architecture",Vol 1 and 2, Fifth Edition, Addison Wesley, (2004)
 2   W.Richard Stevens "TCP/IP Illustrated" Vol 1 , First Edition , Addison Wesley, (2003)

REFERENCES
 1   Forouzan, "TCP/IP Protocol Suite", Second Edition, Tata MC Graw Hill, (2003)
 2   W.Richard Stevens "TCP/IP Illustrated", Volume 2, Second Edition, Pearson Education, (2003)
 3   Sameer Seth, M. Ajaykumar , "TCP/IP Architecture, Design and Implementation in Linux", First Edition, John Wiley & Sons, (2008)
 4   Gary R. Wright, W. Richard Stevens, "TCP/IP Illustrated", Volume 2, Second Edition, Addison Wesley, (2011)
 5   Kevin R. Fall, W. Richard Stevens ,"TCP/IP Illustrated", Volume 1, Second Edition, Addison Wesley , (2011)

COURSE OUTCOMES
At the end of the course student should be able to:
CO1   Understand the architectural principles of computer networking and all Layers
CO2   Know concepts about the Transport control Protocols and Internet Protocols
CO3   Trace the flow of information from one node to another node in the TCP network
CO4   Know the way to manage the TCP usage
CO5   Implement TCP communication

16CS319	MOBILE COMPUTING	L	T	P	C
		3	0	0	3

UNIT I   WIRELESS COMMUNICATION FUNDAMENTALS   9

Introduction – Wireless transmission – Frequencies for radio transmission – Signals – Antennas – Signal Propagation – Multiplexing – Modulations – Spread spectrum – MAC – SDMA – FDMA – TDMA – CDMA – Cellular Wireless Networks.

UNITII   TELECOMMUNICATION SYSTEMS   9

GSM – System Architecture – Protocols – Connection Establishment – Frequency Allocation – Routing – Handover – Security – GPRS.

UNIT III   WIRELESS NETWORKS AND NETWORK LAYER   9

Wireless LAN – IEEE 802.11 Standards – Architecture – Services – HIPERLAN – Ad Hoc Network – Blue Tooth. Mobile IP – Dynamic Host Configuration Protocol – Routing – DSDV – DSR – AODV – ZRP – DMR.

UNIT IV   TRANSPORT LAYER   9

TCP over Wireless Networks – Indirect TCP – Snooping TCP – Mobile TCP – Fast Retransmit / Fast Recovery – Transmission/Timeout Freezing – Selective Retransmission – Transaction Oriented TCP.

UNIT V   APPLICATION LAYER   9

WAP – WAP Architecture – WDP – WTLS – WTP – WSP – WML – WML Script – WAE – WTA – Traditional TCP – Classical TCP improvements – WAP, WAP 2.0. Mobile Operating Systems: Palm OS – Windows CE – Symbion OS – Linux for Mobile Devices – Case Study of M-MAIL.

L : 45   T: 0   P: 0   Total: 45 PERIODS

TEXT BOOKS
1 Jochen Schiller, "Mobile Communications", Second Edition, Pearson Education, 2009.
2. William Stallings, "Wireless Communications and Networks", Second Edition, Pearson Education, 2002.

REFERENCES
1 Raj Kamal, "Mobile Computing", First Edition, Oxford University Press, 2007.
2 Kaveh Pahlavan, Prasanth Krishnamoorthy, "Principles of Wireless Networks", First Edition, Pearson Education, 2006.
3 Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, "Principles of Mobile Computing", First Edition , Springer, 2003.
4 C.K.Toh, "Ad Hoc Mobile Wireless Networks", Second Edition, Pearson Education, 2009.

COURSE OUTCOMES
At the end of the course student should be able to:

CO1 Demonstrate the actual meaning of power and energy management in wireless mobile networks. Outline knowledge on Mobile IP

CO2 Analyze and characterize Location management in wireless mobile networks
CO3 Understand various types of cellular telephone systems
CO4 A comprehension and appreciation of the design and development of role of TCP/IP in mobile networks
CO5 Analyze the strengths and limitations of WAP architecture

16IT405	SOFTWARE TESTING	L	T	P	C
		3	0	0	3

UNIT I   INTRODUCTION   9
Testing as an Engineering Activity: Role of Process in Software Quality – Testing Process – Testing Fundamentals: Basic Definitions – Software Testing Principles – Tester's Role in Software Development Organization – Origin of Defects – Defect Classes – Defect Repository – Developer/Tester support for Developing a Defect Repository – Test Organization : Introducing Test Specialist – Skills needed by Test Specialist – Building a Test Group

UNIT II   TEST CASE DESIGN   9
The Smart Tester – Test Case Design Strategies – Black Box Approach to Test Case Design – Random Testing – Equivalence Class Partitioning – Boundary Value Analysis – Examples for Equivalence Class Partitioning and Boundary Value Analysis – Cause and Effect Graphing – State Transition Testing – White Box Approach to Test Case Design – Test Adequacy Criteria – Coverage and Control Flow Graphs – Covering Code Logic – Loop Testing – Mutation Testing.

UNIT III   LEVELS OF TESTING   9
The need for Levels of Testing – Unit Test – Unit Test Planning – Designing the Unit Tests – The Test Harness – Integration Tests : Goals – Strategies for Procedures and Functions – Designing Integration Tests – Integration Test Planning – System Testing : Different Types – Regression Testing – Alpha, Beta and Acceptance Testing – Usability Testing – Accessibility Testing – Compatibility Testing – Domain Testing.

UNIT IV   TEST MANAGEMENT   9
Testing and Debugging Goals & Policies – Test Planning – Test Plan Components – Test Plan Attachments – Locating Test Items – Reporting Test Results – Role of Three Critical Groups in Test Planning and Policy Development – Test Organization : Introducing Test Specialist – Skills needed by Test Specialist – Building a Test Group – Structure of Testing Group – Tester Certification – Integrating Testing Activities in the Software Life Cycle

UNIT V   SOFTWARE TESTING TOOLS   9
Testing Tools Overview: Need for Automated Testing Tools-Taxonomy of Testing Tools-Functional/Regression Testing Tools-Performance Testing Tools-Testing Management Tools-Source Code Testing Tools-How to select a Testing Tool-WinRunner: Overview-Testing an Application using WinRunner-Test Script Language(TSL)- LoadRunner: Overview-Creating Virtual user Script using Virtual User Generator-Creating Virtual Users using LoadRunner Controller - JMeter : Overview – JDBC Test-HTTP Test.

L : 45   T: 0   P:0   Total: 45 PERIODS

TEXT BOOKS
 1   Ilene Burnstein, "Practical Software Testing", Fourth Edition, Springer, 2011
 2   K.V.K.K. Prasad, "Software Testing Tools", Reprint Second Edition, Dream Tech press, 2009
REFERENCES
 1   Bories Beizer, "Software Testing Techniques", Second Edition, Dreamtech Press, 2008
 2   William E. Perry, "Effective Methods for Software Testing", 2nd Edition, Wiley India, 2007
 3   Glenford J. Myers, Corey Sandler, Tom Badgett, "The Art of Software Testing", Third   Edition, 2012
 4   Aditya P.Mathur, " Foundations of Software Testing" ,Dorling Kindersley(India) Pvt Ltd.,First
       Edition,2008
 5   Nageswara Rao Pusuluri, "Software Testing Concepts and Tools", Dream tech Press,2008
COURSE OUTCOMES
At the end of the course student should be able to:
CO1   Analyze different approaches to software testing and select optimal solutions for different environments
            and projects
CO2   Test software in structured and organized ways.
CO3   Learn practical ways to design and automate high quality tests during unit and integration testing.
CO4   Design and conduct a software test process for a software testing project
CO5   Develop a test tool to support test automation.

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16IT406   **HIGH PERFORMANCE NETWORKS**

3   0   0   3

UNIT I   LAYERED ARCHITECTURE AND NETWORK SERVICES   9

Protocol Layers and their Service Models - Basic Networks mechanism: Multiplexing and Demultiplexing – Switching: Circuit and Packet – Routing Algorithm - Error Detection and Correction Techniques - Flow control - Congestion Control - PPP - SONET –ATM - MPLS.

UNIT II   WIRELESS AND MOBILE NETWORKS   9

Wireless Links and Network Characteristics – Wi-Fi:802.11 Wireless LANs – Cellular Internet Access – Mobility Management: Principles – Managing Mobility – Impact on Higher Layer Protocols

UNIT III   MULTIMEDIA NETWORKING   9

Streaming stored Audio and Video – Best effort service – protocols for real time interactive applications – Beyond best effort – scheduling and policing mechanism – integrated services and differentiated services – RSVP.

UNIT IV   SECURITY   9

Network security - Principles of cryptography – Authentication – Integrity - key distribution and certification - Access controls-firewalls - attacks and counter measures - Case study: security in many layers.

UNIT V   NETWORK MANAGEMENT   9

Infrastructure for network management-The internet standard management framework - SMI, MIB, SNMP, Security and administration - ASN.1

L : 45   T: 0   P:0   Total: 45 PERIODS

TEXT BOOKS

1   James F. Kurose, Keith W. Ross, "Computer Networking - A Top-Down Approach Featuring the Internet", Fifth Edition, Pearson Education, 2009.

REFERENCES

1   Behrouz A. Forouzan, "Data communication and Networking", Fourth Edition, Tata McGraw – Hill, 2011.
2   Walrand .J. Varatya, "High performance communication network", Margan Kanffman – Harcourt Asia Pvt. Ltd. 2 nd Edition, 2000.
3   LEOM-GarCIA, WIDJAJA, "Communication networks", TMH seventh reprint 2002
4   Aunurag kumar, D. Manjunath, Joy kuri, "Communication Networking", Morgan Kaufmann Publishers, 1ed 2004.
5   Warland & Pravin Varaiya, "High Performance Communication Networks", Second Edition, Jean Harcourt Asia Pvt. Ltd., New Delhi, 2001.

COURSE OUTCOMES

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

CO1   Demonstrate the protocol layers and routing algorithms
CO2   Describe the functions of wireless and mobile networks
CO3   Implement the protocols for real time interactive applications
CO4   Analyze the security measures of high performance networks
CO5   Design protocol for network management to manage high performance networks

16IT407	INFORMATION SECURITY	L	T	P	C
		3	0	0	3

UNIT I   INTRODUCTION   9

Growing IT Security Importance and New Career Opportunities – Becoming an Information Security Specialist – Conceptualizing Information Security – Information Security Principles of Success.

UNIT II   GOVERNANCE AND RISK MANAGEMENT   9

Introduction – Security Policies Set the stage for Success – Four Types of Policies – Developing and Managing Security Policies –Providing Policy Support Documents – Suggested Standards Taxonomy – Security Architecture and Design : Introduction – Defining the Trust Computing Base – Protection Mechanisms in a Trusted Computing Base – System Security Assurance Concepts.

**UNIT III   BUSINESS CONTINUITY PLANNING AND DISASTER   9
                    RECOVERY PLANNING & LAWS**

Overview of the Business Continuity Planning - Disaster Recovery Planning– Introduction to Laws , Investigations and Ethics – Types of Computer Crimes – How Cyber Criminals Commit Crimes – The Computer and the Law – Intellectual Property Law – Privacy and the Law – Computer Forensics – The Information Security Professionals Code of Ethics – Other Ethics Standards.

UNIT IV   PHYSICAL SECURITY CONTROL & OPERATIONS SECURITY   9

Introduction – Understanding the Physical Security Domain – Physical Security Threats – Providing Physical Security – Introduction to Operations Security – Operations Security Principles – Operations Security Process Controls – Operations Security Controls in Action.

UNIT V   ACCESS CONTROL SYSTEMS & CRYPTOGRAPHY   9

Introduction – Terms and Concepts – Principles of Authentication – Biometrics – Single Sign-On – Remote User Access and Authentication – Introduction to Cryptography – Applying Cryptography to Information Systems – Basic Terms and Concepts – Strength of Cryptosystems – Putting the Pieces to Work – Examining Digital Cryptography.

L : 45   T: 0   P:0   Total: 45 PERIODS

TEXT BOOKS
  1   Information Security: Principles and Practices by Mark Merkow and Jim   Breithaupt, Pearson Education, 2007.

  2   Computer Security: Art and Science by Matt Bishop, Pearson Education, 2006

REFERENCES
  1   The Complete Reference "Information Security", Mark Rhodes-Ousley, Mc Graw Hill Education, Second Edition 2013.
  2   *Principles of Information Security by* Michael *E. Whitman* and. Herbert J. Mattord. Vice President Editorial, Career Education &. Training Solutions, Fourth Edition
  3   Information Security Management Principles by Andy Taylor, David Alexander , Amanda Finch, David Sutton, The Chartered Institute for IT, Second Edition
  4   Introduction to Information Security and Cyber Laws by Surya Prakash Tripathi, Ritendra Goel, Praveen Kumar Shukla, Wiley India Private Limited , First Edition 2014
  5   Applied Cryptography by Bruce Schneier, Katherine Schowalter, Second Edition.

COURSE OUTCOMES

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

CO1   Recognize the career opportunities and principles of Information Security

CO2   Illustrate the policies and trusted protection models of a computer

CO3   Point out several types of laws and computer crimes

CO4   Eliminate security threats

CO5   Deduce the concepts of cryptography , authentication and biometrics

16CS419	**KNOWLEDGE MANAGEMENT**	L	T	P	C
		3	0	0	3

UNIT I   **9**

Introduction: Definition, evolution, need, drivers, scope, approaches in Organizations, strategies in organizations, components and functions, understanding knowledge; Learning organization: five components of learning organization, knowledge sources, and documentation.

UNITII   **9**

Essentials of Knowledge Management; knowledge creation process, knowledge management techniques, systems and tools.

UNIT III   **9**

Organizational knowledge management; architecture and implementation strategies, building the knowledge corporation and implementing knowledge management in organization.

UNIT IV   **9**

Knowledge management system life cycle, managing knowledge workers, knowledge audit, and knowledge management practices in organizations, few case studies.

UNIT V   **9**

Futuristic KM: Knowledge Engineering, Theory of Computation, Data Structure

L : 45   T: 0   P: 0   Total: 45 PERIODS

TEXT BOOKS

 1   Knowledge Management – a resource book – A Thohothathri Raman, Excel, 2004.

REFERENCES

 1   Knowledge Management- Elias M. AwadHasan M. Ghazri, Pearson Education
 2   The KM Toolkit – Orchestrating IT, Strategy & Knowledge Platforms, AmritTiwana, Pearson, PHI, II Edn.
 3   The Fifth Discipline Field Book – Strategies & Tools For Building A learning Organization – PeterSengeetal. Nicholas Brealey 1994.
 4   Knowledge Management – Sudhir Warier Vikas Publishing House,2003.

COURSE OUTCOMES

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

CO1   Students can implement the knowledge management in organization

CO2   Can apply the theoretical concepts in practical

CO3   provide examples of the ways in which information and knowledge management infrastructure impacts contemporary organizations

CO4   understand the relations between different components of information and knowledge management infrastructure

CO5   analyze and discuss issues related to information and knowledge management infrastructure

16CS406	MACHINE LEARNING	L	T	P	C
		3	0	0	3

UNIT I   FOUNDATIONS OF LEARNING   9

Components of learning – learning models – geometric models – probabilistic models – logic models – grouping and grading – learning versus design – types of learning – supervised – unsupervised – reinforcement – theory of learning – feasibility of learning – error and noise – training versus testing – theory of generalization – generalization bound – approximation generalization tradeoff – bias and variance – learning curve.

UNIT II   LINEAR MODELS   9

Linear classification – univariate linear regression – multivariate linear regression – regularized regression – Logistic regression – perceptrons – multilayer neural networks – learning neural networks structures – support vector machines – soft margin SVM – going beyond linearity – generalization and overfitting – regularization – validation.

UNIT III   DISTANCE-BASED MODELS   9

Nearest neighbor models – K-means – clustering around medoids – silhouttes – hierarchical clustering – k-d trees – locality sensitive hashing – non-parametric regression – ensemble learning – bagging and random forests – boosting – meta learning.

UNIT IV   TREE AND RULE MODELS   9

Decision trees – learning decision trees – ranking and probability estimation trees – regression trees – clustering trees – learning ordered rule lists – learning unordered rule lists – descriptive rule learning – association rule mining – first-order rule learning

UNIT V   REINFORCEMENT LEARNING   9

Passive reinforcement learning – direct utility estimation – adaptive dynamic programming – temporal-difference learning – active reinforcement learning – exploration – learning an actionutility function – Generalization in reinforcement learning – policy search – applications in game playing – applications in robot control.

L : 45   T: 0   P: 0   Total: 45 PERIODS

TEXT BOOKS
 1   P. Flach, "Machine Learning: The art and science of algorithms that make sense of data", Cambridge University Press, 2012.
 2   M. Mohri, A. Rostamizadeh, and A. Talwalkar, "Foundations of Machine Learning", MIT Press, 2012.

REFERENCES
 1   Y. S. Abu-Mostafa, M. Magdon-Ismail, and H.-T. Lin, "Learning from Data", AMLBook Publishers, 2012.
 2   K. P. Murphy, "Machine Learning: A probabilistic perspective", MIT Press, 2012.
 3
       C. M. Bishop, "Pattern Recognition and Machine Learning", Springer, 2007.
 4   T. M. Mitchell, "Machine Learning", McGraw Hill, 1997.
 5
       S. Russel and P. Norvig, "Artificial Intelligence: A Modern Approach", Third Edition, Prentice Hall, 2009.

COURSE OUTCOMES
At the end of the course student should be able to:
CO1   Explain theory underlying machine learning
CO2   Construct algorithms to learn linear and non-linear models
CO3   Implement data clustering algorithms
CO4   Construct algorithms to learn tree and rule-based models
CO5   Apply reinforcement learning techniques

16CS407	COMPUTER GRAPHICS AND MULTIMEDIA	L	T	P	C
		3	0	0	3

UNIT I   2D PRIMITIVES   9

Elements of pictures created in computer graphics – Graphics input primitives and devices Drawing primitives in open GL and Basic open GL programming - open GL basic Graphics primitives – Output primitives – Line, Circle and Ellipse drawing algorithms – Attributes of output primitives.

UNIT II   2D GEOMETRIC TRANSFORMATIONS   9

2D Viewing – Window-Viewport Transformation - Two dimensional Geometric transformations – Line, Polygon, Curve and Text clipping algorithms.

UNIT III   3D CONCEPTS   9

Projections - Three dimensional object representation – Parallel and Perspective Polygons, Splines, Quadric Surfaces - Visualization of data sets - 3D affine transformations 3D Rotations using Quaternions – Viewing – Visible surface identification – Color Models, 3D Transformations in open GL.

UNIT IV   MULTIMEDIA BASICS   9

Introduction and definitions – applications – elements – Animations – Compression – Types of Compressions: Lossless – Lossy – Video compression – Image Compression – Audio Compression – Data and file format standards – Multimedia data structures: KD Trees –R trees.

UNIT V   MULTIMEDIA AUTHORING AND APPLICATIONS   9

Creating interactive multimedia – Multimedia Authoring Systems – Multimedia Authoring Software Applications – Video On demand – Virtual Reality – Augmented Reality – Content based retrieval in digital libraries.

L : 45   T: 0   P: 0   Total: 45 PERIODS

TEXT BOOKS
1. Donald D. Hearn, M. Pauline Baker and Warren Carithers, "Computer Graphics with OpenGL", Fourth Edition, Pearson Education, (2010)
2. Ze-Nian Li and Mark S.Drew, "Fundamentals of Multimedia", First Edition, Pearson Education, (2007)

REFERENCES
1. F.S.Hill, "Computer Graphics using OPENGL", Second Edition, Pearson Education, (2003)
2. Prabhat K Andleigh, Kiran Thakrar, "Multimedia systems design", First Edition, PHI, (2007)
3. James D. Foley, Andries Van Dam, Steven K. Feiner, John F. Hughes, Computer Graphics-Principles and Practice, Second Edition in C, Pearson Education, (2007)
4. Arup Chattpadhyay, Anirban Mukhopadhyay , "Introduction to Computer Graphics & Multimedia", Second Edition, Pearson Education, (2009)
5. Pakhira Malay K., "Computer Graphics, Multimedia and Animation", Second Edition, PHI Publishing, (2010)

COURSE OUTCOMES
At the end of the course student should be able to:
CO1   Know about the general software architecture of programs that use 3D computer graphics

CO2   Know and be able to discuss hardware system architecture for computer graphics.
CO3   Gain Knowledge about graphics Transformation and projection.
CO4   Make use of multimedia techniques in real world applications
CO5   Capable of using transmission of multimedia objects

16CS413   **AGENT BASED INTELLIGENT SYSTEMS**   L   T   P   C
                                                                  3   0   0   3

UNIT I   INTRODUCTION   9

Definitions – Foundations – History – Intelligent Agents – Problem Solving – Searching –Heuristics – Constraint Satisfaction Problems – Game playing.

UNIT II   KNOWLEDGE REPRESENTATION AND REASONING   9

Logical Agents – First order logic – First Order Inference – Unification – Chaining – Resolution Strategies – Knowledge Representation – Objects – Actions – Events.

UNIT III   PLANNING AGENTS   9

Planning Problem – State Space Search – Partial Order Planning – Graphs – Nondeterministic Domains – Conditional Planning – Continuous Planning – MultiAgent Planning. Agents and environment.

UNIT IV   AGENTS AND UNCERTAINITY   9

Acting under uncertainty – Probability Notation – Bayes Rule and use – Bayesian Networks – Other Approaches – Time and Uncertainty – Temporal Models – Utility Theory – Decision Network – Complex Decisions.

UNIT V   HIGHER LEVEL AGENTS   9

Knowledge in Learning-Relevance Information-Statistical Learning Methods – Reinforcement Learning – Communication – Formal Grammar – Augmented Grammars – Future of AI.

L : 45   T: 0   P: 0   Total: 45 PERIODS

TEXT BOOKS

1   Stuart Russell and Peter Norvig, "Artificial Intelligence - A Modern Approach", 2nd Edition, Prentice Hall, 2002.

2   Zili Zhang , Chengqi Zhang , "Agent-Based Hybrid Intelligent Systems: An Agent-Based Framework", First Edition,2004.

REFERENCES

1   Michael Wooldridge, "An Introduction to Multi Agent System", John Wiley, 2002.

2   Patrick Henry Winston, "Artificial Intelligence", Third Edition, AW, 1999.

3   Nils.J.Nilsson, "Principles of Artificial Intelligence", Narosa Publishing House, 1992.

4   Sophie D'Amours, Alain Guinet ,"Intelligent Agent-based Operations Management", First Edition, 2004.

COURSE OUTCOMES

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

CO1   Understand Intelligent Agents

CO2   Make uncertainty with decision Network

CO3   Conditional planning for Agents

CO4   Gain deep understanding of the basic artificial intelligence techniques

CO5   Apply their knowledge to design solutions to different problems

<div align="center">**PROFESSIONAL ELECTIVE V**</div>

16IT408	**FRONT END TECHNOLOGIES** **(offered by Infosys)**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

UNIT I   **INTRODUCTION TO NOSQL DATABASE - MONGODB**   **9**

What is NoSQL Database - Why to Use MongoDB - Difference between MongoDB& RDBMS - Download & Installation - Common Terms in MongoDB – Implementation of Basic CRUD Operations using MongoDB

UNIT II   **INTRODUCTION TO SERVER-SIDE JS FRAMEWORK –**   **9**
                         NODE.JS

Introduction - What is Node JS – Architecture – Feature of Node JS - Installation and setup - Creating web servers with HTTP (Request & Response) – Event Handling - GET & POST implementation - Connect to NoSQL Database using Node JS – Implementation of CRUD operations.

UNIT III   **INTRODUCTION TO TYPESCRIPT**   **9**

TypeScript : Introduction to TypeScript – Features of TypeScript – Installation setup – Variables – Datatypes – Enum – Array – Tuples – Functions – OOP concepts – Interfaces – Generics – Modules – Namespaces – Decorators – Compiler options – Project Configuration

UNIT IV   **INTRODUCTION TO CLIENT-SIDE JS FRAMEWORK –**   **9**
                         BASICS OF ANGULAR 4.0

Introduction to Angular 4.0 - Needs & Evolution – Features – Setup and Configuration – Components and Modules – Templates – Change Detection – Directives – Data Binding - Pipes – Nested Components

UNIT V   **INTRODUCTION TO CLIENT-SIDE JS FRAMEWORK –**   **9**
                         FORMS AND ROUTING IN ANGULAR 4.0

Template Driven Forms - Model Driven Forms or Reactive Forms - Custom Validators - Dependency Injection - Services - RxJS Observables - HTTP - Routing

<div align="center">**L : 45   T: 0   P:0   Total: 45 PERIODS**</div>

TEXT BOOKS

1. Nathan Rozentals, "Mastering TypeScript", April 2015
2. Nate Murray, Felipe Coury, Ari Lerner and Carlos Taborda, "ng-book, The Complete Book on Angular 4" September 2016
3. AmolNayak, "MongoDB Cookbook Paperback" , November 2014
4. KrasimirTsonev, "Node.js by Example Paperback", May 2015

REFERENCES

1. Peter Membrey , David Hows, Eelco Plugge,"MongoDB Basics 1st ed. Edition" , APress, Ist Edition, 2014

COURSE OUTCOMES

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

CO1   Design and query Nosql MongoDB database
CO2   Design server side scripts using nodeJS
CO3   Discuss about typescript
CO4   Design client side script design using AngularJS
CO5   Designs with form routing using AngularJS

	L	**T**	**P**	**C**

16IT409   **SOFTWARE PROJECT MANAGEMENT**   **L   T   P   C**

                                  3   0   0   3

UNIT I   **PROJECT EVALUATION AND PROJECT PLANNING**   **9**

Importance of Software Project Management - Activities Methodologies – Categorization of Software Projects – Setting objectives – Management Principles –Management Control – Project portfolio Management – Cost-benefit evaluation technology – Risk evaluation – Strategic program Management – Stepwise Project Planning

UNIT II   **PROJECT LIFE CYCLE AND EFFORT ESTIMATION**   **9**

Software process and Process Models – Choice of Process models - mental delivery – Rapid Application development – Agile methods – Extreme Programming – SCRUM – Managing interactive processes – Basics of Software estimation – Effort and Cost estimation techniques – COSMIC Full function points - COCOMO II A Parametric Productivity Model - Staffing Pattern.

UNIT III   **ACTIVITY PLANNING AND RISK MANAGEMENT**   **9**

Objectives of Activity planning – Project schedules – Activities – Sequencing and scheduling – Network Planning models – Forward Pass & Backward Pass techniques – Critical path (CRM) method – Risk identification – Assessment – Monitoring – PERT technique – Monte Carlo simulation – Resource Allocation – Creation of critical patterns – Cost schedules

UNIT IV   **PROJECT MANAGEMENT AND CONTROL**   **9**

Framework for Management and control – Collection of data Project termination – Visualizing progress – Cost monitoring – Earned Value Analysis- Project tracking – Change control- Software Configuration Management – Managing contracts – Contract Management.

UNIT V   **STAFFING IN SOFTWARE PROJECTS**   **9**

Managing people – Organizational behavior – Best methods of staff selection – Motivation – The Oldham-Hackman job characteristic model – Ethical and Programmed concerns – Working in teams – Decision making – Team structures – Virtual teams – Communications genres – Communication plans. Case studies: open project – Estimation as a tool.

                              L : 45   T: 0   P:0   Total: 45 PERIODS

TEXT BOOKS

1   Bob Hughes, Mike Cottrell and Rajib Mall: Software Project Management – Fifth Edition, Tata McGraw Hill, New Delhi, 2012.

REFERENCES

1   Ian Sommerville, "Software Engineering", nineth Edition, Pearson Education Asia, 2011.
2   Rajib Mall, "Fundamentals of Software Engineering", Third Edition, PHI Learning Private Limited, 2009.
3   Robert K. Wysocki " Effective software project management" Third edition 2011
4   Jalote "Software Project Management in Practice" Pearson Education India, Eighth edition 2002, Pearson Education India.
5   Bruce Barkley., "Project Risk Management", McGraw Hill Professional, Second edition, 2004.

COURSE OUTCOMES

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

CO1   Understand the basic concepts and issues of software project management
CO2   Planning the software projects
CO3   Match organizational needs to the most effective software development model
CO4   Develop the skills for tracking and controlling software deliverables
CO5   Create project plans that address real-world management challenges

16IT410	AD HOC AND SENSOR NETWORKS	L	T	P	C
		3	0	0	3

UNIT I   INTRODUCTION   9

Fundamentals of Wireless Communication Technology – The Electromagnetic Spectrum – Radio propagation Mechanisms – Characteristics of the Wireless Channel -Mobile Ad hoc Networks (MANETs) and Wireless Sensor Networks (WSNs) :concepts and architectures. Applications of Ad Hoc and Sensor networks. Design Challenges in Ad hoc and Sensor Networks.

UNIT II   MAC PROTOCOLS FOR AD HOC WIRELESS NETWORKS   9

Issues in designing a MAC Protocol- Classification of MAC Protocols- Contention based protocols-Contention based protocols with Reservation Mechanisms- Contention based protocols with Scheduling Mechanisms – Multi channel MAC-IEEE 802.11

UNIT III   ROUTING PROTOCOLS AND TRANSPORT LAYER IN AD HOC   9
**   WIRELESS NETWORKS**

Issues in designing a routing and Transport Layer protocol for Ad hoc networks- proactive routing, reactive routing (on-demand), hybrid routing- Classification of Transport Layer solutions-TCP over Ad hoc wireless Networks.

UNIT IV   WIRELESS SENSOR NETWORKS AND MAC PROTOCOLS   9

Single network platforms- Hardware and software platforms- sensor network databases-challenges – data indices and range queries-network aggregation-MAC layer protocols: self-organizing, Hybrid TDMA/FDMA and CSMA based MAC- IEEE 802.15.4.

UNIT V   WSN ROUTING, LOCALIZATION AND QOS

WSN routing – OLSR- Localization – Indoor and Sensor Network Localization-Localization services-QOS in WSN-Energy Efficient Design-Synchronization-Transport Layer issues.

**   L : 45   T: 0   P:0   Total: 45 PERIODS**

TEXT BOOKS
 1   C. Siva Ram Murthy, and B. S. Manoj, "Ad hoc Wireless Networks: Architectures and Protocols ", Prentice Hall Professional Technical Reference, 2008.

 2   Feng Zhao and Leonides Guibas, "Wireless Sensor Networks", Elsevier Publication – 2007.

REFERENCES
 1   Carlos De Morais Cordeiro, Dharma Prakash Agrawal "Ad Hoc & Sensor Networks: Theory and Applications", World Scientific Publishing Company, 2006.
 2   Holger Karl and Andreas Willig "Protocols and Architectures for Wireless Sensor Networks", Wiley, 2005
 3   Kazem Sohraby, Daniel Minoli, & Taieb Znati, "Wireless Sensor Networks-Technology, Protocols, and Applications", John Wiley, 2007
 4   Anna Hac, "Wireless Sensor Network Designs", John Wiley, 2003

COURSE OUTCOMES
At the end of the course student should be able to:
CO1   Apply the principles and characteristics of mobile ad hoc networks (MANETs) and WSNs
CO2   Implement the challenges in designing MAC, routing and transport protocols for Ad-hoc networks
CO3   Analyze the limitations of Ad- hoc and wireless sensor networks and the workarounds needed to develop real-life applications
CO4   Compare and Analyze various routing protocols used in wireless sensor networks
CO5   Design energy efficient wireless sensor applications

16IT411	INFORMATION RETRIEVAL	L	T	P	C
		3	0	0	3

UNIT I INFORMATION RETRIEVAL MODELS AND TEXT PROCESSING 9

Information Retrieval Versus Web Search – Search Engine Frameworks – Algebraic Models - Probabilistic Models – Language Models - Structured Text Retrieval Models - XML Retrieval - Text Processing – Document Parsing – Determining Vocabulary – Skip Pointers - Positional Pointing - Phrase Queries – Wildcard Queries – Spelling Correction – Phonetic Correction .

UNIT II RANKING WITH INDEXES 9

Index Construction – Types of Indexing – Inverted Indexes – Index Compression – Statistical Properties – Dictionary Compression – Postings File Compression – Scoring – Weighting – Vector Space Modeling – Variant Functions – Efficient Scoring and Ranking – Web Crawling – Web Meta-Crawlers - Focused Crawling – Web Indexes –- Near-duplicate Detection

UNIT III EVALUATING SEARCH ENGINES 9

Effectiveness Metrics - Test Collections – Reference Collections - Unranked Retrieval Evaluation – Ranked Retrieval Evaluation – Assessing Relevance – System Quality – User Utility – Results Snippets - Methods for Query Reformulation - Query Specification – Context - Using Relevance Judgments - Human-Computer Interaction

UNIT IV UNIVERSAL NETWORKING LANGUAGE (UNL) 9

Structure – UN Graph - Lexical Issues of UNL – Words – Lexical Units – Attributes - Relations – Universal Words with Multilingualism – UNL Sentence Structure – UNL Document Structure - WordNet - UNL Knowledge Base – Logical Expression in UNL – Developing Dictionaries and Rules

UNIT V DOCUMENT TEXT MINING 9

Information Filtering - Organization - Relevance Feedback – Text Mining - Text Classification and Clustering – Categorization Algorithms - Naive Bayes - Decision Trees - Nearest Neighbor – Clustering Algorithms - Agglomerative Clustering - K-Means - Expectation Maximization (EM)

L : 45 T: 0 P:0 Total: 45 PERIODS

TEXT BOOKS

1 C. Manning, P. Raghavan, and H. Schütze, Introduction to Information Retrieval, Cambridge University Press, First Edition, 2009.
2 Ricardo Baeza -Yates and BerthierRibeiro – Neto, Modern Information Retrieval: The Concepts and Technology behind Search, Second Edition, ACM Press Books, 2011.

REFERENCES

1 Mark Levene, An Introduction to Search Engines and Web Navigation, Second Edition Wiley, 2010.
2 Stefan Buettcher, Charles L. A. Clarke, Gordon V. Cormack, Information Retrieval: Implementing and Evaluating Search Engines, The MIT Press, 2010.
3 Bruce Croft, Donald Metzler and Trevor Strohman, Search Engines: Information Retrieval in Practice, First Edition, Addison Wesley, 2009.
4 AyseGoker, John Davies, Information Retrieval: Searching in the 21st Century, First Edition, Wiley Publications, 2009

COURSE OUTCOMES

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

CO1 Experiment with information retrieval models for text processing
CO2 Rank and score the web pages using indexes
CO3 Evaluate the performance of web search engines
CO4 Use UNL for knowledge representation
CO5 Apply document text mining techniques

16IT412	SOFTWARE DEFINED NETWORKS	L	T	P	C
		3	0	0	3

UNIT I   INTRODUCTION TO SOFTWARE DEFINED NETWORKS   9

Defining SDN – Need for SDN – Evolution of switched and control Planes – Cost – Increased cost of development– Increased cost of operating the network – Implications for research and innovation – Data center innovation– Compute and storage virtualization– Inadequacies in Networks – Needs – Genesis of SDN – Forerunners of SDN – Centralized and distributed control planes and data planes

UNIT II   WORKING OF SDN   9

Working of SDN – Fundamental characteristics– SDN operation – SDN devices – SDN controller – Core modules – Interfaces – Existing SDN controller – Issues with the SDN controller – SDN applications – Alternate SDN methods – Open flow – switch specification - Channel - Controller modes - Configuration and management protocol – Drawbacks of open SDN

UNIT III   SDN IN DATA CENTER   9

Data center concepts and constructs – SDN in data center – Data center definition – Data Center Demands – Tunneling technologies – Virtual extensible LAN – GRE – Stateless transport tunneling – Path technologies – General multipath routing issues – Multiple spanning tree protocol –Shortest path bridging – Equal-cost multipath – Shortest-path complexity – Ethernet fabrics – SDN use cases in data center – Open SDN Vs. Overlays in data center – Data center implementation – SDN in other environment

UNIT IV   TOPOLOGY AND FRAMEWORK   9

Network topology and topological information abstraction - Traditional methods – LLDP - BGP-TE/LS - BGP-LS with PCE – ALTO - BGP-LS and PCE interaction with ALTO - I2RS Topology - Juniper SDN framework – IETF SDN framework – Open Daylight controller/Framework - SDN evolution - Enterprise networks - Transport networks - Optical transport networks - Scalable SDN - SDN management

UNIT V   APPLICATIONS AND FUTURE TRENDS   9

SDN applications – SDN open source – Terminology – Issues – Profile – OpenStack – Applying SDN open source – Business ramifications – EaS – Classifying SDN vendors – Impact on incumbent NEMs – Impact on enterprise consumers – Major SDN acquisitions – SDN startups – SDN futures – Current state of affairs– Applications of open SDN– Physical layer links – Programming techniques to networks – Security applications – Roaming in mobile networks – Traffic engineering in mobile networks – Energy savings – SDN-enabled switching chips

L : 45   T: 0   P:0   Total: 45 PERIODS

TEXT BOOKS
1   Paul Goransson, Chuck Black, "Software Defined Networks: A Comprehensive Approach" , Morgan Kaufmann, 2014.
2   Thomas D. Nadeau, Ken Gray , "SDN: Software Defined Networks", Oreilly, 2013

REFERENCES
1   Siamak Azodolmolky, "Software Defined Networking with OpenFlow, packt publishing", 2013
2   Fei Hu ,"Network Innovation through OpenFlow and SDN: Principles and Design", CRC Press, 2014
3   Sriram Subramanian, Sreenivas Voruganti, "Software-Defined Networking (SDN) with OpenStack",Packt, 2016.

COURSE OUTCOMES

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

CO1   Apply the acquired knowledge in Software Defined Networks
CO2   Perform operations in SDN
CO3   Understand technologies of SDN to data center
CO4   Examine the concepts of topology and framework area
CO5   Become well-versed in the application and future trends in SDN

16IT413	SEMANTIC WEB	L	T	P	C
		3	0	0	3

UNIT I   THE BASICS OF SEMANTIC WEB   9

Traditional web to Semantic Web – WWW and its usage- Metadata - Metadata Considerations and tools - Search engines for Semantic Web –Web Page Markup Problem - Query Building Problem.

UNIT II   BUILDING BLOCK OF SEMANTIC WEB   9

RDF - Basic Elements - RDF triples - RDF tools - Fundamental rules of RDF - Relation of RDF with DC and XML - RDFS - Core Elements of RDFS - Ontology and Taxonomy- Inference of RDF.

UNIT III   WEB ONTOLOGY LANGUAGE   9

Web Ontology language – Defines Classes - Define Properties-set Operators - Ontology Matching and Distributed Information- Three faces of OWL- Validating OWL Ontology

UNIT IV   SEMANTIC WEB SERVICES   9

Web Services –Web Services Standards – Web Services to Semantic Web Services UDDI and its usage- Concept of OWL-S and its building blocks - Mapping OWL-S to UDDI - WSDL-S.

UNIT V   REAL WORLD EXAMPLES AND APPLICATIONS   9

Swoogle - Architecture, Usage and Examples; FOAF – Overview, Vocabulary –Creating FOAF Documents – Overview of Semantic Markup – Semantic Web Search Engines.

L : 45   T: 0   P:0   Total: 45 PERIODS

TEXT BOOKS
 1   Liyang Yu, "Introduction to the Semantic Web and Semantic web services" Chapman & Hall/CRC, Taylor & Francis group, 2007.

REFERENCES
 1   Manish Joshi, Harold Boley, Rajendra Akerkar, "Advances in Semantic Computing", Techno mathematics Research Foundation, 2010

 2   Grigoris Antoniou and Frank van Harmelen, "A Semantic Web Primer", MIT Press, 2004
 3   Karin K. Breitman K., Marco Antonio Casanova, Walt Truszkowski, "Semantic web:concepts, Technologies and applications" Walt Truszkowski – 2007
 4   Pascal Hitzler, Markus Krotzsch, Sebastian Rudolph, "Foundations of Semantic Web Technologies" CRC Press, 2009.
 5   John Hebeler, Matthew Fisher, Ryan Blace, Andrew Perez-Lopez, "Semantic Web Programming" Wiley, 2008

COURSE OUTCOMES
At the end of the course student should be able to:

CO1   Demonstrate knowledge and understanding of the technical architecture of the Semantic Web, and its integration with the World Wide Web

CO2   Understand the concepts of metadata, semantics of knowledge and resource, ontology

CO3   Describe logic semantics and inference with OWL

CO4   Apply the knowledge in developing Program semantic applications with java API

CO5   Discuss the methodologies in ontology semantics engineering and research issue

16GE303	TOTAL QUALITY MANAGEMENT	L	T	P	C
	(Common to all B.E. / B. Tech. Courses)	3	0	0	3

UNIT I INTRODUCTION 9

Introduction - Need for quality - Evolution of quality - Definitions of quality - Dimensions of product and service quality - Basic concepts of TQM - TQM Framework - Contributions of Deming, Juran and Crosby - Barriers to TQM - Quality statements - Customer focus - Customer orientation, Customer satisfaction, Customer complaints, and Customer retention - Costs of quality.

UNITII TQM PRINCIPLES 9

Leadership - Strategic quality planning, Quality Councils - Employee involvement - Motivation, Empowerment, Team and Teamwork, Quality circles Recognition and Reward, Performance appraisal - Continuous process improvement - PDCA cycle, 5S, Kaizen - Supplier partnership - Partnering, Supplier selection, Supplier Rating.

UNIT III STATISTICAL PROCESS CONTROL (SPC) 9

Statistical fundamentals – Measures of central Tendency and Dispersion - Population and Sample, Control Charts for variables and attributes, Industrial Examples. Process capability. Concept of six sigma – New seven Management tools.

UNIT IV TQM TOOLS 9

Bench marking -Reason to bench mark, Bench marking process - FMEA - Stages, Types. Quality Function Deployment (QFD) - House of Quality - Taguchi quality loss function - TPM - Concepts, improvement needs - Performance measures.

UNIT V QUALITY SYSTEMS 9

Need for ISO 9000 and Other Quality Systems - ISO 9001-2015 Quality System - Elements, Implementation of Quality System Documentation, Quality Auditing - QS 9000 – BS-OHSAS 18001: 2007, ISO 20000, ISO 22000 IATF 16949: 2016, ISO 14001:2015, AS9100– Concept, Requirements and Benefits- Case studies.

L:45 T: 0 P: 0 Total: 45 PERIODS

TEXT BOOKS

1 Dale H. Besterfiled, "Total Quality Management", Third Edition, Pearson Education Asia, Indian Reprint, 2016.
2. SubburajRamasamy" Total Quality Management" Tata Mcg raw hill edition, 2015.

REFERENCES

1 Suganthi.L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd., 2010.
2 James R. Evans and William M. Lindsay, "The Management and Control of Quality", 8th Edition, First Indian Edition, Cengage Learning, 2012. .
3 Dr S. Kumar, "Total Quality Management", Laxmi Publications Ltd., New Delhi 2006.
4 P. N. Muherjee, "Total Quality Management", Prentice Hall of India, New Delhi, 2015.
5 Suganthi.L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd., 2010.

COURSE OUTCOMES

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

CO1 State about the recent techniques followed in quality approach.
CO2 Improve Leadership Skills.
CO3 Implement the Concepts of SPC Tools in Industrial Activity.
CO4 Examine the TQM Tools in Several Engineering fields.
CO5 Explain about the ISO and QS certification process and its need for the industries.

	L	T	P	C
16IT414 **USER INTERFACE DESIGN**				
	3	0	0	3

UNIT I   INTRODUCTION   9

Human–Computer Interface – The importance of User Interface - Characteristics of Graphical and Web User Interface –Direct Manipulation Graphical System –Popularity –Merging of Graphical Business Systems and the Web – Characteristics & Principles of User Interface Design

UNIT II   HUMAN COMPUTER INTERACTION   9

User Interface Design Process – Obstacles –Usability –Human Characteristics In Design –Business Functions –Requirement Analysis – Direct – Indirect Methods – Basic Business Functions – Design Standards – System Timings – Human Consideration In Screen Design – Structures Of Menus – Functions Of Menus– Contents Of Menu– Formatting – Phrasing the Menu – Selecting Menu Choice– Navigating Menus– Graphical Menus & Examples.

UNIT III   WINDOWS   9

Characteristics– Components– Presentation Styles– Types– Managements– Organizations– Operations– Web Systems– Device Based Controls Characteristics– Screen Based Controls – Operate Control – Text Boxes– Selection Control– Combination Control– Custom Control– Presentation Control.

UNIT IV   MULTIMEDIA   9

Choosing Proper Words and Creating Acceptable Messages and Text - Text for Web Pages – Effective Feedback– Guidance & Assistance– Internationalization– Accessibility– Icons–Multimedia – Coloring

UNIT V   WINDOWS LAYOUT– TEST   9

Organize and Layout Windows - Prototypes – Comparisons - Kinds of Tests – Retest – Information Search – Visualization – Hypermedia – WWW– Example for Object-Action Interface Model for Web Site Design - Software Tools.

L : 45   T: 0   P:0   Total: 45 PERIODS

TEXT BOOKS
1. Wilbert. O. Galitz, "The Essential Guide to User Interface Design", John Wiley & Sons, 3rd Edition 2011.
2. Ben Sheiderman, "Design the User Interface", Pearson Education, 2006.

REFERENCES
1. Alan Cooper, "The Essential Of User Interface Design", Wiley – Dream Tech Ltd., 2002.
2. Theo Mandel, "The Elements of User Interface Design", John Wiley & Sons, 1997.
3. P. J. Lynch, S. Horton, "Web Style Guide: Basic Design Principles For Creating Web Sites", Universities Press,1999
4. JoAnn T. Hackos and Janice (Ginny) Redish, "User and Task Analysis for Interface Design", 1998.
5. Clayton Lewis and John Reiman, "Task-Centered User Interface Design - A Practical Introduction", 1993.

COURSE OUTCOMES
At the end of the course student should be able to:

CO1   Analyze a user interface from a communication perspective
CO2   Know the components of user interface design and methods
CO3   Demonstrate knowledge of different interaction styles
CO4   Describe how user interface development can be integrated into an overall software development process
CO5   Design their own Human Computer Interaction design project with user interface building tools

16IT415	MAINFRAME TECHNOLOGIES	L	T	P	C
		3	0	0	3

UNIT I   NEW MAINFRAME   9

Mainframe concepts-an evolving architecture-mainframe computer users-factors contributing to mainframe use – mainframe workloads.

UNIT II   CAPACITY   9

Capacity – elements of a system required for capacity – few server Vs Many server – service level agreement – managing the system to the SLA – architecture, running work and capacity – several servers on one physical machine – parallel sysplex and its measurements.

UNIT III   SCALABILITY, INTEGRITY AND SECURITY   9

Introduction to scalability – scalability concepts – scalability implementation on IBM system – integrity – security – introduction to availability – Inhibitors to availability -redundancy – z/OS elements for availability – Disaster recovery

UNIT IV   ACCESSING LARGE AMOUNT OF DATA   9

Introduction – channel subsystem – control unit-DASD CKD architecture and DASD subsystem – multiple allegiance/Parallel Access volumes – database and data sharing – Data placement and management.

UNIT V   SYSTEM MANAGEMENT AND AUTONOMIC COMPUTING   9

Introduction – system data – configuration management – operating management – performance management – problem management – introduction to autonomic computing – self healing – self protecting – self optimizing.

L : 45   T: 0   P:0   Total: 45 PERIODS

TEXT BOOKS
1   Mike Ebbers,Frank Byrne, Pilar Gonzalez Adrados,Rodney Martin and Jon Veilleux "Redbook – Introduction to Mainframe -Large Scale Commercial Computing". First Edition December 2006, IBM Corp

REFERENCES
1   Lydia Parziale, Edi Lopes Alves, Klaus Egeler, Clive Jordan" Introduction to the New Mainframe: z/VM Basics", November 26, 2007, IBM Redbooks. UNIT (I-V)
2   Yuval Sinay, " Introduction to the New Mainframe: z/OS Basics ",July 24, 2009, IBM RedBook Series. (UNIT I-IV)
3   Mike Ebbers ,Wayne O'Brien, Bill Ogden, "Introduction to the New Mainframe: z/OS Basics", March 2005 , IBM RedBook Series.(Unit-I-III)

COURSE OUTCOMES

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

CO1   Discuss fundamentals of mainframe technology

CO2   Analyze the capacity of mainframe systems

CO3   Analyze about availability and integrity of work loads

CO4   Analyze the large work loads and data placement strategies

CO5   Outline system management and autonomic Computing

16IT416	PERVASIVE COMPUTING	L	T	P	C
		3	0	0	3

UNIT I INTODUCTION 9

Pervasive Computing: Past, Present and Future - Pervasive Computing Market –M-Business – Application examples: Retail, Airline check-in and booking – Health care – Car information system – E-mail access via WAP and voice.

UNIT II DEVICE TECHNOLOGY 9

Hardware – Human Machine Interfaces – Biometrics – Operating Systems – Java for Pervasive devices.

UNIT III DEVICE CONNECTIVITY AND WEB APPLICATION 9
CONCEPTS

Protocols – Security – Device Management - Web Application Concepts: WWW architecture – Protocols – Transcoding - Client Authentication via Internet Smart Card- based Authentication Mechanisms - Wearable computing Architecture.

UNIT IV WAP & VOICE TECHNOLOGY 9

WAP and Beyond: Components of the WAP architecture – WAP infrastructure –WAP security issues – WML – WAP push – Products – i-Mode – Voice Technology: Basics of Speech recognition- Voice Standards – Speech applications – Speech and Pervasive Computing.

UNIT V PDA & PERVASIVE WEB APPLICATION ARCHITECTURE 9

Device Categories – PDA operation Systems – Device Characteristics – Software Components - Standards – Mobile Applications - PDA Browsers - Pervasive Web Application architecture: Background – Development of Pervasive Computing web applications - Pervasive application architecture.

L : 45   T: 0   P:0   Total: 45 PERIODS

TEXT BOOKS
1 Jochen Burkhardt, Horst Henn, Stefan Hepper, Thomas Schaech & Klaus Rindtorff, "Pervasive Computing, Technology and Architecture of Mobile Internet Applications", Pearson Education, 2012
2 Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, Principles of Mobile Computing, Springer, New York, 2003

REFERENCES
1 Uwe Hansmann, L. Merk, Nicklous M., Stober T., Hansmann U., "Pervasive Computing (Springer Professional Computing)", 2003, Springer Verlag, ISBN: 3540002189.
2 Debashis Saha, Networking Infrastructure for Pervasive Computing: Enabling Technologies, Kluwer Academic Publisher, Springer; First edition, 2002
3 Introduction to Wireless and Mobile Systems by Agrawal and Zeng, Brooks/ Cole (Thomson Learning), First edition, 2002
4 Frank Adelstein, Sandeep KS Gupta, Golden Richard III, Loren Schwiebert, "Fundamentals of Mobile and Pervasive Computing", McGraw Hill edition,2006
5 Jochen Schiller, "Mobile Communications", PHI, Second Edition, 2003

COURSE OUTCOMES
At the end of the course student should be able to:
CO1 Analyze problems and case studies of pervasive computing systems and choose the   appropriate technological solutions
CO2 Identify various design principles, implementation methods and evaluation criteria for Pervasive Computing Systems.
CO3 Design and develop various mobile and web applications for real time problems.
CO4 Blueprint and Implement human machine interface with voice technology
CO5 Design the Windows Layout And Test

16IT417   **ETHICAL HACKING AND CYBER SECURITY**

L	T	P	C
3	0	0	3

UNIT I   CASING THE ESTABLISHMENT   9

Foot printing - Internet Foot printing -Scanning-Enumeration – Windows NT/2000 Enumeration-Novell Enumeration-UNIX Enumeration.

UNIT II   SYSTEM HACKING   9

Hacking Windows 95/98 and ME –Hacking Windows NT- Overview-The Quest for Administrator-Consolidation of Power-Exploiting Trust-Sniffers-Remote Control and Back Doors-Port Redirection -Case study- Know Your Enemy.

UNIT III   NETWORK HACKING   9

Dial-up, PBX, Voicemail, and VPN hacking -Wardialing- PBX hacking- Virtual Private Network Hacking - Network Devices – Discovery-Detection, SNMP-Back Doors-Default Accounts, Lower the Gates-Shared Versus Switched.

UNIT IV   FIREWALLS   9

Firewalls landscape- Firewall Identification-Scanning Through firewalls- packet Filtering- Application Proxy Vulnerabilities. Denial of Service Attacks - Motivation of Dos Attackers- Types of DoS attacks-Generic Dos Attacks-Unix and Windows NT DoS.

UNIT V   WEB HACKING   9

Web Pilfering Finding Well-Known Vulnerabilities-Script Inadequacies-Buffer Overflow –Poor Web Design- Hacking the internet User –Malicious Mobile Code-SSL Fraud-Email Hacking.

L : 45   T: 0   P:0   Total: 45 PERIODS

TEXT BOOKS
1   Stuart McClure, Joel Scambray and Goerge Kurtz, "Hacking Exposed Network Security Secrets & Solutions", Tata McGraw hill Publishers, 2010.
2   Bensmith, and Brian Komer, "Microsoft Windows Security Resource Kit", Prentice Hall of India, 2010.

REFERENCES
1   Kenneth J. Knapp, "Cyber Security and Global Information Assurance: Threat Analysis and Response Solutions", IGI Global, 2009.
2   Nina Godbole, SUNIT Belapure, "Cyber Security : Understanding Cyber Crimes , Computer Forensics and Legal Perspectives" , Wiley , 2011
3   Stuart McClure , Joel Scambray, George Kurtz , "Hacking Exposed : Network Security & Solutions" , McGraw-Hill , 2003
4   Ankit Fadia , "Windows Hacking" , Vikas Publishing House , 2009
5   Michael T.Simpson, Kent Backman, James E.Corley, "Hands on Ethical Hacking and Network Defense" , Course Technology, 2013

COURSE OUTCOMES
At the end of the course student should be able to:
CO1   Identify and analyze the stages an ethical hacker requires to take in order to compromise a target system
CO2   Practice and use safe techniques in virtual path networking
CO3   Develop Solutions for network security problems
CO4   Critically evaluate security techniques used to protect system and user data
CO5   Demonstrate systematic understanding of the concepts of hacking the internet and malicious code

16IT418   **DIGITAL MARKETING**   **L   T   P   C**
                              (Offered by Verticurl)

                                                                3   0   0   3

UNIT I   **OVERVIEW OF DIGITAL MARKETING AND DESIGN**   **9**
Evolution of Digital marketing, Digital Marketing, Benefits of digitals marketing, Online research methodology, cost of market research, Defining content marketing, content creation, distribution, tools, Inbound Marketing & Outbound Marketing, B2B Vs B2C Marketing, CRM Strategy.

UNIT II   **ADVERTISEMENT DESIGN**   **9**
Core principles of user experience design, Mobile user experience, step by step to user experience, Tools, Writing for audience: Writing for audience, types of web copy, SEO copy writing, Strategies and Best practices. Branding

UNIT III   **EMAIL MARKETING**   **9**
Email marketing: objectives, key terms, strategies, tools and advantages and challenges. Case study: Zando, Campaign Types–(Eg. Announcement Emails, Newsletter Emails, Product Launch Emails, Event Invitations, Brochures, Introduction or Welcome emails, etc.,)

UNIT IV   **MOBILE MARKETING**   **9**
Mobile marketing, Mobile Apps,location and mobile, integrated mobile into online marketing, augmented reality, mobile analytics, advantages, strategies and case study: carling black label's "be the coach".

UNIT V   **OTHER MARKETING CHANNELS & TECHNOLOGIES**   **9**
Social Media Marketing, Video Marketing& Content Marketing, Search Engine Marketing, and Loyalty Marketing; Technologies: AI in Digital Marketing, E-Commerce, API role in connecting different Marketing platforms, Big Data ; Marketing Automation & Campaign Management tools - Analytics tools, Data Management Platforms, Testing & Optimization Platforms, Tag Management tools, Sales Enablement tools

                              L : 45   T: 0   P:0   Total: 45 PERIODS
TEXT BOOKS
  1   Rob Stokes, "eMarketing: The essential guide to marketing in a digital world", Kindle Edition
REFERENCES
  1   https://www.guru99.com/free-digital-marketing-tutorial.html
  2   https://www.lynda.com/Online-Marketing-SEO-training-tutorials/35-0.html
  3   https://analytics.google.com/analytics/academy/
  4   https://analytics.google.com/analytics/academy/course/6
  5   https://searchenginewatch.com/2016/01/21/seo-basics-22-essentials-you-need-for-optimizing-your-site/
COURSE OUTCOMES
At the end of the course student should be able to:
CO1   Analyze the digital marketing in basics and optimize webpage
CO2   Design an advertisement with content optimization
CO3   Perform the email marketing and analyze the efficient way of doing it
CO4   Analyze the market using mobile analytics, and understand disadvantages
CO5   Analyze the marketing data using AI techniques and other strategies

16CS322	PYTHON PROGRAMMING	L	T	P	C
		3	0	0	3

UNIT I   INTRODUCTION TO PYTHON   9

Features of Python- Fundamentals of Python – Variables-Identifiers-Operators-Data Types and Operations- Input / Output and Import functions

UNIT II   CONTROL FLOW, FUNCTIONS   9

Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, scope: local and global, composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd,exponentiation, sum an array of numbers, linear search, binary search.

UNIT III   COMPOUND DATA: LISTS, TUPLES, DICTIONARIES   9

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters;Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension; Illustrative programs: selection sort, insertion sort, mergesort,quicksort

UNIT IV   FILES, MODULES, PACKAGES   9

Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file.

UNIT V   OBJECT ORIENTED PROGRAMMING THROUGH PYTHON   9

Class definition-Creating an Object-Inheritance-Polymorphism-Exception handling-GUI programming

L : 45   T: 0   P: 0   Total: 45 PERIODS

TEXT BOOKS

1   Y.Daniel Liang,"Introduction to Programming using Python", 1st Edition, Pearson Education,(2017)

REFERENCES

1   Eric Matthes," Python Crash Course: A Hands-On, Project-Based Introduction to Programming", 2016

2   Mark Lutz," Learning Python", O'Reilly Media, 2013

COURSE OUTCOMES

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

CO1   Read and write simple Python programs

CO2   Develop Python programs with conditionals and loops.

CO3   Define Python functions and call them.

CO4   Use Python data structures –- lists, tuples, dictionaries

CO5   Understand the object oriented features using Python

16IT419	ENTERPRISE RESOURCE PLANNING	L	T	P	C
		3	0	0	3

UNIT I   ERP AND TECHNOLOGY   9

Introduction – Related Technologies – Business Intelligence – E-Commerce and E-Business – Business Process Reengineering – Data Warehousing – Data Mining – OLAP – Product life Cycle management – SCM – CRM.

UNIT II   ERP IMPLEMENTATION   9

Implementation Challenges – Strategies – Life Cycle – Pre-implementation Tasks – Requirements Definition – Methodologies – Package selection – Project Teams – Process Definitions – Vendors and Consultants – Data Migration – Project management – Post Implementation Activities.

UNIT III   ERP IN ACTION & BUSINESS MODULES   9

Operation and Maintenance – Performance – Maximizing the ERP System – Business Modules – Finance – Manufacturing – Human Resources – Plant maintenance – Materials Management – Quality management – Marketing – Sales, Distribution and service.

UNIT IV   ERP MARKET   9

Marketplace – Dynamics – SAP AG – Oracle – PeopleSoft – JD Edwards – QAD Inc – SSA Global – Lawson Software – Epicor – Intuitive.

UNIT V   APPLICATIONS   9

Enterprise Application Integration – ERP and E-Business – ERP II – Total quality management – Future Directions – Trends in ERP- ERP Case Studies.

                                        L : 45   T: 0   P:0   Total: 45 PERIODS

TEXT BOOKS
 1   Alexis Leon, "Erp Demystified", Tata McGraw Hill, Second Edition, 2008.
REFERENCES
 1   Mary Sumner, "Enterprise Resource Planning", Pearson Education, 2007.
 2   Jim Mazzullo,"SAP R/3 for Everyone", Pearson, 2007.
 3   Jose Antonio Fernandz, "The SAP R /3 Handbook", Tata McGraw Hill, 1998.
 4   Ellen F. Monk, Bret J. Wangner, "Concepts in Enterprise Resource Planning", Thomson Learning, Fourth Edition 2012
 5   D.P.Goyal, "Enterprise Resource Planning, A Managerial Perspective", Tata McGraw Hill, 2011.
COURSE OUTCOMES
At the end of the course student should be able to:
CO1   Understand the concepts of Enterprise Resource Planning (ERP) applications in the needs of business for integrated information systems
CO2   Identify the essential characteristics and processes of ERP systems
CO3   Implement various ERP system strategies in real time
CO4   Apply modern software including SAP, Oracle ERP system to plan and manage resources in organizations
CO5   Develop working skills in planning and managing enterprise resources

16IT420	SOCIAL NETWORK ANALYSIS	L	T	P	C
		3	0	0	3

UNIT I   INTRODUCTION TO SOCIAL NETWORK ANALYSIS   9

Introduction to social Networks, Semantic webs - 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

UNIT II   MODELLING, AGGREGATING AND KNOWLEDGE   9
**   REPRESENTATION**

Ontology-based Knowledge Representation – Ontology languages for the Semantic Web – RDF and OWL **-** Modelling and aggregating social network data **-** State-of-the-art in network data representation, Ontological representation of social individuals, Ontological representation of social relationships, Aggregating and reasoning with social network data, Advanced Representations.

UNIT III   WEB CONTENT MINING AND LINKAGE MINING   9

Web search- Activities on Web Archiving- web crawling- Personalized Web Search- Latent Semantic Indexing- Automatic topic extraction from Web Documents- Opinion Search and Opinion Spam- Web Search and Hyperlink- Co-citation and Bibliographic Coupling- Page Rank and HITS Algorithms- Web Community Discovery

UNIT IV   WEB USAGE MINING   9

Modelling Web user Interests using Clustering – Probabilistic Latent Semantic Analysis Model- Constructing User Access Pattern and Identifying Latent Factor with PLSA – Co-Clustering analysis of weblogs using Bipartite Spectral Projection Approach

UNIT V   EXTRACTING AND ANALYZING WEB SOCIAL NETWORKS   9

Modeling Web User Interests using Clustering - Types of Changes - Evolution Metrics - Web Archives and Graphs - Evolution of Web Community Charts - Temporal Analysis on Semantic Graph using Three-Way Tensor Decomposition - Analysis of Communities and Their Evolutions in Dynamic Networks

L : 45   T: 0   P:0   Total: 45 PERIODS

TEXT BOOKS
 1   Peter Mika, "Social networks and the Semantic Web", Springer, 1st edition 2007.
 2   Guandong Xu , Yanchun Zhang and Lin Li, "Web Mining and Social Networking
     Techniques and applications", Springer, 1st edition, 2011.

REFERENCES
 1   Borko Furht, "Handbook of Social Network Technologies and Applications", Springer, 1st
     edition, 2010.
 2   Dion Goh and Schubert Foo, "Social information retrieval systems: emerging technologies and
     applications for searching the Web effectively", IGI Global snippet, 2008.
 3   Max Chevalier, Christine Julien and Chantal Soulé-Dupuy, "Collaborative and social information
     retrieval and access: techniques for improved user modelling", IGI Global snippet, 2009.
 4   John G. Breslin, Alexandre Passant and Stefan Decker, "The Social Semantic Web", Springer,
     2009.

COURSE OUTCOMES
At the end of the course student should be able to:
CO1   Analyze the development of social networks
CO2   Become Master in modelling, aggregating and knowledge representation of Semantic Web
CO3   Evaluate the concepts of web content mining and linkage mining.
CO4   Know about the usage of web mining in industry standards
CO5   Understand the concepts of Extracting and Analyzing Web Social Networks

16IT421	NETWORK PROCESSORS	L	T	P	C
		3	0	0	3

UNIT I   ROUTING IN IP NETWORKS   9

Static Routes – Dynamic Routes – RIP v1, RIP v2 – IGRP – EIGRP – SPF – Integrated IS-IS – IP Traffic engineering – Traffic Stochasticity – Delay and Utilization – Application view – Architecture Framework – EGP – BGP routing

UNIT II   ROUTER ARCHITECTURE   9

Function of Router – Types – Elements – Packet Flow – Packet Processing – Algorithms and Data Structures – Packet Processing Functions – Bridge Algorithm – Table Lookup and Hashing - Protocol Software – Threads – Interrupts – Hardware Architectures for Protocol Processing – Classification and Forwarding – Switching Fabrics

UNIT III   NETWORK PROCESSORS   9

Scalability with Parallelism and Pipelining – Complexity of Network Processor Design – Packet processing – Ingress and egress processing – Macroscopic Data Pipelining and Heterogeneity – Network Processor Architectures architectural variety - Primary architectural characteristics – Packet Flow - Clock Rates - software architecture - Assigning Functionality to the Processor Hierarchy

UNIT IV   NP ARCHITECTURE   9

Issues in scaling a Network Processor – Processing hierarchy and scaling – examples of commercial Network Processors - Multi-Chip Pipeline - Augmented RISC Processor- Embedded Processor Plus Coprocessors - Design Tradeoffs and consequences – Programmability Vs Processing Speed – Speed Vs Functionality

UNIT V   CASE STUDY – NP ARCHITECTURE AND PROGRAMMING   9

Intel NP – Multithreaded Architecture Overview – Basic Features - External Connections - Internal components – Embedded RISC processor – Instruction set - Internal peripheral unit - User and Kernel Mode Operation – Packet Processor Hardware – Microsequencing - Instruction set – Memory interfaces – System and control interface components – Bus interface – Software Development Kit – IXP instruction set – MicroEngine Programming – Thread synchronization – Developing sample applications - Packet Tracer - GNS3

L : 45   T: 0   P:0   Total: 45 PERIODS

TEXT BOOKS
1 Deepankar Medhi, Karthikeyan Ramasamy, "Network Routing: Algorithms, Protocols, and Architecture"
2 Douglas E. Comer, "Network System Design using Network Processors" Prentice Hall, 2006.

REFERENCES
1 Patrick Crowley, M A Franklin, H Hadimioglu, PZ Onufryk, "Network Processor Design, Issues and Practices Vol – I", Morgan Kauffman, 2002.
2 M. Adiletta, M. Rosenbluth, D. Bernstein, G. Wolrich, and H. Wilkinson, "The next generation of Intel IXP network processors," Intel technology journal, vol. 6, no. 3, p. 6–18, 2002.

COURSE OUTCOMES
At the end of the course student should be able to:
CO1 Apply routing algorithms for a given network
CO2 Implement the various packet processing algorithms
CO3 Apply the Ingress and Egress processing for given network scenario
CO4 Analyze the various issues in network processor architecture
CO5 Develop simple applications using Network Processors

16CS321	C# AND .NET FRAMEWORK	L	T	P	C
		3	0	0	3

UNIT I   INTRODUCTION   9

Review of OOP Concepts – Overview of .NET Framework – Basic Elements of C# – Program Structure and simple Input and Output Operations – Operators and Expressions – Statements – Arrays and Structures.

UNIT II   CLASSES AND INHERITANCE   9

Inheritance – Namespace – Polymorphism – Interface and Overloading – Multiple Inheritance – Property – Indexes – Delegates – Publish/Subscribe Design Patterns- Operator Overloading – Method Overloading.

UNIT III   FILE OPERATIONS   9

C# Concepts for creating Data Structures – File Operation – File Management systems – Stream Oriented Operations – Multitasking – Multithreading – Thread Operation –Synchronization.

UNIT IV   XML & ADO .NET   9

Working with XML – Techniques for Reading and Writing XML Data – Using XPath and
Search XML – 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 SERVICES   9

Application Domains – Remoting – Leasing and Sponsorship –.NET Coding Design Guidelines – Assemblies – Security – Application Development – Web Services – Building an XML Web Service – Web Service Client – WSDL and SOAP – Web Service with Complex Data Types – Web Service Performance.

L : 45   T: 0   P: 0   Total: 45 PERIODS

TEXT BOOKS
1   S. Thamarai Selvi and R. Murugesan "A Textbook on C#", First Edition, Pearson Education, (2003).
2.   Stephen C. Perry "Core C# and .NET", First Edition, Pearson Education,(2006).

REFERENCES
1   Jesse Liberty, "Programming C#", Second Edition, O'Reilly, (2002).
2   Robinson et al, "Professional C#", Fifth Edition, Wrox Press, (2002).
3   Herbert Schildt, "The Complete Reference: C#", First Edition, Tata McGraw Hill, (2004).
4   Andrew Troelsen, "C# and the .NET Platform", First Edition, O'Reilly,(2003).
5   Thuan Thai and Hoang Q. Lam, ".NET Framework Essentials", Second Edition, O'Reilly, (2002).

COURSE OUTCOMES
At the end of the course student should be able to:

CO1   Understand the basics of .NET Framework and C# language

CO2   Learn the various basic elements of C# and applying in OOPS concepts , interface and inheritance concepts

CO3   Illustrate the concepts of namespace, polymorphism, file operation, multi threading and thread operation and synchronization in C#

CO4   Apply window application programming and create a window/Web applications using ASP.NET
CO5   Know the concepts of XML with web services as WSDL and SOAP

16GE304   **PRINCIPLES OF MANAGEMENT**   **L   T   P   C**
          (Common to all B.E. / B. Tech. Courses)   **3   0   0   3**

UNIT I   INTRODUCTION TO MANAGEMENT   9

Management: Definition - Evolution of Management Studies –Nature, Functions, Levels and role of management - Basic Principles and Process of Management - Management vs. Administration – Taylor & Fayol's contribution to Management - Role of Managers.

UNIT II   PLANNING   9

Planning: Basic types of planning – Characteristics of a good plan- Features - Planning process- Obstacles in planning - MBO, Policy - Policy formulation - Types of policies - Forecasting, Process, Importance – Decision making process.

UNIT III   ORGANISING   9

Organization: Need - forms of organization - features of a good organization. Departmentation –- manuals - span of management, factors affecting span of management – delegation of authority and responsibility - centralization and decentralization.

UNIT IV   STAFFING & DIRECTING   9

Staffing: Meaning, Nature, Need, and Process. Directing - Characteristics, Importance and Techniques of directing. Event & Time Management - Scope, Importance - Coordination - Need for coordination.

UNIT V   CONTROLING   9

Concept of Control – Importance of control- Essentials of control system - Process of control – Communication - Process of Communication - Types - Barriers - Management Information Systems.

                    L:45   T:0   P: 0   Total: 45 PERIODS

TEXT BOOKS
 1   Harold Koontz, and Weihrich, 'Essential of Management' 8th Edition, Tata Mc Graw Hill Education, Delhi, (2010) .
 2.   Tripathy.P.C and Reddy.P.N., 'Higher Principles of Management' Tata Mc-Graw Hill Publishing Company limited, New Delhi (2011).

REFERENCES
 1   Stephen.P.Robbins, Mary coulter, NeharikaVohra 'Management', 10th Edition, Tata Mc-Graw Hill Publishing   Company limited, New Delhi (2010).
 2   Glyn James, 'Advanced Modern Engineering Mathematics', Third edition-Pearson Education (2011).
 3   VSP Rao, V.Hari Krishna, 'Management, Excel Books (2010).
 4   Dr.Kumkum Mukherjee, 'Principles of Management, 2nd Edition, Tata Mc Graw Hill, (2009).

COURSE OUTCOMES

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

CO1   Discuss and communicate the management evolution and how it will affect future managers.

CO2   Explain how organizations adapt to an uncertain environment and identify techniques managers use to influence and control the internal environment.

CO3   Practice the process of management's four functions: planning, organizing, leading, and controlling.

CO4   Use appropriate methods of communication in the Business Environment.

CO5   Gather and analyze both qualitative and quantitative information to isolate issues and formulate best control methods.

| 16GE306 | HRM AND ENTREPRENEURSHIP | L | T | P | C |
| | (Common to all B.E. / B. Tech. Courses) | 3 | 0 | 0 | 3 |

UNIT I   INTRODUCTION TO HRM AND FRAMEWORK   9

Nature of HRM, Scope of HRM, Functions and objectives, HRM: policies and Practices, Role of HRM in changing business environment.

**UNIT II   JOB ANALYSIS AND DESIGN & HUMAN RESOURCE   9
             PLANNING**

Job Analysis: Introduction, Importance of Job analysis, The need for man power planning, Objectives, importance, benefits, process of HRP.

UNIT III   RECRUITMENT, SELECTION AND TRAINING   9

Recruitment - Selection – Induction - Types of training methods - Purpose – benefits – resistance - Types of training methods - Purpose – Benefits - Resistance.

UNIT IV   ENTREPRENEURSHIP ENVIRONMENT   9

Evaluation of the concept of Entrepreneur - Role of entrepreneurship - Knowledge and skills of entrepreneur - Need for EDP

UNIT V   ENTREPRENEURSHIP DEVELOPMENT PROGRAMME   9

Criteria for selection of a product - Matching Entrepreneur with the project - Report preparation and evaluation criteria.

                                    L : 45   T:0   P: 0   Total: 45 PERIODS

TEXT BOOKS
 1   K. Aswathappa, 'Human Resource Management: Text and Cases', 7th Edition, (2013).
 2.   S.S. Kanka, Entrepreneurial Development, S.Chand & Company, First Edition, 1999.
 3   Mamoria C.B. and Mamoria S. 'Personnel Management', 1st Edition, Himalaya Publishers.

REFERENCES
 1   V S P Rao, 'Human Resource Management', 3rd Edition, Excel Books, New Delhi, (2010).
 2   Dessler, 'Human Resource Management', 12th Edition, Pearson India, (2011).
 3   David A. Decenzo, 'Human Resource Management', WILEY India PVT. Ltd, New Delhi.
 4   David H.Holt, Asoke K. Ghosh, Porentice New Venture Creation, Sixth Edition, 2002.
 5   R.K.Singal, Entrepreneurship Development and Management, Published by S.K KATARIA ,Darya Ganj, New Delhi, 2009.

COURSE OUTCOMES
At the end of the course student should be able to:

CO1   Develop the knowledge, skills and concepts needed to resolve actual human resource management problems or issues.

CO2   Manage the employment relationship, which is a shared responsibility between employers, management, human resources specialists, and employees.

CO3   Investigate how HRM is responding to current business trends, opportunities, and challenges.

CO4   Develop the knowledge, skills and concepts of Entrepreneurship.

CO5   Evaluate the procedures and practices used for setting up an enterprise.

16ITOE1	GREEN COMPUTING	L	T	P	C
		3	0	0	3

UNIT I   INTRODUCTION   9

Environmental Impacts of IT - Holistic Approach to Greening IT - Green IT Standards and Eco-Labelling - Enterprise Green IT Strategy - Green IT: Burden or Opportunity?

UNIT II   DATA CENTERS   9

Data Centers and Associated Energy Challenges - Data Centre IT Infrastructure - Data Centre Facility Infrastructure: Implications for Energy Efficiency - IT Infrastructure Management - Green Data Centre Metrics

UNIT III   DATA STORAGE AND COMMUNICATION   9

Storage Media Power Characteristics - Energy Management Techniques for Hard Disks – System - Level Energy Management - Objectives of Green Network Protocols - Green Network Protocols and Standards

UNIT IV   INFORMATION SYSTEMS, GREEN IT STRATEGY AND   9
**   METRICS**

Approaching Green IT Strategies - Business Drivers of Green IT Strategy - Business Dimensions for Green IT Transformation - Multilevel Sustainable Information - Sustainability Hierarchy Models - Product Level Information - Individual Level Information - Functional Level Information - Organizational Level Information - Regional/City Level Information - Measuring the Maturity of Sustainable ICT

UNIT V   GREEN IT SERVICES AND ROLES   9

Factors Driving the Development of Sustainable IT - Sustainable IT Services (SITS) - SITS Strategic Framework - Sustainable IT Roadmap - Organizational and Enterprise Greening - Information Systems in Greening Enterprises - Greening the Enterprise: IT Usage and Hardware - Inter-organizational Enterprise Activities and Green Issues - Enablers and Making the Case for IT and the Green Enterprise

L : 45   T: 0   P:0   Total: 45 PERIODS

TEXT BOOKS
 1   San Murugesan, G. R. Gangadharan, "Harnessing Green IT Principles and Practices", WILEY, 1st Edition, 2013 (Unit I, II, III, IV, V)
 2   Chong-Min Kyung, Sungioo yoo, "Energy Aware system design Algorithms and Architecture", Springer, 2011

REFERENCES
 1   Bob steiger wald ,Chris:Luero, "Energy Aware computing", Intel Press,2012
 2   Chapman & Hall, "The Green Computing Book: Tackling Energy Efficiency at Large Scale", CRC Press,1st Edition, 2014
 3   Bud E.Smith, "Green Computing Tools and Techniques for Saving Energy, Money and Resources", CRC Press, 2014

COURSE OUTCOMES
At the end of the course student should be able to:
CO1   Outline the Green IT and its Opportunities
CO2   Analyze Data center role in Green IT
CO3   Outline Green Network and Communication
CO4   Describe Green IT Strategies and its metrics
CO5   Analyze Role of Green IT

16ITOE2   **ETHICS IN COMPUTING**   **L   T   P   C**

                                                             3   0   0   3

UNIT I   INTRODUCTION TO ETHICS   9

Ethics in Business World - Ethics in Information Technology - Ethics for IT Workers and IT users- Computer and Internet Crime - Information Technology Security Incidents - Implementing Trustworthy Computing

UNIT II   PRIVACY   9

Privacy Protection and the Law - Key Privacy and Anonymity issues - Identity Theft - Electronic Discovery - Consumer Profiling - Treating Consumer Data Responsibility - Workplace Monitoring - Advanced Surveillance Technology-Freedom of Expression-First Amendment rights-Freedom of Expression Key issues

UNIT III   INTELLECTUAL PROPERTY   9

Definition-Copyrights-Copyright Term-Eligible works-Software copyright protection-PRO-IP-GATT-WTO and WTO TRIPS Agreement-WIPO-Digital Millennium Copyright-patents-Software Patents-Cross Licensing Agreements-Trade Secrets-Key Intellectual Property Issues – Plagiarism - Reverse Engineering - Open Source Code - Competitive Intelligence - Trademark Infringement - Cyber Squatting

UNIT IV   SOFTWARE DEVELOPMENT   9

Strategies for engineering Quality Software-Software Product Liability-Key issues in software development-Impact of IT on productivity and quality of life-Social Networking-Business Application-Ethical Issues-Online Virtual worlds

UNIT V   ETHICS OF IT ORGANIZATIONS   9

Key Ethical Issues for Organizations-Contingent Workers-H-1B Workers-Application Process-outsourcing-offshore outsourcing-pros and cons-strategies-Whistle Blowing-Protection for whistle blowers and Private sector Workers-Green Computing

L : 45   T: 0   P:0   Total: 45 PERIODS

TEXT BOOKS

1   George Reynolds, "Ethics in Information Technology", Cengage Learning, Fourth edition, 2014

REFERENCES

1   Michael J. Quinn ,"Ethics for the Information Age", Pearson Education, Fifth Edition, 2012
2   Deborah G.Johnson ,"Computer Ethics", Pearson Education, Fourth Edition , 2009
3   Kallman, E.A. & Grillo, J.P, "Ethical Decision Making and Information Technology", McGraw-Hill, Second edition, 2006
4   Lee, Wanbil W., "Information Security Management: Semi-intelligent Risk-analytic Audit", Verlag Dr Müller, 2010

COURSE OUTCOMES

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

CO1   Identify the ethical issues in information technology
CO2   Apply privacy related laws and regulation to enlighten the legal constraints
CO3   Learn the legalities to avoid plagiarism and intellectual property related crimes
CO4   Apply the code of ethics for software development
CO5   Exhibit ethics while working as teams in IT organizations

16ITOE3	**MANAGEMENT INFORMATION SYSTEMS**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

UNIT I   INFORMATION SYSTEM AND ORGANIZATION   9

Management Information Systems- Roles of information systems in Business – Perspectives on Information Systems - Contemporary Approaches to Information Systems – Business Processes and Information Systems – Types of Information Systems - Organization and Information Systems – Use of Information to achieve competitive advantage.

UNIT II   INFORMATION AND KNOWLEDGE   9

Information: Concepts - Classification of information-Methods of Data and Information Collection-Value of Information-General Model of a Human as an Information Processor-. Information concepts and their implications – Business Intelligence – MIS, Information and Knowledge..

UNIT III   DECISION SUPPORT SYSTEMS AND KNOWLEDGE   9
**   MANAGEMENT**

Decision Making- Decision Making Concepts – Process - Models of Decision Making – MIS and Decision Making. Decision Support Systems -Group Decision Support Systems – DSS Applications in E-enterprise- Knowledge management and Knowledge Management Systems-KBES-MIS and the benefits of DSS..

UNIT IV   ETHICS, SOCIAL ISSUES AND SECURITY IN INFORMATION   9
**   SYSTEMS**

Ethical and Social Issues related to systems – Ethics in an Information Society – The Moral Dimensions of Information Systems. Securing Information Systems: System vulnerability and Abuse –Business value of Security and Control - Technologies and Tools for protecting Information Systems.

UNIT V   APPLICATIONS OF MIS TO E-BUSINESS   9

Applications in Manufacturing Sector - Production Management – Marketing Management –Personnel Management- Financial Management. Applications in service sector - Service Management System.

L : 45   T: 0   P:0   Total: 45 PERIODS

TEXT BOOKS
1   Ken Laudon, Jane Laudon and Rajanish Dass, "Management Information Systems",Pearson, 11th Edition, 2011
2   Waman S.Jawadekar ,"Management Information Systems", Tata McGraw Hill, 4th Edition,2010.

REFERENCES
1   R. Kelly Rainer, Hugh J. Watson and Brad Prince, "Management Information Systems",   John Wiley & Sons, 2nd Edition, 2012
2   William E. Perry, "Effective Methods for Software Testing", 2nd Edition, Wiley India, 2007
3   Robert G. Murdock, Joel. E. Ross, and James R. Clugett, "Information System for Modern Management", Prentice Hall of India, 2nd Edition, 2010
4   O'Brien James and George Marakas, "A Management Information Systems", Tata McGraw Hill, 10th Edition, 2010.
5   Efraim Turban and Jay E.Aronson, "Decision Support Systems and Intelligent Systems", Prentice Hall of India, 6th Edition, 2000

COURSE OUTCOMES

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

CO1   Summarize the process of developing and implementing information Systems
CO2   Analyze how various information systems work together to accomplish the information objectives of an organization
CO3   Design, maintain and protect an information system
CO4   Design and conduct a software test process for a software testing project
CO5   Understand the role of information systems in organizations

16ITOE4	BASICS OF INTERNET OF THINGS	L	T	P	C
		3	0	0	3

UNIT I   **INTRODUCTION TO IOT**   **9**

Defining IoT, Characteristics of IoT, Physical design of IoT, Logical design of IoT, Functional blocks of IoT, Communication models &APIs

UNIT II   **INFORMATION AND KNOWLEDGE**   **9**

Machine to Machine, Difference between IoT and M2M, Software defined Network

UNIT III   **IOT DESIGN METHODOLOGY**   **9**

IoT systems management – IoT Design Methodology – Specifications Integration and Application Development

UNIT IV   **CHALLENGES AND DOMAIN SPECIFIC APPLICATIONS**   **9**

Design challenges, Development challenges, Security challenges,Other challenges, Home automation, Industry applications, Surveillance applications, Other IoT applications

UNIT V   **BUILDING IOT WITH GALILEO/ARDUINO**   **9**

Intel Galileo Gen2 with Arduino- Interfaces - Arduino IDE – Programming - APIs and Hacks

L : 45   T: 0   P:0   Total: 45 PERIODS

TEXT BOOKS

1. Arshdeep Bahga, Vijay Madisetti, "Internet of Things – A hands-on approach", Universities Press, 2015
2. Manoel Carlos Ramon, "Intel® Galileo and Intel® Galileo Gen 2: API Features and Arduino Projects for Linux Programmers", Apress, 2014

REFERENCES

1. Adrian McEwen , Hakim Cassimally, "Designing the Internet of Things", Wiley publication, 1st Edition, November 2013

2. Olivier Hersent, David Boswarthick, Omar Elloumi, "The Internet of Things: Key Applications and Protocols", Wiley, 2013
3. Dieter Uckelmann, Mark Harrison, Florian Michahelles, "Architecting the Internet of Things", Springer, 2011
4. Internet of Things: Converging Technologies for Smart Environments and Integrated Ecosystems, Dr. Ovidiu Vermesan, Dr. Peter Friess, River Publishers,2013
5. Marco Schwartz, "Internet of Things with the Arduino Yun", Packt Publishing, 2014

COURSE OUTCOMES

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

CO1   Understand the concepts of Internet of Things
CO2   Analyze basics of M2M communication
CO3   Design a portable architecture for IoT.
CO4   Design IoT applications in different domain and be able to analyze their performance
CO5   Implement basic IoT applications on embedded platform

16ITOE5	PROGRAMMING IN C++ AND JAVA	L	T	P	C
		3	0	0	3

UNIT I   INTRODUCTION TO C++   9

Basics of C++ - Abstractions and Mechanisms – Containers and Algorithms – Concurrency and Utilities

UNIT II   POINTERS AND ARRAYS IN C++   9

Types and Declarations – Pointers, Arrays – Structures, Unions and Enumerations – Statements - Expressions

UNIT III   INTRODUCTION TO JAVA   9

C++ Vs JAVA - JAVA virtual machine - JAVA program structure – Tokens – Statements - Constant & Variables, Data Types, Declaration of Variables, Scope of Variables, Symbolic Constants, Type Casting. Operators: Arithmetic, Relational, Logical Assignments, Increment and Decrement, Conditional, Bitwise, Special, Expressions & its evaluation- If statement, if…else… statement, Nesting of if…else… statements, else…if Ladder, Switch, ? operators, Loops – While, Do, For, Jumps in Loops, Labelled Loops

UNIT IV   CLASSES   9

 Defining a Class, Adding Variables and Methods, Creating Objects, Accessing Class Members, Constructors, Methods Overloading, Static Members, Nesting of Methods

UNIT V   INHERITANCE   9

Inheritance: Extending a Class, Overriding Methods, Final Variables and Methods, Final Classes, Finalize Methods, Abstract methods and Classes, Visibility Control

L : 45   T: 0   P:0   Total: 45 PERIODS

TEXT BOOKS
  1   Bjarne Stroustrup, "The C++ Programming Language", Fourth Edition, Pearson Education, 2013
  2   E.Balaguruswamy, "Programming In Java", 2nd Edition, TMH Publications ISBN

REFERENCES
  1   Balagurusamy.E, "Object Oriented Programming with C++", Fourth Edition, Tata Mcgraw-Hill., 2008.
  2   Stanley B.Lippman, Jove Lajoie, "C++ Primer", Fourth Edition, Pearson Education, Asia, 2007.
  3   Ashok N Kamthane, "Object-Oriented Programming with ANSI and Turbo C++", First Edition, Pearson Education, 2003
  4   Peter Norton, "Peter Norton Guide To Java Programming", Techmedia Publications.

COURSE OUTCOMES
At the end of the course student should be able to:
  CO1   Implement features of object oriented programming to solve real world problems
  CO2   Develop applications using Object Oriented Programming Concepts
  CO3   Write object-oriented programs of moderate complexity in C++
  CO4   Gain knowledge about basic Java language syntax and semantics
  CO5   Write Java programs and use concepts such as variables, conditional and iterative execution methods

16ITOE6   **FUNDAMENTALS OF OPERATING SYSTEMS**   L   T   P   C

                                                                    3   0   0   3

UNIT I   INTRODUCTION AND PROCESS SCHEDULING   9

Operating System – Process concept – Process scheduling – Operations on processes – Cooperating processes – Inter process communication – Threads: Multi-threading Models – Threading issues. CPU Scheduling: Scheduling criteria – Scheduling algorithms – Multiple-processor scheduling – Real time scheduling

UNIT II   PROCESS SYNCHRONIZATION AND DEADLOCK   9

Process Synchronization: The critical-section problem – Synchronization hardware – Semaphores – Classic problems of synchronization. Deadlock: System model – Deadlock characterization – Methods for handling deadlocks – Deadlock prevention – Deadlock avoidance – Deadlock detection – Recovery from deadlock.

UNIT III   STORAGE MANAGEMENT AND FILE SYSTEMS   9

Memory Management: Background – Swapping – Contiguous memory allocation – Paging – Segmentation. Virtual Memory: Background – Demand paging – Page replacement –Thrashing. File concept – Access methods – Directory structure – File Sharing – Protection. File System Implementation: Directory implementation – Allocation methods – Free-space management.

UNIT IV   I/O SYSTEMS AND CASE STUDIES   9

I/O Systems – I/O Hardware – Application I/O interface –Mass-Storage Structure: Disk scheduling – Disk management – Swap-space management – RAID – disk attachment – stable storage – tertiary storage.

Windows XP : Design Principles, System Components, File System, Networking

The Linux System : Design Principles, Kernel Modules, Process Management, Scheduling, Memory Management

UNIT V   ANDROID   9

Android Overview – Android Versions – Installing the Android SDK – Hello World – The Emulator – Android User Interface – Preferences – File System – Options Menu – Intents – Services – The Database – The Android Interface Definition Language

                            L : 45   T: 0   P:0   Total: 45 PERIODS

TEXT BOOKS
 1   Silberschatz, Galvin, and Gagne, "Operating System Concepts", Ninth Edition, Wiley India Pvt Ltd, 2013.
 2   Marko Gargenta, "Learning Android", First Edition, O'Reilly Publications, 2011

REFERENCES
 1   Andrew S. Tanenbaum, "Modern Operating Systems", Fourth Edition, Pearson Education, 2010.
 2   Gary Nutt, "Operating Systems", Third Edition, Pearson Education, 2004.

COURSE OUTCOMES

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

CO1   Describe the basic concepts of operating systems, process management and synchronization
CO2   Identify the services provided by operating systems and understand the internal structure of an operating system
CO3   Possess the skills of system programming, infer the OS problems and identify the ways to resolve them.
CO4   Analyze the mobile operating system concepts and services
CO5   Develop mobile operating based applications

16ITOE7   **PRINCIPLES OF MULTIMEDIA**   **L   T   P   C**

                                                                    3   0   0   3

UNIT I   MULTIMEDIA SYSTEM DESIGN: AN INTRODUCTION   9

Multimedia Elements, Multimedia Applications, Multimedia System Architecture, Evolving Technologies for Multimedia Systems, Multimedia Data interface standards, Need for Data Compression, Multimedia Databases.

UNIT II   COMPRESSION AND DECOMPRESSION TECHNIQUES   9

Types of Compression, Binary Image Compression Schemes, Color, gray scale, still-video image compression, Discrete Cosine Transform, Video Image compression, MPEG Coding methodology, Audio Compression, Data and File format standards- RTF, TIFF,RIFF, MIDI, JPEG, AVI, JPEG,TWAIN Architecture.

UNIT III   MULTIMEDIA INPUT AND OUTPUT TECHNOLOGIES   9

Key Technology Issues, Pen Input, Video and Image Display Systems, Print Output Technologies, Image Scanners, Digital Voice and Audio, Digital Camera, Video Images and Animation, Full Motion Video.

UNIT IV   STORAGE AND RETRIEVAL TECHNOLOGIES   9

Magnetic Media Technology, RAID-Level-0 To 5, Optical Media, WORM optical drives, Hierarchical Storage Management, Cache Management for storage systems.

UNIT V   MULTIMEDIA APPLICATION DESIGN   9

Types of Multimedia systems - Virtual Reality Design - Components of Multimedia system - Distributed Application Design Issues – Multimedia Authoring and User Interface - Hypermedia Messaging – Distributed Multimedia Systems

                              L : 45   T: 0   P:0   Total: 45 PERIODS

TEXT BOOKS
 1   Prabhat K Andleigh & Kiran Thakrar, "Multimedia Systems and Design", PHI, 2003
 2   Marko Gargenta, "Learning Android", First Edition, O'Reilly Publications, 2011

REFERENCES
 1   Andleigh PK and Thakrar K, "Multimedia Systems", Addison Wesley, Longman, 2003
 2   Fred Halsall, "Multimedia Communications", Addison Wesley, 2000
 3   Ralf Steinmetz, Klara Nahrstedt, "Multimedia, computing, communications and applications", Prentice Hall,1995
 4   Tay Vaughan, "Multimedia making It work", TMH 5th Edition 2001
 5   Weixel, Fulton, Barksdale.Morse, "Multimedia Basics", Easwar Press, 2004

COURSE OUTCOMES
At the end of the course student should be able to:
CO1   Gain basic knowledge about Multimedia and its Components.
CO2   Apply various compression and decompression techniques for images, audio and video over real time.
CO3   Recognize various Multimedia Input and Output Technologies available.
CO4   Identify and Investigate different types of Storage and Retrieval Technologies in the field of Multimedia.
CO5   Familiarize on various real time applications of multimedia.

ONE CREDIT COURSES

16ITOC1   **IOT USING RASPBERRY PI**

1.   Interfacing sensor (Analog & Digital) with MCUs

2.   Interfacing switches and LEDs with MCUs

3.   Interfacing sensors and other peripherals using SPI and I2C communication protocols

4.   Installation of Numpy, Panda, IoT analytics and many other python packages

5.   Installation and Working with Ipython notebooks

6.   Learning python fundamentals and programming

7.   Running python on Raspberry Pi, GPIO programming

8.   Setting up wireless (bluetooth) link between systems

9.   Configuring bluetooth module by using AT commands

10.   Configuring and uploading data on cloud using WiFi ESP8266 module using AT commands

11.   Programming ESP8266 module using LUA and Micropython to access/upload data on cloud

12.   Setting up HTTP server and testing HTTP methods on local host and with cloud

13.   Setting up MQTT server and testing publish & subscribe methods

14.   Understanding TCP/IP protocol and pushing and pulling data from cloud using Restful APIs.

15.   Understanding differences between TCP and UDP protocols practically

16.   Setting up a private cloud/server on Raspberry Pi

In Collaboration with **Easy Design Solutions**

Total: 15 PERIODS

TEXT BOOKS
1   Singh R," Internet Of Things With Raspberry Pi And Arduino" 2020 Edition by Singh R, Taylor & Francis Ltd

REFERENCES
1   Gary Smart," Practical Python Programming for IoT: Build advanced IoT projects using a Raspberry Pi 4, MQTT, RESTful APIs, WebSockets, and Python 3

COURSE OUTCOMES
At the end of the course student should be able to:
 CO1   Install Numpy, Panda, IoT analytics and many other python packages

 CO2   Program ESP8266 module using LUA and Micropython to access/upload data on cloud

16ITOC2   **BIGDATA ANALYTICS USING SPARK ENGINE**

1.   Introduction to Bigdata

2.   HDFS and YARN

3.   MapReduce and SCOOP

4.   Basic of Hive and Impala

5.   Working Hive and Impala

6.   Types of Data formats

7.   Advances Hive Concepts & Data file partitioning

8.   Apache Flume & HBase

9.   Pig

10.   Basic of Apache Spark

11.   RDDs in Spark

12.   Implementation of Spark Applications

13.   Spark Parallel Processes

14.   Spark RDD optimization Techniques

15.   Spark Algorithms

16.   Spark SQL

In Collaboration with **Easy Design Solutions & Infence Technologies**

                                                                  Total: 15 PERIODS

TEXT BOOKS
 1   Mohammed Guller," Big Data Analytics with Spark A Practitioners Guide to Using Spark for
       Large Scale Data Analysis "2015 Edition by Mohammed Guller , Apress
REFERENCES
 1   Nataraj Dasgupta "Practical Big Data Analytics hands on techniques to implement enterprise
       analytics and machine learning using Hadoop,Spark,NoSQL and R
COURSE OUTCOMES
At the end of the course student should be able to:
 CO1   Create a database using HIVE and Hbase
 CO2   Create a database using Spark

16ITOC3 **OBJECT ORIENTED PROGRAMMING USING PYTHON**

1. Introduction to python

2. gitHub, Functions, Booleans and Modules

3. Sequences, Iteration and String Formatting

4. Conditions and control flow

5. Dictionaries, Sets, and Files

6. Exceptions, Testing, Comprehensions

7. Functions, list of functions

8. Python Standard Library

9. Object Oriented Programming

10. File Handling

11. Classes, More OO -- Properties, Special methods

12. Third Party Tools

13. Advance Concepts

In Collaboration with **Propulsion Technologies**

Total: 15 PERIODS

TEXT BOOKS
 1   Dusty Phillips," Python 3 Object-Oriented Programming" - Third Edition: Build robust and maintainable software with object-oriented design patterns in Python 3.8, 3rd Edition
REFERENCES
 1   Mark Lutz," Programming Python: Powerful Object-Oriented Programming" (Covers Python 3.X), 4th Edition,O'Reilly
COURSE OUTCOMES
At the end of the course student should be able to:
 CO1   Write the program using gitHub, Functions, Booleans and Modules,Sequences, Iteration and String Formatting,Conditions and control flow

 CO2   Demonstrate file handling concepts and third party tools