ANNA UNIVERSITY, CHENNAI

UNIVERSITY DEPARTMENTS

M. Sc. INFORMATION TECHNOLOGY (5 YEARS INTEGRATED)

REGULATIONS – 2015

CHOICE BASED CREDIT SYSTEM

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs) :

Design of a 5-yr curriculum in IT targeting the 10+2 qualified students so as to bring up them as research scientists and high-tech technology solution providers. The objective is to develop a critical understanding about the diverse domains of studies, their analytical base and philosophy etc. Employ a content management system to develop a knowledge repository to be used for the on-line examinations and evaluations etc.

PROGRAMME OUTCOMES (POs):

The programme is specifically designed for targeting the Research and Development, Teaching and Software developing in the field of Information Technology. This programme is designed in such a way that it can mould candidates to get their job in IT Computers and other sectors. This programme aims at developing the software professionals to keep abreast of the most recent development in the field of Information Technology for the requirements of the dynamic and highly global environment of the present era. The curriculum based on enriching and sharpening software developing skills in the field of Information Technology.

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CURRICULA AND SYLLABI

SEMESTER - I

S.No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	HS7152	Communicative English	FC	3	3	0	0	3
2.	MA7158	Mathematics – I	FC	4	4	0	0	4
3.	PH7152	Applied Physics	FC	4	4	0	0	4
4.	CY7152	Chemistry of Materials	FC	4	4	0	0	4
5.	XC7151	Fundamentals of Computing	PC	4	4	0	0	4
PRACTICAL								
6.	HS7161	Communication Skills Laboratory (Language)	FC	4	0	0	4	2
7.	XC7161	Computing Laboratory	PC	4	0	0	4	2
			TOTAL	**27**	**19**	**0**	**8**	**23**

SEMESTER - II

S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	HS7252	Technical Communication	FC	3	3	0	0	3
2.	MA7252	Discrete Mathematics	PC	4	4	0	0	4
3.	MA7253	Mathematics – II	FC	4	4	0	0	4
4.	XC7251	Digital Systems	PC	3	3	0	0	3
5.	XC7252	Programming in C	PC	3	3	0	0	3
PRACTICAL								
6.	XC7261	Digital Systems Laboratory	PC	4	0	0	4	2
7.	XC7262	Programming in C Laboratory	PC	4	0	0	4	2
			TOTAL	**25**	**17**	**0**	**8**	**21**

SEMESTER – III

S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	MA7351	Mathematics - III	FC	4	4	0	0	4
2.	XC7351	Data Structures	PC	3	3	0	0	3
3.	XC7352	Database Management Systems	PC	3	3	0	0	3
4.	XC7353	Microprocessors and Applications	PC	5	3	0	2	4
5.	XC7354	Object Oriented Programming in C++	PC	3	3	0	0	3
PRACTICAL								
6.	XC7361	Data Structures Laboratory	PC	4	0	0	4	2
7.	XC7362	Database Management Systems Laboratory	PC	4	0	0	4	2
8.	XC7363	Object Oriented Programming Laboratory	PC	4	0	0	4	2
			TOTAL	**30**	**16**	**0**	**14**	**23**

SEMESTER - IV

S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	XC7451	Combinatorics and Graph Theory	PC	4	4	0	0	4
2.	XC7452	Computer Architecture	PC	3	3	0	0	3
3.	XC7453	Java and Internet Programming	PC	3	3	0	0	3
4.	XC7454	Operating Systems	PC	3	3	0	0	3
5.	XC7455	Theory of Computation	PC	4	4	0	0	4
PRACTICAL								
6.	XC7461	Java and Internet Programming Laboratory	PC	4	0	0	4	2
7.	XC7462	Operating Systems Laboratory	PC	4	0	0	4	2
8.	XT7411	XML and Web Services Laboratory	PC	4	0	0	4	2
			TOTAL	**29**	**17**	**0**	**12**	**23**

SEMESTER - V

S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	MA7551	Applied Statistics	PC	4	4	0	0	4
2.	XC7551	Computer Networks	PC	3	3	0	0	3
3.	XC7552	Design and Analysis of Algorithms	PC	4	4	0	0	4
4.	XC7553	Software Engineering	PC	3	3	0	0	3
5.	XT7551	Data Mining and warehousing	PC	3	3	0	0	3
6.		Elective - I	PE	3	3	0	0	3
PRACTICAL								
7.	XT7561	Data Mining and Warehousing Laboratory	PC	4	0	0	4	2
8.	XT7562	GUI Applications Laboratory	PC	4	0	0	4	2
			TOTAL	**28**	**20**	**0**	**8**	**24**

SEMESTER - VI

S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	MA7651	Probability, Queuing Theory and Reliability	PC	4	4	0	0	4
2.	XC7651	Computer Graphics and Multimedia	PC	3	3	0	0	3
3.	XC7652	Object Oriented Analysis and Design	PC	3	3	0	0	3
4.	XT7601	Network Management	PC	3	3	0	0	3
5.	GE7651	Environmental Science and Engineering	PC	3	3	0	0	3
6.		Elective – II	PE	3	3	0	0	3
PRACTICAL								
7.	XC7661	Case Tools Laboratory	PC	4	0	0	4	2
8.	XC7662	Computer Graphics and Multimedia Laboratory	PC	4	0	0	4	2
			TOTAL	**27**	**19**	**0**	**8**	**23**

SEMESTER - VII

S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	XT7711	Industrial Project	EEC	32	0	0	32	16
			TOTAL	**32**	**0**	**0**	**32**	**16**

SEMESTER - VIII

S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	MA7851	Numerical Methods	PC	4	4	0	0	4
2.	XC7852	Principles of Compiler Design	PC	3	3	0	0	3
3.	XC7853	Software Testing and Quality Assurance	PC	3	3	0	0	3
4.	XT7851	Cloud Computing	PC	5	3	0	2	4
5.	XT7852	Software Project Management	PC	3	3	0	0	3
6.		Elective – III	PE	3	3	0	0	3
PRACTICAL								
7.	XC7861	Software Testing Laboratory	PC	4	0	0	4	2
8.	XT7811	Creative and Innovative Project	EEC	4	0	0	4	2
			TOTAL	**29**	**19**	**0**	**10**	**24**

SEMESTER - IX

S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	XC7951	Operations Research	PC	4	4	0	0	4
2.	XT7951	Information Management	PC	3	3	0	0	3
3.	XT7952	Mobile and Pervasive Computing	PC	3	3	0	0	3
4.	XT7953	Service Oriented Architecture	PC	3	3	0	0	3
5.		Elective – IV	PE	3	3	0	0	3
6.		Elective – V	PE	3	3	0	0	3
PRACTICAL								
7.	XT7911	Mobile Applications Development (Mini Project)	EEC	4	0	0	4	2
8.	XT7961	Service Oriented Architecture Laboratory	PC	4	0	0	4	2
			TOTAL	**27**	**19**	**0**	**8**	**23**

SEMESTER - X

S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	XT7091	Project Work	EEC	32	0	0	32	16
			TOTAL	**32**	**0**	**0**	**32**	**16**

Total Credits for the Programme: 216

FOUNDATION COURSES (FC)

S.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.		Communicative English	FC	3	3	0	0	3
2.		Mathematics – I	FC	4	4	0	0	4
3.		Applied Physics	FC	4	4	0	0	4
4.		Chemistry of Materials	FC	4	4	0	0	4
5.		Communication Skills Laboratory (Language)	FC	4	0	0	4	2
6.		Technical Communication	FC	3	3	0	0	3
7.		Mathematics – II	FC	4	4	0	0	4
8.		Mathematics - III	FC	4	4	0	0	4

PROFESSIONAL CORE (PC)

S.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.		Fundamentals of Computing	PC	4	4	0	0	4
2.		Computing Laboratory	PC	4	0	0	4	2
3.		Programming in C	PC	3	3	0	0	3
4.		Digital Systems	PC	3	3	0	0	3
5.		Discrete Mathematics	PC	4	4	0	0	4
6.		Digital Systems Laboratory	PC	4	0	0	4	2
7.		Programming in C Laboratory	PC	4	0	0	4	2
8.		Database Management Systems	PC	3	3	0	0	3
9.		Data Structures	PC	3	3	0	0	3
10.		Microprocessors and Applications	PC	5	3	0	2	4
11.		Object Oriented Programming in C++	PC	3	3	0	0	3
12.		Data Structures Laboratory	PC	4	0	0	4	2
13.		Database Management Systems Laboratory	PC	4	0	0	4	2
14.		Object Oriented Programming Laboratory	PC	4	0	0	4	2
15.		Theory of Computation	PC	4	4	0	0	4
16.		Operating Systems	PC	3	3	0	0	3
17.		Java and Internet Programming	PC	3	3	0	0	3
18.		Combinatorics and Graph Theory	PC	4	4	0	0	4
19.		Computer Architecture	PC	3	3	0	0	3
20.		Operating Systems Laboratory	PC	4	0	0	4	2
21.		Java and Internet Programming Laboratory	PC	4	0	0	4	2

22.		XML and Web Services Laboratory	PC	4	0	0	4	2
23.		Applied Statistics	PC	4	4	0	0	4
24.		Design and Analysis of Algorithms	PC	4	4	0	0	4
25.		Computer Networks	PC	3	3	0	0	3
26.		Data Mining and Warehousing	PC	3	3	0	0	3
27.		Software Engineering	PC	3	3	0	0	3
28.		GUI Applications Laboratory	PC	4	0	0	4	2
29.		Data Mining and Warehousing Laboratory	PC	4	0	0	4	2
30.		Probability, Queuing Theory & Reliability	PC	4	4	0	0	4
31.		Object Oriented Analysis and Design	PC	3	3	0	0	3
32.		Network Management	PC	3	3	0	0	3
33.		Computer Graphics and Multimedia	PC	3	3	0	0	3
34.		Environmental Science and Engineering	PC	3	3	0	0	3
35.		Case Tools Laboratory	PC	4	0	0	4	2
36.		Computer Graphics and Multimedia Laboratory	PC	4	0	0	4	2
37.		Numerical Methods	PC	4	4	0	0	4
38.		Principles of Compiler Design	PC	3	3	0	0	3
39.		Software Testing and Quality Assurance	PC	3	3	0	0	3
40.		Cloud Computing	PC	5	3	0	2	4
41.		Software Project Management	PC	3	3	0	0	3
42.		Software Testing Laboratory	PC	4	0	0	4	2
43.		Operations Research	PC	4	4	0	0	4
44.		Information Management	PC	3	3	0	0	3
45.		Mobile and Pervasive Computing	PC	3	3	0	0	3
46.		Service Oriented Architecture	PC	3	3	0	0	3
47.		Service Oriented Architecture Laboratory	PC	4	0	0	4	2

PROFESSIONAL ELECTIVES (PE)

S.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	MA7071	Algebra and Number Theory	PE	3	3	0	0	3
2.	XC7071	Computation Complexity	PE	3	3	0	0	3
3.	XC7072	Embedded Systems	PE	3	3	0	0	3
4.	XC7073	Fault Tolerant Systems	PE	3	3	0	0	3
5.	XC7074	High Speed Networks	PE	3	3	0	0	3
6.	XC7075	Intellectual Property Rights	PE	3	3	0	0	3
7.	XC7076	Pattern Recognition	PE	3	3	0	0	3
8.	XC7077	Visual Programming	PE	3	3	0	0	3
9.	XC7851	Machine Learning Techniques	PE	3	3	0	0	3
10.	XT7071	Adhoc and Sensor Networks	PE	3	3	0	0	3
11.	XT7072	Bioinformatics	PE	3	3	0	0	3
12.	XT7073	Digital Image Processing	PE	3	3	0	0	3
13.	XT7074	Digital Signal Processing	PE	3	3	0	0	3
14.	XT7075	Electronic Commerce	PE	3	3	0	0	3
15.	XT7076	Free and Open Source Software	PE	3	3	0	0	3
16.	XT7077	Game Programming	PE	3	3	0	0	3
17.	XT7078	Geographic Information System	PE	3	3	0	0	3
18.	XT7079	Information Coding Techniques	PE	3	3	0	0	3
19.	XT7080	Information Security	PE	3	3	0	0	3
20.	XT7081	Modeling and Simulation	PE	3	3	0	0	3
21.	XT7082	Performance Evaluation of System and Networks	PE	3	3	0	0	3
22.	XT7083	Personal Software Processes	PE	3	3	0	0	3
23.	XT7084	Soft Computing	PE	3	3	0	0	3
24.	XT7085	Software Metrics	PE	3	3	0	0	3
25.	XT7086	Total Quality Management	PE	3	3	0	0	3
26.	XT7087	Wavelet Analysis	PE	3	3	0	0	3
27.	XT7451	Cryptography and Data Security	PE	3	3	0	0	3

EMPLOYABILITY ENHANCEMENT COURSES (EEC)

S.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.		Industrial Project	EEC	32	0	0	32	16
2.		Project Work	EEC	32	0	0	32	16
3.		Creative and Innovative Project	EEC	4	0	0	4	2
4.		Mobile Applications Development (Mini Project)	EEC	4	0	0	4	2

HS7152 **COMMUNICATIVE ENGLISH** **L T P C**
3 0 0 3

OBJECTIVES

- To develop the four basic skills of language (reading, writing, speaking and listening) in order to acquire a creative and analytical mind that would fit into this new age of technological and global communication.
- To explore the various ways language is used effectively in day-to-day formal and informal contexts
- To learn the appropriate form and structure essential for effective communication

UNIT I **9**

Importance of Listening Skills – Difference between Listening and Hearing – Active Listening – Barriers to Listening – Listening comprehension focusing on varying elements of vocabulary and structure - Pronunciation –Self Introduction – Descriptive Language – Meanings – Affixes – Prefixes – Vocabulary building for places and people verb forms – Reading Skills – Sub skills of Reading – Skimming and Scanning – Descriptive writing – People description – Letter Writing – Personal: To family – To friends – Asking for information/ giving suggestions – Social conversation – Introducing and Greeting

UNIT II **9**

Listening for general understanding – Listening Comprehension – Comparative Language – Conversation: One to one – Introducing Others – Social Conversation – Initiating, carrying on and concluding a conversation – Place Description – Definition

UNIT III **9**

Listening to specific information – Listening to talks and description – Conversion from noun to adjectives – Superlative Adjectives – Grammar in context – Subject-verb adjective – Conversation One to many- Discussion Activities – Social Conversation – Politeness strategies – Reading a narrative – Reading for general information – Intensive reading exercises – Object description – Descriptive language development of equipment use and functions - Comparing and Contrasting in writing – Letter writing – official letter: Letter of Enquiry to higher officials – inviting, making a complaint

UNIT IV **9**

Development of basic writing skills applying studied grammatical structures - Conversion of verb to nouns – Perfect Tense forms – Prepositions – Abbreviations – Listening to Casual Conversation – Listening for grammatical points – Strategies adopted for speaking – social conversation – striking a conversation with strangers – Reading for Specific information – Reference skills – books – Cause and effect in writing – Official letter – Answering a query.

UNIT V **9**

Listening to collect information for discussion – Making short speeches – Use of suffixes to convert verb – Noun – Adjective – Use of pronouns - Conditionals – Acronyms – Whole class discussion – Communication structure for expression of opinion – Extensive reading – reading between lines – Paragraph writing – Developing the hints.

TOTAL : 45 PERIODS

REFERENCES

1. Mindscopes, Department of English, Anna University, Chennai, Orient Blackswan, 2012.
2. Sood S.C.et al, Developing Communication Skills: Oral Communication and Reading Comprehension, Writing Skills and Workbook. Manohar, New Delhi: 2007.
3. English for Engineers and Technologists, Dept. of Humanities and Social Sciences, Anna University, Chennai: Orient Longman, 2006
4. Sasikumar V., P.Kiranmayi Dutt and Geetha Rajeevan, Listening and Speaking II New Delhi: Foundation Books, 2007.

MA7158 **MATHEMATICS - I** **L T P C**
4 0 0 4

UNIT I DIFFERENTIAL CALCULUS 12

Representation of functions - New functions from old functions - Limit of a function - Limits at infinity - Continuity - Derivatives - Differentiation rules - Polar coordinate system - Differentiation in polar coordinates - Maxima and Minima of functions of one variable.

UNIT II FUNCTIONS OF SEVERAL VARIABLES 12

Partial derivatives – Homogeneous functions and Euler's theorem – Total derivative – Differentiation of implicit functions – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor's series for functions of two variables – Errors and approximations – Maxima and minima of functions of two variables – Lagrange's method of undetermined multipliers.

UNIT III INTEGRAL CALCULUS 12

Definite and Indefinite integrals - Substitution rule - Techniques of Integration - Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions - Improper integrals.

UNIT IV MULTIPLE INTEGRALS 12

Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of solids – Change of variables in double and triple integrals.

UNIT V DIFFERENTIAL EQUATIONS 12

Method of variation of parameters – Method of undetermined coefficients – Homogenous equation of Euler's and Legendre's type – System of simultaneous linear differential equations with constant coefficients.

TOTAL : 60 PERIODS

TEXTBOOKS

1. James Stewart, "Calculus with Early Transcendental Functions", Cengage Learning, New Delhi, 2008.
2. Narayanan, S. and Manicavachagom Pillai, T. K., " Calculus" Volume I and II, S. Viswanathan Publishers Pvt. Ltd., Chennai, 2007.
3. Erwin Kreyszig ,"Advanced Engineering Mathematics", John Wiley and Sons, 9th Edition, New Delhi, 2014.
4. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 43rd Edition, 2014.

REFERENCES

1. Ramana B.V., "Higher Engineering Mathematics", Tata McGraw Hill Co. Ltd., New Delhi, 11th Reprint, 2010.
2. Jain R.K. and Iyengar S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi, 3rd Edition, 2007.
3. Bali N., Goyal M. and Watkins C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009.
4. Greenberg M.D., "Advanced Engineering Mathematics", Pearson Education, New Delhi, 2nd Edition, 5th Reprint, 2009.
5. Peter V.O'Neil, "Advanced Engineering Mathematics", Cengage Learning India Pvt., Ltd, New Delhi, 2007.

PH7152 **APPLIED PHYSICS** **L T P C**
4 0 0 4

OBJECTIVES

- To enhance the fundamental knowledge in Physics and its applications relevant to various streams of Engineering and Technology.

UNIT I PROPERTIES OF MATTER AND THERMAL PHYSICS 12

Elasticity- Hooke's law - relationship between three types of modulus of elasticity (qualitative) – stress -strain diagram – Poisson's ratio – bending of beams - bending moment – depression of a cantilever – Young's modulus by non-uniform bending- I-shaped girders. Thermal Physics - modes of heat transfer- thermal conductivity –Lee's disc method - conduction through compound media - thermal expansion – thermal stress – laws of thermodynamics – entropy.

UNIT II ACOUSTICS AND ULTRASONICS 12

Characteristics of sound - classification of sound- intensity of sound - decibel – Acoustics - Sabine's formula- derivation using growth and decay method – absorption coefficient and its determination – factors affecting acoustics of buildings and their remedies. Ultrasonics – production by magnetostrictionand piezoelectric methods - acoustic grating – applications of ultrasonic waves.

UNIT III QUANTUM PHYSICS 12

Black body radiation – Planck's theory (derivation) – Photoelectric effect – Compton effect. theory and experimental verification – matter waves –Schrondingerwave equation in one dimension: time independent and time dependent equations – particle in a infinitely deep square well potential – finite well potential – tunnelling through barrier – applications.

UNIT IV SEMICONDUCTOR PHYSICS 12

Energy bands in solids – intrinsic and extrinsic semiconductors - distribution of quantum states in the energy band (qualitative) – Fermi-Dirac statistics – carrier concentration in an intrinsic semiconductor – carrier concentration in n-type semiconductor – variation with temperature and impurity - semiconductor devices: diode, BJT, FET, MOSFET.

UNIT V PHOTONICS AND FIBRE OPTICS 12

Spontaneous and stimulated emission - population inversion – Nd:YAG, CO2, semiconductor lasers - homojunction and heterojunction lasers - industrial applications. Principle and propagation of light in optical fibres – numerical aperture and acceptance angle - types of optical fibres (material, refractive index, mode) – attenuation, dispersion, bending - fibre optical communication system.

TOTAL: 60 PERIODS

OUTCOME

- The students will have knowledge on the basics of physics related to properties of matter, optics, acoustics etc., and they will apply these fundamental principles to solve practical problems related to materials used for engineering applications.

TEXT BOOKS

1. Gaur R.K. and Gupta S.L. Engineering Physics. Dhanpat Rai Publications, 2013.
2. Pillai, S. O., Solid State Physics, New Age International Publishers, 2009.
3. Palanisamy, P. K. Engineering Physics, SCITECH Publications, 2012.

REFERENCES

1. Searls and Zemansky. University Physics, Addison-Wesley, 2000.
2. N.Garcia and A.Damask, Physics for Computer Science Students, Springer, 2012.
3. Paul Tipler and Gene Mosca, Physics for Scientists and Engineers, W.H. Freeman, 2007.
4. Raymond Serway, John Jewett, Physics for Scientists and Engineers, Brooks/Cole, 2014.
5. G.Keiser, Optical fiber communications, McGraw Hill Co.,1995.

CY7152 CHEMISTRY OF MATERIALS L T P C
4 0 0 4

UNIT I POLYMER IN ELECTRONICS 12

Basic concepts of polymers, Piezo and pyro electric polymers – Polyvinyl fluoride – Polyvinyliderne fluoride. Conducting polymers – Classifications – Polyparaphenylene and polypyrrole. Potting and encapsulation, Photoresists – Positive and negative.

UNIT II COMPOSITES 12

Introduction to composites – Characteristics, Matrix materials – Types – Polymer matrix, metal matrix, ceramic matrix, carbon and graphite matrix material. Reinforcement – fiber, particulates, flakes and whiskers, Classification of composites – Particulates, fibrous and laminated composites – Hybrid composites – Application of composites in electrical and electronic component.

UNIT III SPECIALITY MATERIALS 12

Dielectrics – Characteristics, insulating materials – Characteristics – Polymers– Polyethylene, polytetrafluroethylene – Ceramics – Mica and glass. Magnetic materials – basis of magnetism – Soft and hard magnetic materials. Semiconductors – Extensive and intensive. Metallic solids – Characteristics. Nanomaterials – Properties – Synthesis of nano materials – Sol Gel synthesis – Nano tubes – Carbon nano tubes – Nano wires – Applications.

UNIT IV FABRICATION OF INTEGRATED CIRCUITS 12

Introduction – Fabrication – MOS – NMOS, PMOS, CMOS, Ga-As Technologies, Printed circuit boards-Fabrication (Single layer only) – Lamination, printing (photo and screen printing) and mechanical operation.

UNIT V BATTERIES 12

Primary and Secondary – Requirements – Commercial batteries – Dry Cell, acid cells, alkaline batteries (Ni-Cd), Li-ion. Fuels cells – (Hydrogen - oxygen) – UPS.

TOTAL : 60 PERIODS

TEXTBOOKS

1. Wong M.N., “Polymer for electronics and photonic applications”, John Wiley,New York, 2006.
2. Jain P.C and Monika Jain, “Engineering Chemistry”, Dhanpet Rai Publishing Company (P) Ltd., New Delhi, 2013.

REFERENCES

1. Dyson R.W. “Specialty Polymer”, Blackie Academic and Professional, Chennai,2006.
2. Sharma S.C. “Composite Materials”, Narosa Publishing House, New Delhi, 2000.
3. RodnayZaks and Alexander Wolfe, From chips to System – An introduction to Micro Computers”, BPB Publication, New Delhi, 1996.
4. Khanna O.P.,” Material Science” NIH Publications, 2007.

XC7151 FUNDAMENTALS OF COMPUTING L T P C
4 0 0 4

OBJECTIVES

- To enable the student to learn the major Components of a Computer System
- To learn how arithmetic is handled in computers
- To know the correct and efficient ways of solving problems
- To know the need and importance of system software
- To learn to use office automation tools
- To learn networking, database concepts and security issues

UNIT I COMPUTER GENERATIONS AND CLASSIFICATIONS 12

World of Computers - Evolution of Computer – Computers in Life – Computer and its scope – Computers to fit every need – Computer Networks and the Internet – Computer and Society – Security

UNIT II DATA REPRESENTATION AND BINARY ARITHMETIC 12

Programming Languages - Data and Program representation - Creating computer program - Program Planning – Algorithms – Flow charts – Pseudo codes – Programming Paradigms – System Unit- CPU – Performance and improvement

UNIT III INPUT/OUTPUT UNITS AND MEMORY DEVICES 12

Storage Units – Magnetic Disk Systems – Optical Disc Systems – Flash Memory Systems – Comparing Storage Alternatives – Input and Output: Key boards, Pointing devices, Scanners, Readers, Digital cameras, Audio input, Display devices, Printers, Audio Output.

UNIT IV OPERATING SYSTEMS AND LANGUAGES 12

System Software - Operating systems and Utility Programs, Operating Systems for Desktop PC's – Operating Systems for Handled PC's and Mobile Devices – Operating Systems for Larger Computers – Utility Programs – Future of Operating Systems

UNIT V APPLICATION SOFTWARE AND NETWORK 12

Basics of Application Software – Word Processing Software - Spreadsheet Concepts – Database Concepts – Presentation Graphics Concepts – Graphics and Multimedia Concepts – Other types of Application Software – Networking and Communications Applications – Types of Networks – Data Communications – Communications Protocols – Networking Hardware

TOTAL : 60 PERIODS

OUTCOMES

Upon successful completion of this course, students will be able to:

- comprehends the fundamental idea on various computing techniques
- know and learn to use the various soft wares assisting for the successful completion of a program
- Comprehend the intricacies involved when systems are connected in a network

TEXTBOOKS

1. Deborah Morley and Charles S. Parker, "Understanding Computers – Today and Tomorrow Comprehensive ", Cengage Learning, 2015
2. Peter Norton, "Introduction to Computers", Tata McGraw Hill, 2011.

REFERENCES

1. Anita Goel, "Computer Fundamentals", Pearson Education, 2015.
2. V. Rajaraman and Neeharika Adabala, "Fundamentals of Computers" PHI, 2014
3. Dromey,R.G, "How to solve it by Computer", Pearson Education.

HS7161 COMMUNICATION SKILLS LABORATORY L T P C
0 0 4 2

OBJECTIVES

- To develop the students' language ability to a level that enables them to use English in their professional and academic environment
- To improve the communication skills of students seeking a career in IT industry

1. Listening Comprehension focusing on varying elements of vocabulary and structure
2. Video Comprehension developing combined audio-video receptive skills to deduce meaning from context - Use of online resources – Making short speeches
3. Seminar skills - agreeing and disagreeing, clarifying, questioning, persuading, emphasizing, concluding, interrupting; evaluating ideas and actions, presenting solutions, recommending action, comparing and contrasting, probability and possibility, cause and effect, criticizing - Group Discussion Activities on current issues – Presenting your viewpoints
4. Listening Comprehension of authentic materials – Self-instruction using listening and video materials from the self access language laboratory with comprehension exercises.
5. Use of the Internet to extract authentic materials on specific areas of interest

TOTAL: 60 PERIODS

REFERENCES

1. Esteras, Santiago Remacha, Infotech: English for Computer Users. Cambridge: Cambridge University Press, 2008.
2. Newspapers and Technical Magazines can be used for reference.

XC7161 COMPUTING LABORATORY L T P C
0 0 4 2

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
5. LaTex Basics

b) SPREAD SHEET

6. Chart - Line, XY, Bar and Pie.
7. Formula - formula editor.
8. Spread sheet - inclusion of object, Picture and graphics, protecting the document and sheet.
9. Sorting and Import / Export features.

c) DATABASE

10. Creating and Manipulating MS-ACCESS File.

TOTAL: 60 PERIODS

HS7252 TECHNICAL COMMUNICATION L T P C
3 0 0 3

OBJECTIVES

- To develop the essential language skills needed to present technical material in oral and written form.
- To introduce different forms of technical material and help students learn the required skills to listen/read, write, understand and speak about such technical material.

UNIT I **9**

Reading Comprehension of Authentic Materials - Reading for real life context - Listening to different accents & understanding - Communicative & decision making activities based on authentic reading materials - Language Functions: agreeing, disagreeing, expressing likes & dislikes etc - Written communication tasks for authentic task oriented goals - Types of writing - process writing, Evaluative & Analytical Writing - Homophones - British / American Vocabulary - Framing Questions: Auxiliary Verbs, Question Tags.

UNIT II **9**

Understanding reading materials like schedules, brochures etc - Listening to authentic broadcasts from Radio & TV - Group discussion activities - Descriptive language development of equipment use & functions - Giving directions / instructions - Language of Instruction, Writing Recommendations - Futuristic writing - Official letters - inviting, accepting. Refusing - Foreign Words in English - Technical Jargons - Abbreviations, Acronyms.

UNIT III **9**

Reading Technical Documents & interpreting them - Listening to follow instructions – Note taking Exercises - Analysing problems & offering solutions - Presenting statistical information - Presenting numbers & figures – Role play -Mock Interviews - Job Application with CV - Writing a project proposal - Writing a post for a discussion forum - Compound Words - Time, Quality, Cost & Numbering Vocabulary - Numerical Expressions.

UNIT IV **9**

Reading Reports & Analysing them - Reading for Specific Purposes - Listening to tonal inflections - Listening & Responding - Listening for collecting information - Information gathering activities concerning time, place, cost and personal description - Discussion on blog post or about discussion forum - Report Writing - Letter to Editor - Taking part in an online conversation - Blog entry - Reported Speech - Editing & Error Correction.

UNIT V **9**

Reading & understanding press releases pertaining to technical information - Listening for technical information – Public Speaking - Non-verbal Communication – Body Language, Eye Contact – Effective use of space, silence - Writing Technical Documents - User Manual, Instruction Manual etc - Posting a comment in an Online Conversation - Collocations in IT context - Active & Passive - Phrasal Verbs.

TOTAL : 45 PERIODS

REFERENCES

1. Mindscopes, Department of English, Anna University, Chennai, Orient Blackswan, 2012.
2. Sood S.C.et al, Developing Communication Skills: Oral Communication and Reading Comprehension, Writing Skills and Workbook Manohar,. New Delhi: 2007.
3. Esteras, Santiago Remacha, Infotech: English for Computer Users. Cambridge: Cambridge University Press, 2008.

MA7252 **DISCRETE MATHEMATICS** **L T P C**
4 0 0 4

UNIT I MATHEMATICAL LOGIC I **12**

Statements – Truth tables – Connectives – Equivalences – Implications – Functionally complete set of connectives – Normal forms.

UNIT II MATHEMATICAL LOGIC II **12**

Predicate Calculus – Inference theory for statement calculus and predicate calculus – Mathematical Induction.

UNIT III RELATIONS AND FUNCTIONS **12**

Relations – Relation Matrix and the graph of a relation – Transitive closure and Warshall's algorithm - Equivalence relations – Functions – Composition – Inverse of a function.

UNIT IV GROUPS **12**

Groups – Definitions and Examples – Subgroups and Homomorphism – Cosets and Lagrange's theorem – Normal Subgroups – Group Codes.

UNIT V LATTICES **12**

Posets – Lattices – Properties of Lattices – Lattices as Algebraic System – Some Special Lattices – Boolean algebra.

TOTAL: 60 PERIODS

TEXTBOOKS

1. Tremblay J.P. and Manohar, R., "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw-Hill Publishing Company Ltd, 2002
   [Sections: 1-2.1 to 1-2.4, 1-2.6 to 1-2.14, 1-3**;** 1-4.1 to 1-4.3, 1-5, 1-6.4 and 1-6.5, 2-5.1**;** 3-5.1 to 3-5.4, 3-7.2 to 3-7.3**;** 4-1, 4-2]
2. Kenneth A. Rosen, "Discrete Mathematics and its Applications", 5th Edition, Tata McGraw–Hill Publishing Company Ltd., 2003.
   [Sections: 2.3, 7.1, 7.3-7.5]

REFERENCES

1. Kolman, Busby and Ross, "Discrete Mathematical Structures" 6th Edition, PHI Learning Pvt. Ltd., New Delhi, 2009.
2. Doerr Alan W., "Applied Discrete Structures for Computer Science", Galgotia Publications Pvt. Ltd., Reprinted 1997.

MA7253 MATHEMATICS - II **L T P C**
4 0 0 4

UNIT I MATRICES **12**

Eigenvalues and Eigenvectors – Properties of Eigenvalues - Cayley Hamilton theorem -Orthogonal reduction of a symmetric matrix to diagonal form – Reduction of quadratic form to canonical form by orthogonal transformation.

UNIT II LAPLACE TRANSFORM **12**

Transform of standard functions – Properties - Unit step and impulse functions – Periodic functions – Transforms of derivatives and integrals – Shifting theorems – Initial and Final Value Theorems – Inverse Transforms – Convolution Theorem – Application to linear differential equations with constant coefficients and simultaneous equation of first order with constant co-efficients

UNIT III VECTOR CALCULUS **12**

Gradient, divergence and curl of functions – Line, surface and volume integrals – Green, Gauss and Stokes theorems – Verification and Applications.

UNIT IV FOURIER SERIES **12**

Dirichlet's conditions - General Fourier series – Half range sine and cosine series RMS value – Parseval's identity.

UNIT V FOURIER TRANSFORMS **12**

Statement of Fourier Integral Theorem – Fourier Transform and its Inverse – Sine and Cosine transforms and their inverses – Properties – Convolution Theorem - Parseval's identity.

TOTAL : 60 PERIODS

TEXTBOOKS

1. Erwin Kreyszig ,"Advanced Engineering Mathematics", John Wiley and Sons, 9th Edition, New Delhi, 2014.
2. Grewal B.S., “Higher Engineering Mathematics”, Khanna Publishers, New Delhi, 43rd Edition, 2014.

REFERENCES

1. Ramana B.V., “Higher Engineering Mathematics”, Tata McGraw Hill Co. Ltd.,New Delhi, 11th Reprint, 2010.
2. Jain R.K. and Iyengar S.R.K., “Advanced Engineering Mathematics”, Narosa Publications, New Delhi, 3rd Edition, 2007.
3. Bali N., Goyal M. and Watkins C., “Advanced Engineering Mathematics”, Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, Edition, 2009.
4. Greenberg M.D., “Advanced Engineering Mathematics”, Pearson Education, New Delhi, 2nd Edition, 5th Reprint, 2009.
5. Peter V.O’Neil, “Advanced Engineering Mathematics”, Cengage Learning India Pvt., Ltd, New Delhi, 2007.

XC7251 DIGITAL SYSTEMS L T P C
3 0 0 3

OBJECTIVES

- To Introduce the basic concept of digital and binary systems
- To Give students the concept of digital logic design
- To Give students the basic tools for the design and implementation of digital modules and subsystems
- To Reinforce theory and techniques taught in the classroom through project assignments.

UNIT I NUMBER SYSTEMS AND BINARY CODES 9

Introduction to Digital Systems - Binary Numbers – Number Systems and Conversions – Complements – Signed Binary Numbers - Binary Arithmetic – Binary Codes – BCD and other Weighted Codes, Excess-3, Gray Code, Hamming Code – Binary Logic.

UNIT II BOOLEAN ALGEBRA AND LOGIC GATES 9

Basic Definitions – Axiomatic Definitions of Boolean Algebra - Basic Theorems and Properties of Boolean Algebra – Boolean Functions – Canonical and Standard Forms – Other Logic Operations – Digital Logic Gates – Integrated Circuits – TTL – MOS – CMOS Circuits.

UNIT III GATE-LEVEL MINIMIZATION 9

Karnaugh Map Method – Four Variable Map – Five Variable Map – Product-of-Sums Simplification – Don’t Care Conditions – NAND and NOR Implementations - Other Two-Level Implementations - QuineMcCluskey Method –Exclusive OR function.

UNIT IV COMBINATIONAL LOGIC 9

Combinational Circuits – Binary Adder-Subtractor – Binary Multiplier – Comparator – Decoders-Encoders - Multiplexers - Read Only Memories – Programmable Logic Devices.

UNIT V SEQUENTIAL LOGIC 9

Sequential Circuits – Storage Elements: Latches and Flip-Flops – Analysis of Clocked Sequential Circuits – State Reduction and Assignment – Registers – Counters.

TOTAL : 45 PERIODS

OUTCOMES

Upon successful completion of this course, students will be able to:

- Apply knowledge of math, science and engineering.
- Design digital circuitry, analyze and interpret data.
- Design a system, component, process to meet desired needs within realistic constraints.

TEXTBOOK

1. Mano, M.M. and Ciletti, M.D., "Digital Design", 5th Edition, Pearson Education, 2012.

REFERENCES

1. Charles H. Roth Jr., "Fundamentals of Logic Design", 7th edition, Jaico Publishing House, Mumbai, 2014.
2. Tocci, R.C., "Digital System: Principles and Applications", 10th Edition, Pearson, 2009.
3. Palmer, J.E. and David E. Perlman, "Introduction to Digital System", Tata McGraw Hill Publishing Co. Ltd., 1996.

XC7252 PROGRAMMING IN C L T P C
3 0 0 3

OBJECTIVES

- To gain experience about structured programming
- To help students to understand the implementation of C language
- To understand various features in C

UNIT I FUNDAMENTALS AND INPUT/OUTPUT STATEMENTS 9

Constants - Variables - Data types - Operators - Expressions - Library functions - Standard Input/Output functions.

UNIT II CONTROL STATEMENTS, FUNCTIONS AND STORAGE CLASSES 9

While, do-while, for, if-else, switch and go to statements - break and continue statements. Defining a function - accessing a function- passing arguments to a function – Recursion Automatic, External and Static variables.

UNIT III ARRAYS AND POINTERS 9

Defining and processing an array - passing arrays to a function - multi dimensional arrays Pointer declarations- passing pointers to a function - pointers and arrays - operations on printers - arrays of pointers – passing functions to other functions.

UNIT IV STRUCTURES AND UNIONS 9

Defining a structure - Processing a structure - user-defined data type - Structure and pointers – passing structures to a function - self-referential structures - Unions.

UNIT V FILE HANDLING 9

File Creation – Opening & Closing files – Read, Write, Appending data – ftell() and fseek() File I/O – Command line arguments

TOTAL : 45 PERIODS

OUTCOMES

Upon successful completion of this course, students will be able to:

- Study, analyze and understand logical structure of a computer program, and different construct to develop a program in 'C' language
- Write small programs related to simple/ moderate mathematical, and logical problems in 'C'.
- Study, analyze and understand simple data structures, use of pointers, memory allocation and data handling through files in 'C'.

TEXTBOOK

1. Gottfried, B.S.., "Schaum's Outline of Theory and Problems of Programming in C", Tata Mc-Graw Hill Publishing Company Ltd., New Delhi, 1995.

REFERENCES

1. Kernighan, B.W. and Ritchi, D.M., "The C Programming Language", Prentice- Hall of India Private ltd., New Delhi, (1998).
2. E.Balagurusamy, "Programming in ANSI C", 4th Edition, Tata Mcgraw-Hill Education Private Ltd., 2008.

XC7261 DIGITAL SYSTEMS LABORATORY L T P C
0 0 4 2

1. Study of logic gates
2. Simplification of Boolean expressions using K-maps
3. Adders - Subtractors
4. Code Converters
5. Multiplexers - Demultiplexers
6. Comparators
7. Parity Checkers
8. Construction of Flip Flops using logic gates
9. Study of Flip-flops using IC's
10. Shift Registers
11. Counters

TOTAL: 60 PERIODS

XC7262 PROGRAMMING IN C LABORATORY L T P C
0 0 4 2

1. Input/Output statements
2. Control functions
3. Functions with recursion
4. Arrays
5. Pointers
6. Structures and Unions
7. File Handling

TOTAL: 60 PERIODS

MA7351 **MATHEMATICS - III** **L T P C**
4 0 0 4

UNIT I ANALYTIC FUNCTIONS 12

Function of a complex variable – Analytic function – Cauchy-Riemnn Equations – Properties of analytic functions – Construction of Analytic Functions - Conformal mapping of $w = z + a, w = 1/z, w = cz, w = z^2, w = e^z$ and Bilinear transformations.

UNIT II COMPLEX INTEGRATION 12

Line integral – Cauchy's theorem – Cauchy's integral formula – Taylor's and Laurent's series – Singularities and classification – Residues – Cauchy's residue theorem – Contour integration around circular and semi-circular contours. (excluding poles on real axis).

UNIT III Z-TRANSFORM 12

Transforms of elementary sequences – Unit Step and impulse functions – Properties – Initial and Final Value Theorems - Convolution Theorem – Inverse Z-transform – Application to linear difference equations with constant coefficients.

UNIT IV FIRST ORDER PARTIAL DIFFERENTIAL EQUATIONS 12

Formation of partial differential equations – Solutions of partial differential equations – Equations solvable by direct integration – Standard types and equations reduced to standard type – Lagrange's linear equation.

UNIT V HIGHER ORDER PARTIAL DIFFERENTIAL EQUATIONS 12

Homogeneous linear equations with constant coefficients – Complementary function – Particular integral – Non-homogeneous linear equations.

TOTAL: 60 PERIODS

TEXTBOOK

1. Grewal B.S., "Higher Engineering Mathematics", 43rd Edition, Khanna Publishers, New Delhi, 2014.

REFERENCES

1. Ramana B. V. , "Higher Engineering Mathematics" ,Tata McGraw Hill Co. Ltd., New Delhi, 11th Reprint, 2010.
2. Bali N.P and Manish Goyal," Engineering Mathematics", Laxmi Publications (P) Ltd., New Delhi, 7th Edition, 2007.
3. Kreyszig E., "Advanced Engineering Mathematics", John Wiley and Sons, 9th Edition, 2014.
4. Ravish R. Singh and Mukul Bhatt, "Engineering Mathematics" A tutorial approach test, MCGraw Hill Private Limited., New Delhi, 2010.

XC7351 **DATA STRUCTURES** **L T P C**
3 0 0 3

OBJECTIVES

- To solve problems using data structures such as linear lists, stacks, queues, hash tables, binary trees, heaps, tournament trees, binary search trees, and graphs and writing programs for these solutions.
- To allow to assess how the choice of data structures and algorithm design methods impacts the performance of programs

- To choose the appropriate data structure and algorithm design method for a specified application.
- To learn the systematic way of solving problems, various methods of organizing large amounts of data.
- To efficiently implement the different data structures and solutions for specific problems

UNIT I STACKS AND RECURSION 9

Arrays, Structures and Stacks – Recursion.

UNIT II QUEUES AND LISTS 9

Queue and its sequential representation, Linked lists, Lists, Circular Linked lists.

UNIT III GRAPHS AND TREES 9

Graphs: Introduction, application of Graphs, C Representation of Graphs, Transitive Closure, Linked Representation of Graph, Binary Trees – Binary tree representation – Application of trees.

UNIT IV SORTING 9

Exchange sorts – Selection and Tree sorting – Insertion sorts – Merge sort.

UNIT V SEARCHING 9

Basic Search Technique (except Interpolation search) – Tree Searching (except Balance Trees) – Hashing - Open Addressing – Deleting Items .

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the subject, students will be able to:

- understand the properties of various data structures
- identify the strengths and weaknesses of different data structures
- design and employ appropriate data structures for solving computing problems

TEXTBOOK

1. Langsam Y., Augenstein M. and Tenenbaum A. M. – " Data Structures using C and C++.", (Second Edition) Prentice Hall of India, New Delhi – 2009.
   [Chapter 1 : Sections 1.2, 1.3 , Chapter 2, Chapter 3 : Sections 3.1 to 3.3, Chapter 4 : Sections 4.1 to 4.3 and 4.5, Chapter 5 : Sections 5.1, 5.2 and 5.5 , Chapter 6 :Sections 6.2 to 6.5, Chapter 7 : Sections 7.1, 7.2 and 7.4 (topics mentioned in the syllabus alone), Chapter 8: Section 8.1 (excluding Warshall's algorithm, Shortest Path algorithm), Section 8.3 (Only Linked list representation)]

REFERENCE

1. Kruse C. L., Lenny B.P. and Tonto C. L., - "Data Structures and Program Design in C.", Prentice Hall of India 1995.

XC7352 DATABASE MANAGEMENT SYSTEMS L T P C

3 0 0 3

OBJECTIVES

- To learn the fundamentals of data models and to conceptualize and depict a database system using ER diagram.
- To make a study of SQL and relational database design.
- To understand the internal storage structures using different file and indexing techniques which will help in physical DB design.
- To know the fundamental concepts of transaction processing- concurrency control techniques and recovery procedure.

UNIT I DATABASE SYSTEM CONCEPTS 11

Database Systems – Data Models – Database Languages – Database System Architecture – Database Users and Administrators – ER Model – EER Model – Transforming ER models to Tables.

UNIT II RELATIONAL DATABASE SYSTEM DESIGN 9

Relational Algebra– Tuple and Domain Relational Calculus – SQL – Views – Triggers – Domain Constraints – Referential Integrity

UNIT III NORMALIZATION 6

Functional Dependencies – Inference rules – Decomposition – Properties – Normal Forms (NF) – First NF, Second NF, Third NF, Boyce-Codd NF, Fourth NF, and Fifth NF.

UNIT IV DATA STORAGE AND QUERYING 10

Data Dictionary Storage – File Organisation – Indexing – Static Hashing – Dynamic Hashing – B+ tree index files - Query Processing Overview – Measures of Query Cost – Selection Operation – Sorting – Join Processing.

UNIT V TRANSACTION MANAGEMENT 9

Transaction Properties – Concurrent Executions – Serializability – View Serializability – Conflict Serializability – Testing for Serializability – Protocols for Concurrency Control – Lock Based protocols – Timestamp based protocols – Recovery – Log Based Recovery.

TOTAL: 45 PERIODS

OUTCOMES

Upon successful completion of this course, students will be able to:

- Distinguish unary, binary, and ternary relationships and give a common example of each.
- Draw an E-R diagram to represent common business situations
- Compare and contrast the object oriented model with the E-R and EER models
- Explain the properties of relations
- Discuss the first normal form, second normal form, and third normal form
- Use normalization to decompose our relation with anomalies into well structured relations
- Describe the physical database design process, its objectives, and deliverables
- Explain how to select an appropriate file organization by balancing various important design factors

TEXTBOOK

1. Abraham Silberschatz, Henry F. Korth and S. Sudharshan, **"**Database System Concepts", 6th Edition, Mc Graw Hill, New Delhi, 2011.

REFERENCES

1. Ramez Elmasri and Shamkant B.Navathe, "Fundamentals of Database Systems", 6th Edition, Addison Wesley, 2011.
2. C.J. Date, A.Kannan and S.Swamynathan, "An Introduction to Database Systems", 8th Edition, Pearson Education India, 2006.
3. Raghu Ramakrishnan and Johannes Gehrke, "Database Management Systems", 3rd Edition, Mc Graw Hill, Singapore, 2004.
4. Gary W. Hansen and James V. Hansen. "Database Management and Design", 2nd Edition, PHI, 2009.

XC7353 MICROPROCESSORS AND APPLICATIONS L T P C
3 0 2 4

OBJECTIVES

- To develop an in-depth understanding of the operation of microprocessors and microcontrollers, machine language programming & interfacing techniques.

UNIT I INTRODUCTION AND INTEL 8085 9

Architecture – Instruction format - addressing modes – Simple Program - Basic timing Diagram – Input/ Output – Interrupt system –based system design.

UNIT II 16 – BIT PROCESSORS (INTEL 8086) 9

Intel 8086: Architecture – addressing modes and Instruction format interfacing of memory & I/O device – odd and even addressed blanks – storing/retrieval of 16 bit data at an odd address – Simple Programs.

UNIT III INTRODUCTION TO MICROCONTROLLERS 9

Introduction to Intel 8-bit and 16-bit microcontrollers – 8051 – comparisons to microprocessors – on chip D/A and A/D facilities – Watchdog timer – Capabilities of bit-wise manipulation – real time clock – automatic process control / instrumentation applications case studies – cross assemblers

UNIT IV INTERFACING BASICS 9

On controlling/monitoring continuous varying (analog) non-electrical signal using microprocessor/microcontrollers need for interfacing ICs – thumb wheel switch as input devices – single LED, seven segment LED as output devices – interfacing these using both memory mapped I/O and peripheral mapped I/O – D/A, A/D ICs and their signals – sample and hold IC and its usage.

UNIT V INTERFACING ICs 9

(i) 8255 - Programmable Peripheral Interface along with 8085
(ii) 8254 – Programmable Interval Timer along with Intel 8086
(iii) Need for the following ICs: (a) 8251 – USART; (b) 8257 – Direct Memory Access Controller; (c) 8259 – Programmable Interrupt Controller; (d) 8279 – Keyboard / Display Interface.
(iv) 8085 and 8051 based industrial automations

TOTAL (45+30): 75 PERIODS

OUTCOMES

Upon completion of the subject, students will be able to:

- Learn the internal organization of some popular microprocessors/microcontrollers.
- Learn hardware and software interaction and integration.
- Learn the design of microprocessors/microcontrollers-based systems.

TEXTBOOK

1. Charles M. Gilmore, “Microprocessor: Principles and Applications”, McGraw Hill International, 1989.

REFERENCES

1. Mohammed Rafiquzzaman, “Microprocessors and Micro-computer Based System Design” 2008.
2. Mohammed Rafiquzzaman, “Microprocessors – Theory and Applications: Intel and Motorola”, Prentice Hall International, 1999.
3. Mohammed Ali Mazide, JancieGillispieMazidi “The 805 Microcontroller and Embedded Systems”, Pearson Education, 2004.

XC7354 OBJECT ORIENTED PROGRAMMING IN C++ L T P C
3 0 0 3

OBJECTIVES

- To get a clear understanding of object-oriented concepts.
- To understand object oriented programming through C++.

UNIT I OOP AND C++ FUNDAMENTALS 9

Object-oriented paradigm - Elements of object oriented programming – Merits and demerits of OO methodology - Characteristics of OOP - C++ data types - Operators - Expressions- Pointers - References - Enumeration - Classes.

UNIT II CLASSES 9

Classes and Objects - Members and Member function - This pointer Constructors and Destructors – Friend functions - Template classes - New and Delete operators.

UNIT III FUNCTIONS IN C++ 9

Function Prototype - Arguments passing - Return type - Default arguments - Inline functions– Function overloading - Operator function - Operator overloading - Template functions.

UNIT IV INHERITANCE 9

Derived class - Single Inheritance - Multiple Inheritance - Hierarchical Inheritance - Hybrid Inheritance - Virtual Functions - Virtual Base class - Nesting of classes.

UNIT V INPUT/OUTPUT 9

Input/Output operations - I/O stream classes – Overloading the insertion and extraction operators - File input/output - Exception handling-command line arguments.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the subject, students will be able to:

- prepare object-oriented design for small/medium scale problems
- demonstrate the differences between traditional imperative design and object-oriented design
- explain class structures as fundamental, modular building blocks
- understand the role of inheritance, polymorphism, dynamic binding and generic structures in building reusable code
- write small/medium scale C++ programs with simple graphical user interface
- use classes written by other programmers when constructing their systems

TEXTBOOKS

1. Stanley B. Lippman, Josee Lajoie, “C++ Primer”, Pearson Education, 5th Edition, 2013.
2. Robert Lafore, "Object Oriented Programming in Microsoft C++", Pearson Education, 4th Edition, 2010.

REFERENCES

1. Kamthane, ”Object Oriented Programming with ANSI and Turbo C++”, Person Education, 2006.
2. Bhave, “Object Oriented Programming With C++”, Pearson Education, 2004.
3. Dietel & Dietel, “C++ How to Program”, Fifth Edition, Prentice Hall,.2005.
4. Bjarne Stroustrup, "The C++ Programming Language", Addison Wesley,4th Edition, 2013.

XC7361 DATA STRUCTURES LABORATORY L T P C
0 0 4 2

1. Arrays and structures in C
2. Infix, Postfix, Prefix expressions using Stack
3. Linked list, Circular Linked list
4. Queues as Circular list
5. Representations of Graphs
6. Operation on binary trees
7. Insert sort, Quick Sort, Heap Sort
8. Sequential Search and Binary Search
9. Index based search

TOTAL: 60 PERIODS

XC7362 DATABASE MANAGEMENT SYSTEMS LABORATORY L T P C
0 0 4 2

1. DDL, DML, DCL
2. Subquery, Set functions
3. Date, Time, String functions
4. Nested Queries
5. Single row functions, Group functions
6. Joins – Left, Right, Full, Equi
7. Index, Views
8. PL/SQL Functions (or equivalent)
9. Procedures
10. Triggers

TOTAL: 60 PERIODS

REFERENCE :

1. Pranab Kumar Das Gupta, **"**Database Management System ORACLE SQL and PL/SQL", Prentice Hall of India Delhi, 2009.

XC7363 OBJECT ORIENTED PROGRAMMING LABORATORY L T P C
0 0 4 2

1. Create a complex number class with all possible operators
2. Static members, Friend functions.

3. Operator overloading, overloading of assignment operator
4. Type conversions such as integer to complex, double to complex, complex to double.
5. Constructor, Destructor, Copy constructor.
6. Virtual functions
7. Matrix class with operator overloading
8. Single, Multiple and Hybrid Inheritance
9. Polymorphism
10. Exception Handling
11. Input/Output file handling

TOTAL: 60 PERIODS

XC7451 COMBINATORICS AND GRAPH THEORY L T P C
4 0 0 4

UNIT I FUNDAMENTAL PRINCIPLES OF COUNTING 12

The Rules of Sum and Product – Permutations – Combinations – Binomial theorem – Combinations with repetition –Pigeonhole principle – The principle of Inclusion and Exclusion – Generalizations of the principle – Derangements.

UNIT II GENERATING FUNCTIONS AND RECURRENCE RELATIONS 12

Generating functions – Partitions of integers – The exponential generating function – The summation operator – The first-order linear recurrence relation – The second order linear homogeneous recurrence relation with constant coefficients – The method of generating functions.

UNIT III AN INTRODUCTION TO GRAPH THEORY 12

Definitions and Examples – Subgraphs, Complements and Graph Isomorphism – Euler Trails and Circuits – Planar graphs – Hamilton Paths and Cycles.

UNIT IV TREES 12

Definitions, Properties and Examples – Rooted trees – Trees and Sorting – Weighted Trees and Prefix Codes – Biconnected components and Articulation points.

UNIT V OPTIMIZATION AND MATCHING 12

Shortest path Algorithm – Minimal spanning Tree Algorithms – The Max-flow Min-Cut Theorem.

TOTAL: 60 PERIODS

TEXTBOOK

1. Grimaldi, R. P., "Discrete and Combinatorial Mathematics", 4th Edition, Pearson Education,(Singapore) Pte. Ltd.,2002.
   [Sections: 1.1 to 1.4, 5.5, 8.1 to 8.3; Chapter 9, 10.1, 10.2, 10.4; 11.1 to 11.5; Chapter 12; Chapter 13]

REFERENCES

1. Rosen, K.H., "Discrete Mathematics and its Applications", 7th Edition, Tata McGraw Hill Book Company, New Delhi, 2012.
2. Alan Tucker, "Applied Combinatorics", 4th Edition, John Wiley & Sons Inc, 2003.

XC7452 COMPUTER ARCHITECTURE L T P C
3 0 0 3

OBJECTIVES

- To teach students fundamental knowledge in Computer Architecture.
- To cover the basic organizations of computer systems including instruction set architecture, pipeline, memory hierarchy and I/O subsystem.

UNIT I STRUCTURE OF COMPUTERS 9

Functional Units – Basic Operational Concepts – Performance and Metrics – Bus Strutures – Characteristics and Functions – Instruction Cycle – Addressing Modes and Formats – Register Reference Instructions – Input & Output Instructions.

UNIT II ARITHMETIC AND LOGIC UNIT 9

Binary Addition and Subtraction – Binary Multiplication and Division – Booth Algorithm – Fixed Point Representations – Floating Point Representation – Floating Point Arithmetic Operations – Arithmetic Pipelining – Bit-Sliced ALU

UNIT III CONTROL UNIT 7

Hardwired and Micro programmed Control – Control Memory – Address Sequencing – Micro instruction Sequencing - Macro instruction Execution - Program Control

UNIT IV MEMORY ORGANIZATION 10

Memory Operations – Memory Hierarchy – Main Memory – Associative Memory -Auxiliary memory – Virtual Memory – Cache Memory – Memory Array – Secondary Storage – Memory Management Hardware.

UNIT V INPUT OUTPUT ORGANIZATION AND ADVANCED ARCHITECTURE 10

Peripheral Devices – I/O Interface – Modes of Data Transfer – Interrupt Driven I/O – DMA – Serial Communication – Asynchronous Data Transfer – RISC – CISC - Parallel Processing – Vector and Array Processing.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the subject, students will be able to:

- Understand the fundamentals of different instruction set architectures and their relationship to the CPU design.
- Understand the principles and the implementation of computer arithmetic.
- Understand the operation of modern CPUs including pipelining, memory systems and buses.
- Understand the principles of operation of multiprocessor systems and parallel programming.

TEXTBOOKS

1. Morris Mano, “Computer System Architecture”, Pearson Education, 3rd Edition, 2007.
2. William Stallings, “Computer Organization and Architecture: Designing for Performance”, Pearson Education, 2006.

REFERENCES

1. Subrata Ghoshal, “Computer Architecture and Organization: From 8085 to Core2Duo and beyond”, 1st Edition, Pearson, 2011
2. Douglas E. Comer, “Essentials of Computer Architecture”, 1st Edition, Pearson, 2007
3. Miles Murdocca, Vincent Heuring, “Computer Architecture and Organization: An integrated approach”, Wiley, 2013.

XC7453 JAVA AND INTERNET PROGRAMMING L T P C
3 0 0 3

OBJECTIVES

- To help you to understand some fundamental basic concepts behind the Java technology.
- To understand how to use Java to create, access, and support Java applications and applets.
- To discuss the portability features of Java and how they are changing the way Web users access applications at the desktop level.

UNIT I JAVA FUNDAMENTALS 9

Objects and Classes – Inheritance – Packages – Interfaces and Inner classes – Exceptions – IOStreams – Text Input and Output – Reading and Writing Binary data – Object Streams and Serialization – Generic Concepts.

UNIT II APPLETS AND GUI 9

Applet Basics – Life cycle of an applet – Passing information to Applets – Applet Context – Inter-applet communication – JAR files – Event Handling – AWT – SWING – Layout management – GUI programming using Applets and Frames – Dialog Boxes.

UNIT III THREADING, NETWORKING 9

Threading – Multithreading – Socket Connections – UDP, TCP based Sockets – Secure Sockets - Muticast Sockets – URLConnection class– Retrieving Data with URLs – Protocol Handlers – Content Handlers – RMI

UNIT IV MARKUP AND SCRIPTING LANGUAGES 9

Introduction to HTML 5 – Attributes , Events , Web forms 2.0 , SVG , Audio and Video – DHTML – Client Side Scripting −JavaScript – Cascading style sheets –XML – DTD – XML Schema – DOM – SAX –XSL−AJAX−JSON.

UNIT V SERVER SIDE PROGRAMMING 9

Database Connectivity - JDBC – Servlets – Java Server Pages –Session Handling−Cookies.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of this course, students would be able to:

- Understand the concept of OOP as well as the purpose and usage principles of inheritance, polymorphism, encapsulation and method overloading.
- Identify classes, objects, members of a class and the relationships among them needed for a specific problem.
- Create Java application programs using sound OOP practices (e.g., interfaces and APIs) and proper program structuring (e.g., by using access control identifies, automatic documentation through comments, error exception handling)
- Use testing and debugging tools to automatically discover errors of Java programs as well as use versioning tools for collaborative programming/editing.
- Develop programs using the Java Collection API as well as the Java standard class library.

TEXTBOOKS

1. Cay Horstmann and Gary Cornell, Core Java, Volume 1, Pearson Education, 2012.
2. Cay S. Horstmann and Gary Cornell, “Core Java, Vol. 2: Advanced Features”, 9th Edition (ENGLISH), Prentice Hall, 2013.
3. Deitel and Deitel, “Internet and World Wide Web **:** How to program”, Pearson Education Publishers, 2012.

REFERENCES

1. Deitel and Deitel, "Java – How to program", Prentice Hall of India, 2009 .
2. Robert W. Sebesta, "Programming the World Wide Web", Addison-Wesley, 6th Edition, 2010.
3. Herbert Schildt, "Java The Complete Reference", 8th Edition, McGraw-Hill Osborne Media, 2011.
4. Elliotte Rusty Harold, "Java Network Programming", 3rd Edition, O'Reilly, 2004.

XC7454 OPERATING SYSTEMS L T P C
3 0 0 3

OBJECTIVES

- To provide a clear understanding of the concepts that underlie operating systems.
- Fundamental concepts and algorithms that will be covered are based on those used in existing commercial operating systems.
- To present these topics in a general setting that is not tied to one particular operating system.
- Throughout the course, practical aspects that pertain to the most popular operating systems such as Unix/Linux and Windows, and some instructional operating systems will be studied as well.

UNIT I INTRODUCTION AND PROCESSES 10

Systems –Operating-system Structure – Operating System Operation - Protection and Security - Process Concept – Process Scheduling – Operations on Processes – - Inter process communication – Communication in Client – Server Systems.

UNIT II PROCESS MANAGEMENT 12

Threads – Multithreading Models – Threading Issues – Critical-Section Problem – Synchronization Hardware - Semaphores – Classic Problems of Synchronization –– Monitors - CPU scheduler – Scheduling criteria – Scheduling algorithms – Multiple-Processor Scheduling

UNIT III DEADLOCKS , MEMORY MANAGEMENT AND VIRTUAL MEMORY 9

Deadlock Characterization – Methods for Handling Deadlocks – Deadlock Prevention – Deadlock Avoidance – Deadlock Detection –Recovery from Deadlock – Swapping – Contiguous Memory Allocation – Paging – Page Table - Segmentation – Demand Paging – Page replacement – Allocation of Frames – Thrashing.

UNIT IV FILE SYSTEM 9

File concept – Access methods – Directory structure – File-System Mounting – File Sharing - Protection – File-System Structure – File-System Implementation – Directory Implementation – Allocation Methods – Free-Space Management

UNIT V CASE – STUDY : LINUX AND WINDOWS OPERATING SYSTEM S 5

Design Principles – Kernel Modules – Process Management – Scheduling – Memory Management – File Systems – Inter Process Communication - Security – Windows XP – Design Principles – System Component – File system

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the subject, students will be able to:

- gain extensive knowledge on principles and modules of operating systems
- understand key mechanisms in design of operating systems modules

- understand process management, concurrent processes and threads, memory management, virtual memory concepts, deadlocks
- compare performance of processor scheduling algorithms - produce algorithmic solutions to process synchronization problems
- use modern operating system calls such as Linux process and synchronization libraries
- practice with operating system concepts such as process management, synchronization, networked processes and file systems

TEXTBOOK

1. Silberschatz, A. Galvin, P.B. and Gagne, G. "Operating System Concepts", John Wiley, 8th Edition, 2009.

REFERENCES

1. Andrew S. Tanenbaum, "Distributed Operating Systems", Pearson Education Asia, 2003.
2. Dhamdhere, D.M. "Operating Systems", 2nd Edition, Tata McGraw Hill, 2006.
3. Pramod Chandra P. Bhatt "An introduction to Operating Systems: Concepts and Practice", 2nd Edition, Prentice Hall of India, 2007.
4. Sibsankar Haldar, Alex A. Aravind "Operating Systems", Pearson Education, 2009.
5. William Stallings, "Operating Systems", Prentice Hall, 8th Edition, 2014

XC7455 THEORY OF COMPUTATION L T P C
4 0 0 4

OBJECTIVES

- To provide an understanding of basic concepts in the theory of computation.
- To study push down Automata,Turing machines, universal computation and general undecidability.
- To develop knowledge and the core expertise in Theory of Computation.
- To assess via formal reasoning through computing to solve problems in science and engineering.

UNIT I REGULAR SETS AND FINITE STATE AUTOMATA 12

Finite State Automata – Deterministic and Non-deterministic models – Languages accepted by Finite State Automata – Regular Expression - Pumping Lemma for regular set.

UNIT II CONTEXT FREE LANGUAGES 12

Grammar – Context Free Grammars – Derivation trees – Simplification of context free grammar (only construction and no proof of equivalence of grammars) – Chomsky Normal Form – Greibach Normal From.

UNIT III PUSHDOWN AUTOMATA 12

Pushdown Automata – Pushdown Automata and Context Free Languages – Pumping lemma for Context Free Languages.

UNIT IV TURING MACHINES AND UNDECIDEABILITY 12

Turing Machine model – Computational languages and functions – Modifications of Turing Machines (only descriptions, no proof for theorems on equivalence of the modifications). – Properties of recursive and recursively enumerable languages – Universal Turing Machines and the undecidable problems.

UNIT V THE CHOMSKY HIERARCHY 12

Regular Grammar – Unrestricted Grammar – Context sensitive languages – Linear bounded Automata – Relation between classes of languages.

TOTAL: 60 PERIODS

OUTCOMES

Upon completion of the subject, students will be able to:

- construct finite state machines and the equivalent regular expressions.
- prove the equivalence of languages described by finite state machines and regular expressions.
- construct pushdown automata and the equivalent context free grammars.
- prove the equivalence of languages described by pushdown automata and context free grammars.
- construct Turing machines and Post machines.
- prove the equivalence of languages described by Turing machines and Post machines
- create finite machine that accepts the complex real world problems.
- solve the complex problems using universal Turing machine.
- understand the computational complexity of various problems.
- formalize mathematical models of computations; use these formalisms to explore the inherent limitations of computations; and describe some major current approaches to investigate feasible computation.

TEXTBOOK

1. Hopcroft,J.E. and Ullman, J.D. "Introduction to Automata, Languages and Computation" Naraosa Publishing House, 2002.
   [Sections 2.1-2.5, 3.1, 4.1-4.6, 5.1-5.3, 6.1, 7.1-7.5, 8.1-8.3, 9.1-9.4]

REFERENCES

1. Mishra K.L.P. and Chandrasekaran. N. "Theory of Computation", 3rd Edition, PHI, New Delhi., 2008.
2. Peter Linz, "An Introduction to Formal Languages and Automata", 5th Edition, Jones & Bartlett , 2012.

XC7461 JAVA AND INTERNET PROGRAMMING LABORATORY L T P C
0 0 4 2

1. Java Classes and Objects
2. Inheritance and Polymorphism
3. Packages, Interfaces and Exception Handling
4. GUI Programming (AWT,Swings,Applets)
5. Multi-threaded Applications
6. Socket Programming in Java
7. RMI
8. Client side scripting(HTML 5,XML,AJAX,JSON)
9. Server side scripting(JDBC,JSP)

TOTAL: 60 PERIODS

XC7462 **OPERATING SYSTEMS LABORATORY** **L T P C**
0 0 4 2

1. Basic LINUX commands
2. Shell programming
3. Filters – grep, sed, awk
4. Introduction to C programming with Linux (cc, Makefile, gdb)
5. File Systems - create, open, read, write, close, lseek, stat
6. Process management - Fork, Exec commands, Wait
7. Semaphores
8. Interprocess Communication
9. Simulation of Deadlock
10. Simulation of Scheduling algorithms

TOTAL: 60 PERIODS

XT7411 **XML AND WEB SERVICES LABORATORY** **L T P C**
0 0 4 2

1. XML document creation.
2. Importing and Exporting XML document in database.
3. XSL Transformation
4. Internal and External DTD creation
5. XML Schema creation
6. Parsing XML document using DOM/SAX parser.
7. Web Service creation using JAX-WS
8. Web Service creation using JAX-RS
9. Web Service creation using .NET
10. JAXB Marshaling and Unmarshaling

A possible set of applications may be the following:

a. Currency Conversion
b. Temperature Conversion c. Ticket Booking
d. Dictionary

TOTAL: 60 PERIODS

MA7551 **APPLIED STATISTICS** **L T P C**
4 0 0 4

UNIT I ESTIMATION THEORY **12**

Estimator: Population, Random Sample, Unbiasedness, Consistency, Sample mean and variance, Efficiency and Sufficiency – Maximum likelihood estimation – Method of moments.

UNIT II THEORY OF HYPOTHESIS 12

Sampling distributions: Normal, students-t, χ^2 and F distributions – Test based on Normal, students-t, χ^2 and F distributions for testing of mean, Variance and Proportions – Analysis of r x c Contingency tables – Goodness of fit.

UNIT III NON-PARAMETRIC TESTS 12

Sign Test: Singed – rank test, Rank-Sum test – Wilecoxon U–Test –Test based on Runs (Waldollowize run test).

UNIT IV CORRELATION AND REGRESSION 12

Multiple and Partial Correlation – Method of Least squares – Plane of Regression – Properties of Residuals – Coefficient of multiple correlation – Coefficient of Partial Correlation – Multiple Correlation with total and partial correlations – Regression and partial correlation in terms of lower order correlations.

UNIT V DESIGN OF EXPERIMENTS 12

Analysis of variance – One way and two-way classification – Completely Random Design – Ramdomized Block Design – Latin Square Design.

TOTAL: 60 PERIODS

TEXT BOOKS

1. R.A. Johnson, "Miller and Freund's Probability and Statistics for Engineers", PHI Learning Private Ltd., 7th edition, New Delhi, 2007.
2. Jay L. Devore, "Probability and Statistics for Engineers", CENGAGE Learning India Private Ltd., 2008.
3. Murray R. Spiegel, Larry J. Stephens and Narender Kumar," Statistics, Scham's outlines, 4th Edition, Tata McGraw – Hill, New Delhi, 2011.

REFERENCES

1. John E. Freund ," Mathematical Statistics", 5th Edition, Prentice Hall of India, New Delhi, 2001.
2. Irwin Miller and Marylees Miller, "Mathematical Statistics" 7th Edition, Pearson Education, New Delhi, 2004.
3. Gupta S. C. and Kapoor V. K. (2002), "Fundamentals of Mathematical Statistics", Sultan Chand and Sons, 11th Edition, New Delhi, 2002.

XC7551 COMPUTER NETWORKS L T P C
3 0 0 3

OBJECTIVES

- To Build an understanding of the fundamental concepts of computer networking.
- To Familiarize the student with the basic taxonomy and terminology of the computer networking area.
- To Introduce the student to advanced networking concepts, preparing the student for entry Advanced courses in computer networking.
- To Allow the student to gain expertise in some specific areas of networking such as the design and maintenance of individual networks.

UNIT I FUNDAMENTALS OF NETWORKING 9

History and development of Computer Networks – Network Topologies – Protocol Layers and Service Models – OSI - Internetworking and Routing – Transmission Media – Analog Transmission – Digital Transmission – Multiplexing –Switching.

UNIT II MAC LAYER 9

Framing - ALOHA Protocols – CSMA/CD – FDMA – TDMA – CDMA –Addressing - LANs: Ethernet, Token Ring, FDDI – SONET/SDH – ATM - Error Detection and Correction – Sliding Window Protocols.

UNIT III NETWORK LAYER 12

Logical Addressing: IPv4, IPv6, IPv4 to IPv6 Address Mapping, CIDR – Inter connection of LANs: Hubs, Switches, Repeaters, Bridges, Routers, Spanning Tree, Flooding & Multicasting – Layer 3 Protocols: IP, ARP, RARP, ICMP, IGMP – Inter Domain and Intra Domain Routing.

UNIT IV TRANSPORT LAYER 8

Port to Port Communication – Transport Layer Protocols - UDP – TCP – SCTP – Congestion Control Mechanisms – QOS.

UNIT V APPLICATION LAYER 7

DHCP – DNS – TELNET – FTP – TFTP - HTTP – E-mail – SNMP – WWW Documents – CGI – PERL – Network Security.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the subject, students will be able to:

- Independently understand basic computer network technology.
- Understand and explain Data Communications System and its components.
- Identify the different types of network topologies and protocols.
- Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
- Identify the different types of network devices and their functions within a network
- Understand and build the skills of subnetting and routing mechanisms.
- Familiarze with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.

TEXTBOOKS

1. Behrouz. A. Forouzan, “Data Communications and Networking”, Fifth Edition, Tata McGraw-Hill Publishers, 2013.
2. Larry L. Peterson, Bruce S. Davie, “ Computer Networks: A Systems Approach”, 4th Edition, Morgan Kaufmann Publishers, 2007.
3. Behrouz A. Forouzan, “TCP/IP Protocol Suite”, Fourth Edition, Tata McGraw-Hill Publishers, 2013.

REFERENCES

1. James F. Kurose, Keith W. Ross, ”Computer Networking : A Top-Down Approach Featuring the Internet”, 3rd Edition, Pearson, 2011.
2. W. Richard Stevens, G. Gabrani, “ TCP/IP Illustrated, Volume 1”, Pearson, 2009.
3. Andrew S. Tanenbaum, “Computer Networks”, 4th Edition, Pearson, 2011.
4. William Stallings, “High Speed Networks and Internets”, 2nd Edition, Pearson, 2010.
5. M. Barry Dumas, Morris Schwartz, “Principles of Computer Networks and Communications”, First Edition, Pearson, 2013.
6. Wendell Odom, CCIE No.1624, “IP Networking”, 1st Edition, Pearson, 2012.

XC7552 DESIGN AND ANALYSIS OF ALGORITHMS L T P C
4 0 0 4

OBJECTIVES

- To provide a solid foundation in algorithm design and analysis.

UNIT I ANALYZING ALGORITHMS 10

Algorithms – Analyzing algorithms – Designing algorithms – Growth of functions Recurrences.

UNIT II SORTING 11

Insertion sort – Quick sort – Divide and Conquer – Merge sort – Heap sort – Lower bounds for sorting.

UNIT III GRAPH ALGORITHMS 14

Representations of graphs – Breadth-first search – Depth-first search – Minimum spanning tree – The algorithms of Kruskal and Prim – Shortest paths – Dijkstra's algorithm.

UNIT IV STRING MATCHING 11

The naïve string-matching algorithm – String matching with finite automata – The Knuth-Morris – Pratt algorithm.

UNIT V NP COMPLETENESS 14

Polynomial time – The complexity class NP – NP-Completeness – Reducibility – NP-Complete problems.

TOTAL: 60 PERIODS

OUTCOMES

Upon successful completion of this course, students should be able to:

- prove the correctness and analyze the running time of the basic algorithms for those classic problems in various domains;
- apply the algorithms and design techniques to solve problems
- analyze the complexities of various problems in different domains.

TEXTBOOK

1. Cormen, T.H., Leiserson, C.E. and Rivest, R.L. Introduction to Algorithms, 2nd Edition, Prentice Hall of India, New Delhi (2009).
   Chapters 2, 3, 6, 23; Sections: 1.1, 4.1 to 4.3, 7.1, 7.2, 8.1, 22.1 to 22.4, 24.3, 32.1, 32.3, 32.4, 34.1, to 34.3, 34.5.1, 34.5.4.

REFERENCES

1. Baase, S. Computer Algorithms: Introduction to Design and Analysis, 3rd Edition, Addison and Wesley, 2008.
2. Levitin, A., Introduction to the Design & Analysis of Algorithms, 3rd Edition, Pearson Education (Asia) Pvt. Ltd., 2011.

XC7553 SOFTWARE ENGINEERING L T P C
3 0 0 3

OBJECTIVES

- to assist the student in understanding the basic theory of software engineering, and
- to apply these basic theoretical principles to a group software development project.

UNIT I INTRODUCTION 9

Software - Types of software - Software Engineering - Software Process - Attributes of good software - Challenges of Software Engineering - Professional and Ethical responsibility system - Types of System - Systems Engineering - System Requirements Definition - System Design - System Modeling - Sub-system development - Systems Integration - System Evolution - System Decommissioning - Legacy Systems - Critical Systems - System Dependability.

UNIT II SOFTWARE PROCESS MODELS 9

Waterfall life cycle model - Evolutionary development – Component based Software Engineering - Process Iteration - Incremental Delivery - Spiral model - Process Activities - Rational Unified Process - Computer aided Software Engineering - Case studies.

UNIT III SOFTWARE PROJECT MANAGEMENT AND REQUIREMENT ENGINEERING 9

Management Activities – Project Planning and Scheduling - Risk Management - Functional and non-functional requirements - User Requirements - System Requirements - Software Requirements document - Feasibility Study - Requirements elicitation and analysis - Requirements Validation - Requirement Management.

UNIT IV SOFTWARE DESIGN AND TESTING 9

System Organization - Modular Decomposition – Cohesion - Coupling - Multi Processor architecture – Client server Architecture - Distributed Object Architecture - Object Oriented Design Process - System Testing – Integration Testing – Release Testing -Performance Testing - Component Testing - Interface Testing - Test Case Design -Partition Testing - Structural Testing - Path Testing

UNIT V SOFTWARE COST ESTIMATION AND QUALITY 9

Software Productivity - Estimation Techniques - Algorithmic Cost Modeling - Project duration and staffing - Process and Product Quality - Quality assurance and standards - Quality Planning - Quality Control and Software measurements and metrics

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the subject, students will be able to:

- Perform background research and a feasibility study prior to embarking on a development project.
- apply the waterfall software development lifecycle model to a development project.
- know how and when to adapt or replace the waterfall lifecycle model by other alternatives, including user-centred development and iterative lifecycle models.
- collect and analyse user requirements using a formalism such as UML, including business process modeling.
- Perform a simple risk assessment for a development project.
- should be able to structure this information in a User Requirements Document (URD).
- translate end-user requirements into system and software requirements, using e.g. UML.
- identify and apply appropriate software architectures and patterns to carry out high level design of a system.
- work in a team to implement a project plan, URD, SRD and ADD, by developing detailed designs and code.

TEXTBOOK

1. Sommerville, I. “Software Engineering”, 9th Edition, Pearson Education, 2011.

REFERENCES

1. Pressman, R.S. “Software Engineering: A Practitioner Approach”, 6th Edition, McGraw Hill, 2005.
2. Carlo Ghezzi, Mehdi Jazayeri and Dino Mandrioli, “Software Engineering”, Prentice Hall India, 2009.
3. Gopalasamy Ramesh,” Managing Global Software Project”, Tata McGraw Hill, 2001.

XT7551 DATA MINING AND WAREHOUSING L T P C
3 0 0 3

OBJECTIVES

- To Create a clean, consistent repository of data within a data warehouse for large corporations;
- To Utilize various techniques developed for data mining to discover interesting patterns in large databases;
- To Expose students to new techniques and ideas that can be used to improve the effectiveness of current data mining tools.

UNIT I DATA WAREHOUSING 9

Data Warehousing and Business Analysis: - Data warehousing Components –Building a Data warehouse – Mapping the Data Warehouse to a Multiprocessor Architecture – DBMS Schemas for Decision Support – Data Extraction, Cleanup, and Transformation Tools –Metadata – reporting – Query tools and Applications – Online Analytical Processing (OLAP) – OLAP and Multidimensional Data Analysis.

UNIT II DATA MINING & ASSOCIATION RULE MINING 9

Data Mining: - Data Mining Functionalities – Data Preprocessing – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization and Concept Hierarchy Generation.
Association Rule Mining: - Efficient and Scalable Frequent Item set Mining Methods – Mining Various Kinds of Association Rules – from Association Mining to Correlation Analysis – Constraint-Based Association Mining.

UNIT III CLASSIFICATION & PREDICTION 10

Classification and Prediction: - Issues Regarding Classification and Prediction – Classification by Decision Tree Introduction – Bayesian Classification – Rule Based Classification – Classification by Back propagation – Support Vector Machines – Associative Classification – Other Classification Methods – Prediction – Accuracy and Error Measures – Evaluating the Accuracy of a Classifier or Predictor

UNIT IV CLUSTER ANALYSIS 10

Types of Data in Cluster Analysis – A Categorization of Major Clustering Methods – Partitioning Methods – Hierarchical methods – Density-Based Methods – Grid-Based Methods – Model-Based Clustering Methods – Clustering High- Dimensional Data – Constraint-Based Cluster Analysis – Outlier Analysis.

UNIT V APPLIED DATA MINING 7

Multidimensional Analysis and Descriptive Mining of Complex Data Objects – Spatial Data Mining – Multimedia Data Mining – Text Mining – Mining the World Wide Web.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the subject, students will be able to:

- understand why there is a need for data warehouse in addition to traditional operational database systems;
- identify components in typical data warehouse architectures;
- design a data warehouse and understand the process required to construct one;
- understand why there is a need for data mining and in what ways it is different from traditional statistical techniques;
- understand the details of different algorithms made available by popular commercial data mining software;
- solve real data mining problems by using the right tools to find interesting patterns;
- understand a typical knowledge discovery process such as CRISP-DM;
- obtain hands-on experience with some popular data mining software.

TEXTBOOKS

1. Jiawei Han and Micheline Kamber "Data Mining Concepts and Techniques", 3rd Edition, Elsevier, Reprinted 2012.
2. Alex Berson and Stephen J. Smith "Data Warehousing, Data Mining & OLAP", Tata McGraw – Hill Edition, 27th Reprint, 2013.

REFERENCES

1. K.P. Soman, Shyam Diwakar and V. Ajay "Insight into Data mining Theory and Practice", Easter Economy Edition, Prentice Hall of India, 2006.
2. G. K. Gupta "Introduction to Data Mining with Case Studies", Easter Economy Edition, Prentice Hall of India, 2006.
3. Pang-Ning Tan, Michael Steinbach and Vipin Kumar "Introduction to Data Mining", Pearson Education, 2007.

XT7561 DATA MINING AND WAREHOUSING LABORATORY L T P C
0 0 4 2

SPSS, Clementine – Tools for Data Mining – Classification – Regression – Clustering – Summarization and dependency modeling – Change and deviation detection – Visualization – Using data mining tools for different application.

TOTAL: 60 PERIODS

XT7562 GUI APPLICATIONS LABORATORY L T P C
0 0 4 2

1. Dialog based applications with common controls and ActiveX Controls
2. Applications with menus and toolbars
3. Database Applications to Add, Delete, Modify and View Records
4. Applications with document/view architecture (SDI, MDI)
5. Applications with serialization
6. Database connectivity.
7. Application of all above concepts.

TOTAL: 60 PERIODS

MA7651 PROBABILITY, QUEUEING THEORY AND RELIABILITY L T P C
4 0 0 4

UNIT I ONE – DIMENSIONAL RANDOM VARIABLES 12

Discrete and Continuous random variables – Moments – Moment generating functions – Binomial, Poisson, Geometric, Uniform, Weibull, Normal, Exponential and Gamma Distributions – Function of a random variable.

UNIT II TWO-DIMENSIONAL RANDOM VARIABLES 12

Joint distribution – Marginal and Conditional distributions – Covariance – Correlation and Linear regression – Conditional expectations – Regression curve.

UNIT III QUEUEING MODELS 12

Markovian Queues: M/M/1 and M/M/C infinite and finite capacity waiting line queueing models – Little's formula – Finite source queueing model.

UNIT IV ADVANCED QUEUEING MODELS 12

M/G/1 queue (P-K formula) : M/D/1 and M/G/1 as special cases – Series (Tandem) queueing model – Open Jackson queueing network – Closed queueing network.

UNIT V RELIABILITY MODELS 12

Failure distribution – Reliability and Hazard function – Exponential, Lognormal and Weilbull distributions failure models – Reliability of series and parallel systems – k-out of m system – MTTF – Redundancy – Cross link systems.

TOTAL: 60 PERIODS

TEXTBOOKS

1. S. Ghahramani, "Fundamentals of Probability with Stochastic Processes", Pearson Education Inc., Singapore, 3rd Edition, 2005.
2. Thomas G. Robertazzi," Computer Networks and Systems: Queueing Theory and Performance evaluation", Springer-Verlog, Berlin, 3rd Edition, 2009.
3. E. Balagurusamy," Reliability Engineering, Tata McGraw Hill, New Delhi, 2003.

REFERENCES

1. Irvin Miller and Marylees Miller, "Mathematical Statistics with Applications", Pearson Education, New Delhi, 7th Edition, 2004.
2. Richard A. Johnson and C. B. Gupta," Probability and Statistics for Engineers", Pearson Education, New Delhi, 2006.
3. J. Medhi,: Stochastic Models in Queueing Theory", Elsevier Inc., Amsterdam, 2nd Edition, 2003.
4. Richard H. Williams, "Probability, Statistics and Random Processes for Engineers", Cengage Learning India Private Limited, New Delhi, 2003.
5. D. Gross and C. M. Harris, "Fundamentals of Queueing Theory, Willey student, New Jercy, 3rd Edition, 2004.

XC7651 COMPUTER GRAPHICS AND MULTIMEDIA L T P C
3 0 0 3

OBJECTIVES

- To understand computational development of graphics with mathematics
- To provide in-depth knowledge of display systems, image synthesis, shape modeling of 3D application.
- To Understand basic concepts related to Multimedia including data standards, algorithms and software
- To Experience development of multimedia software by utilizing existing libraries and descriptions of algorithms

UNIT I OVERVIEW OF COMPUTER GRAPHICS AND MULTIMEDIA 9

A Survey of Computer Graphics – Overview of Graphics System – Video Display Devices – Raster-Scan and Random-Scan Systems – Input Devices – Hard Copy Devices – Graphics software – Fractals, Animations.

UNIT II OUTPUT PRIMITIVES AND 2D TRANSFORMATIONS 9

Point Generation – Line and Circle Generating Algorithms – Area filling algorithm-Scanline Polygon Fill algorithm–Inside outside tests-Boundary fill algorithm-flood fill algorithm-character generation-2D Transformations – Windowing & Clipping – Cohen-Sutherland Line Clipping – Liang-Barsky Line Clipping.

UNIT III 3D GRAPHICS 9

3D Concepts – Representations – Polygon Surfaces – Splines representations and types of splines – 3D Transformations – Projections – Visible Surface Detection Methods – Backface Detection – Scanline Method – Depth-Sorting Method.

UNIT IV MULTIMEDIA TOOLS AND COMMUNICATIONS 9

Multimedia – Multimedia and Hypermedia – Overview of Multimedia software tools – multimedia authoring and tools – multimedia networks- multimedia network communications and applications-standards for multimedia communications- multimedia over wireless networks.

UNIT V MULTIMEDIA INFORMATION REPRESENTATION 9

Digitization principles – Text – Unformatted text – formatted text – Hyper text - Images – Graphics – Digitized documents – Digitized pictures - Audio – PCM – CD quality audio – Synthesized audio – Video – Digital video – PC video – text and image compression – audio and video compression.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the subject, students will be able to:

- Students will demonstrate an understanding of contemporary graphics hardware.
- Students will create interactive graphics applications in C++ using one or more graphics application programming interfaces.
- Students will write program functions to implement graphics primitives.
- Students will write programs that demonstrate geometrical transformations.
- Students will demonstrate an understanding of the use of object hierarchy in graphics applications.
- Students will write program functions to implement visibility detection.
- Students will write programs that demonstrate computer graphics animation.
- Students will write programs that demonstrate 2D and 3D image processing techniques.

TEXTBOOKS

1. Hearn, D. and Pauline Baker, M., “Computer Graphics”, 2nd Edition, Pearson Education, Asia, Delhi, 2002.
2. Ze-Nian Li and Mark S. Drew, Fundamentals of Multimedia, Pearson Education, 2005.
3. Fred Halsall, Multimedia communications – Applications, Networks, Protocols and Standards, Pearson Education, 2002.

REFERENCES

1. Rogers, D.F., “Procedural Elements for Computer Graphics”, 2nd Edition, Tata McGraw Hill Publications, New Delhi, 2001.
2. Foley, J.D. , Andries Van Dam, Feiner, S. K. and Hughes J.F., “Computer Graphics – Principles and Practice”, Pearson Education, Asia, Delhi, 2001.
3. Ralf Steinmetz, Klara Nehrstedt, Multimedia, Computing, Communications and Applications, Prentice Hall, 1995.

XC7652 OBJECT ORIENTED ANALYSIS AND DESIGN L T P C
3 0 0 3

OBJECTIVES

- To learn the concept of Object Oriented Software Development Process
- To get acquainted with UML Diagrams
- To understand Object Oriented Analysis Processes

UNIT I INTRODUCTION 9

Overview of OO Systems Development – Object basics – OO Systems development life cycle – OO methodologies: Rumbaugh et al.'s Object Modeling Technique – The Booch Methodology – The Jacobson et al. Methodology – Patterns – Frameworks – The Unified Approach.

UNIT II STATIC AND DYNAMIC MODELLING IN UML 9

UML – Class Diagram – Use Case Diagram – Interaction Diagram: Sequence Diagram – Collaborative Diagram – State Chart Diagram – Activity Diagram – Component Diagram – Deployment Diagram.

UNIT III OBJECT ORIENTED ANALYSIS 9

Approaches for Identifying Classes – Noun Phrase Approach – Common Class Patterns Approach – Use-Case Driven Approach – Classes, Responsibilities and Collaborators – Identifying Object Relationships, Attributes and Methods – Case Study: Banking System.

UNIT IV OBJECT ORIENTED DESIGN – I 9

Object Oriented Design Axioms and Corollaries – Design Patterns - Designing Classes – Refining Attributes – Designing Methods and Protocols – Relational Database management Systems - Object Oriented Database Management Systems – Object Relational Systems: Object Relation Mapping – Table Class Mapping – Table Multiple Classes Mapping – Table Inherited Classes Mapping – Keys for Instance Navigation – Multidatabase Systems – Designing Access Layer Classes.

UNIT V OBJECT ORIENTED DESIGN – II 9

View Layer: Designing Interface Objects – Purpose of View Layer Interface – Prototyping the User Interface – Case Studies: Inventory Control System; Library Management System; Hospital Management System; Online Examination System; Online Railway Reservation System.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the subject, students will be able to:

- Master the fundamental principles of OO programming
- Master key principles in OO analysis, design, and development
- familiaze with the application of the Unified Modeling Language (UML) towards analysis and design
- Master common patterns in OO design and implement them
- familiaze with alternative development processes

TEXTBOOKS

1. Bahrami, Ali, "Object oriented systems development" Boston, Mass: Irwin/McGraw-Hill, 1999.
2. Booch, Grady, James Rumbaugh, and Ivar Jacobson, "The unified modeling language user guide", Pearson Education India, 1999.

REFERENCES

1. Page-Jones, Meilir, "Fundamentals of object-oriented design in UML", Addison-Wesley Professional, 2000.
2. Satzinger, John W, Robert B. Jackson, and Stephen D. Burd, "Object-Oriented Analysis and Design with the Unified Process", Thomson Course Technology, 2005.

3. Booch, Grady, Robert A. Maksimchuk, Michael W. Engel, Bobbi J. Young, Jim Conallen, and Kelli A. Houston, “Object-Oriented Analysis and Design with Applications”, Vol. 3. Addison-Wesley, 2008.

XT7601 NETWORK MANAGEMENT L T P C
3 0 0 3

OBJECTIVES

- To Appreciate the role of network management.
- To Explain basic network models, protocols and database concepts.
- To Identify the requirements of tools required to manage small to medium sized networks.
- To Appreciate the requirements of tools required to manage enterprise networks.
- To Configure basic network management on a network and manage the network using basic tools.

UNIT I FUNDAMENTALS OF COMPUTER NETWORK TECHNOLOGY 9

Network Topology, LAN, Network node components- Hubs, Bridges, Routers, Gateways, Switches, WAN, ISDN Transmission Technology, Communications protocols and standards. Network Management: Goals, Organization, and Functions, Network and System Management, Network Management System Platform, Current Status and future of Network.

UNIT II OSI NETWORK MANAGEMENT 9

OSI Network management model-Organizational model-Information model, communication model. Abstract Syntax Notation - Encoding structure, Macros Functional model CMIP/CMIS.

UNIT III INTERNET MANAGEMENT(SNMP) 9

SNMP(V1 and V2)-Organizational model-System Overview, The information model, communication model-Functional model, SNMP proxy server, Management information, protocol remote monitoring- , RMON SMI and MIB, RMON1,RMON2 - A Case Study of Internet Traffic Using RMON.

UNIT IV BROADBAND NETWORK MANAGEMENT 9

Broadband networks and services, ATM Technology-VP,VC, ATM Packet, Integrated service, ATMLAN emulation, Virtual Lan. ATM Network Management-ATM Network reference model, integrated local management Interface. ATM Management Information base, Role of SNMD and ILMI in ATM Management, M1, M2, M3, M4 Interface. ATM Digital Exchange Interface Management- , TMN conceptual Model- TMN Architecture, TMN Management Service Architecture

UNIT V NETWORK MANAGEMENT APPLICATIONS 9

Configuration management, Fault management, performance management, Event Correlation Techniques security Management, Accounting management, Report Management, Policy Based Management Service Level Management- Network Management Tools, Network Statistics Measurement Systems – Web Based Management, XML Based Network Management - : Future Directions.

TOTAL: 45 PERIODS

OUTCOMES

Upon successful completion of this subject students should be able to:

- Apply systems thinking to understand complex system behaviour including interactions between components and with other systems
- Identify and apply relevant problem solving methodologies
- Design components, systems and/ or processes to meet required specification
- Evaluate model applicability, accuracy and limitations

REFERENCES

1. Mani Subramanian, “Network Management Principles and practice ", Pearson Education, New Delhi, 2010.
2. STALLINGS, WILLIAM, “SNMP, SNMPv2, SNMPv3, and RMON 1 and 2,” Pearson Education, 2012
3. Salah Aiidarous, Thomas Plevayk, “Telecommunications Network Management Technologies and Implementations ", eastern Economy Edition IEEE press, New Delhi, 1998.
4. Lakshmi G. Raman, “Fundamentals of Telecommunication Network Management ", Eastern Economy Edition IEEE Press, New Delhi, 1999.

GE7651 ENVIRONMENTAL SCIENCE AND ENGINEERING L T P C
3 0 0 3

UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY 14

Definition, scope and importance of environment – need for public awareness - concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers – energy flow in the ecosystem – ecological succession – food chains, food webs and ecological pyramids, ecotone, ecological niche – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – hot-spots of biodiversity – 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.

Field study of common plants, insects, birds

Field study of simple ecosystems – pond, river, hill slopes, etc.

UNIT II ENVIRONMENTAL POLLUTION 8

Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution- oil pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – soil waste management: causes, effects and control measures of municipal solid wastes – role of an individual in prevention of pollution – pollution case studies – disaster management: floods, earthquake, Tsunami, cyclone and landslides.

Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

UNIT III NATURAL RESOURCES 10

Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles.

Field study of local area to document environmental assets – river / forest / grassland / hill / mountain.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT 7

From unsustainable to sustainable development – urban problems related to energy – water conservation, rain water harvesting, watershed management – resettlement and rehabilitation of people; its problems and concerns, case studies – role of non-governmental organization- environmental ethics: Issues and possible solutions – climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies. – wasteland reclamation – consumerism and waste products – environment production act – Air (Prevention and Control of Pollution) act – Water (Prevention and control of Pollution) act – Wildlife protection act – Forest conservation act – enforcement machinery involved in environmental legislation- central and state pollution control boards- Public awareness.

UNIT V HUMAN POPULATION AND THE ENVIRONMENT 6

Human population growth and environmental constrains, Environmental ethic in population growth-variation among nations – population explosion – family welfare programme – environment and human health – human rights – value education – HIV / AIDS – women and child welfare – role of information technology in environment and human health – Case studies.

TOTAL: 45 PERIODS

TEXTBOOKS

1. Gilbert M.Masters, "Introduction to Environmental Engineering and Science", 2nd edition, Pearson Education, 2004.
2. Benny Joseph, "Environmental Science and Engineering", Tata McGraw-Hill, New Delhi, 2006.

REFERENCES

1. R.K. Trivedi, "Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards", Vol. I and II, Enviro Media.
2. Cunningham, W.P. Cooper, T.H. Gorhani, "Environmental Encyclopedia", Jaico Publ., House, Mumbai, 2001.
3. Dharmendra S. Sengar, "Environmental law", Prentice Hall of India PVT LTD, New Delhi, 2007.
4. Rajagopalan, R, "Environmental Studies-From Crisis to Cure", Oxford University Press (2005).

XC7661 CASE TOOLS LABORATORY L T P C
0 0 4 2

OBJECTIVES

- To learn the fundamentals of Object Oriented Analysis and Design concepts and experienced using UML diagrams - generate source code – identifies the deliverables of the problem defined. Use case diagram- Class diagram-Interaction diagram- State transition diagram-Component and Deployment diagram.

Suggested List of Domains

1. Stock maintenance
2. Passport automation system
3. Book bank
4. Software personnel management system
5. E-ticketing
6. BPO Management System
7. Conference Management System

TOTAL: 60 PERIODS

OUTCOMES

1. Design and implement projects using object oriented concepts.
2. Create code from design.

XC7662 COMPUTER GRAPHICS AND MULTIMEDIA LABORATORY L T P C
0 0 4 2

Point Generation – Implementation of Line Algorithms – Implementation of Circle Algorithm – Clipping – Implementation of 2D Transformations – 3D Objects – Sphere, Ellipsoid- implementation of perspective and parallel projection.

The above exercises are to be carried out in open GL environment. **(9 labs)**

Tweened Animation- Motion tween – Motion along open/closed guided path - Shape tween– Size tween – Color Tween – morphing – Fractal drawing – Image editing tool –Audio and Video Editing tools. **(9 labs)**

Mini project

TOTAL : 60 PERIODS

MA7851 NUMERICAL METHODS L T P C
4 0 0 4

UNIT I SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS 12

Iterative method and Newton - Raphson method for Algebraic and Transcendental Equations. Solutions of linear system by Gaussian, Gauss-Jordan, Jacobi and Gauss-Seidel methods. Inverse of a matrix by Gauss-Jordan method. Eigenvalue of a matrix by Power methods.

UNIT II INTERPOLATION 12

Newton's divided difference formula, Lagrange's formula. Newton's forward and backward difference formulae, Natural Cubic Spline.

UNIT III NUMERICAL DIFFERENTIATION AND INTEGRATION 12

Numerical differentiation with interpolating polynomials, Numerical integration by Trapezoidal and Simpson's $1/3^{rd}$ rule. Double integrals using Trapezoidal and Simpson's rules .

UNIT IV INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS 12

Single Step Methods-Taylor Series, Euler and Modified Euler, methods for first order differential equations, Runge-Kutta method of order four for first and second order differential equations. Multistep Methods-Milne and Adam's-Bashforth predictor and corrector methods for first order differential equations.

UNIT V BOUNDARY VALUE PROBLEMS FOR ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS 12

Finite difference solution for the second order ordinary differential equations. Finite difference solution for one dimensional heat equation (explicit scheme), one dimensional wave equation and two dimensional Laplace and Poisson equations.

TOTAL: 60 PERIODS

TEXTBOOK

1. Grewal, B.S, and Grewal J.S., "Numerical Methods in Engineering and Science", 39th Edition, Khanna Publishers, New Delhi, 2005.

REFERENCES

1. Sankara Rao, K., "Numerical methods for scientists and Engineers", 3rd Edition, Prentice-Hall of India, New Delhi, 2008.
2. Veerarajan, T. and Ramachandran, T., "Numerical Methods with Programming in C", Tata McGraw-Hill Publishing Company Limited, New Delhi, 2009.
3. John H. Mathews, "Numerical Methods for Mathematics, Science and Engineering", 2rd Edition, Prentice-Hall of India, New Delhi, 2005.
4. Sastry, S. S., "Introductory Methods of Numerical Analysis", 3rd Edition, Prentice-Hall of India, New Delhi, 2004.

XC7852 PRINCIPLES OF COMPILER DESIGN L T P C
3 0 0 3

OBJECTIVES

- To understand the phases of the compilation process and be able to describe the purpose and implementation approach of each phase.
- To provide a practical exposure to aspects of theoretical computer science including Languages, Grammars, and Machines.
- To Exercise and reinforce prior programming knowledge with a non-trivial programming project to construct a compiler.

UNIT I INTRODUCTION AND LEXICAL ANALYSIS 7

Introduction of the Compiler – The Structure of a Compiler – Lexical Analysis: The role of lexical analyzer – Input Buffering – Specification of tokens – Recognition of Tokens - Tools to Generate Lexical Analyzer.

UNIT II SYNTAX ANALYSIS AND INTERMEDIATE CODE GENERATION 11

Role pf Parser – Top –down Parsing – Bottom – up Parsing – LR parser – Parser generators Yacc, Intermediate code generation: Variants of syntax trees – Three – address code – Types and definitions – Translation of Expressions – Type checking – Control flow – Back Patching.

UNIT III RUN – TIME ENVIRONMENT 9

Storage Organization – Stack Allocation of Space – Access to Nonlocal Data on the Stack – Heap Management – Introduction to Garbage Collection.

UNIT IV CODE GENERATION 9

Issues in the Design of a Code Generator – The Target Language - Addresses in the Target Code – Basic Blocks and Flow Graphs – Optimization of Basic Blocks – A simple Code Generator – Peephole Optimization.

UNIT V MACHINE-INDEPENDENT OPTIMIZATIONS 9

The Principle Sources of Optimization – Introduction to Data-Flow Analysis – Foundations of Data-Flow Analysis – Constant Propagation – Partial-Redundancy Elimination – Loops in Flow Graphs.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the subject, students will be able to:

- Design and implement techniques used for optimization by a compiler.
- Modify the existing data structures of an open source optimizing compiler.
- Design and implement new data structures and algorithms for code optimisation. Critically analyze different data structures and algorithms used in the building of an optimizing compiler.

TEXTBOOK

1. Alfred Aho, Monica S. Lam, V. Ravi Sethi and Jeffery Ullman, “Compiler Principles, Techniques and Tools”, Pearson Education, 2nd Edition, 2011.

REFERENCES

1. Steven S. Muchnick, “Advanced compiler design implementation”, Morgan Koffman, 1997.
2. Parag H. Dave, Himanshu B. Dave ”Compilers Principles and Practice”, Pearson, 2012.
3. Allen Holub, “Compiler design in C”, Prentice Hall of India, 1990.

XC7853 SOFTWARE TESTING AND QUALITY ASSURANCE L T P C
3 0 0 3

OBJECTIVES

- To present the concepts, techniques and metrics for quality assurance in software development.
- To develop a good understanding of issues, techniques and tools for software testing.
- To enable students to gain a working knowledge of techniques for management of testing projects.

UNIT I INTRODUCTION TO SOFTWARE QUALITY 8

Ethical Basis for Software Quality – Total Quality Management Principles – Software Processes and Methodologies – Quality Standards, Practices & Conventions – Improving Quality with Methodologies – Structured/Information Engineering – Measuring Customer Satisfaction–Software Quality Engineering – Defining Quality Requirements – Management Issues for Software Quality – Data Quality Control – Benchmarking and Certification.

UNIT II SOFTWARE QUALITY METRICS AND RELIABILITY 9

Writing Software Requirements and Design Specifications – Analyzing Software Documents using Inspections and Walkthroughs – Software Metrics – Lines of code, Cyclomatic Complexity, Function Points, Feature Points – Software Cost Estimation– Reliability Models – Reliability Growth Models – OO Metrics.

UNIT III TEST CASE DESIGN 11

Testing as an Engineering Activity – Testing Fundamentals – Defects – Strategies and Methods for Black Box Test Case Design – Strategies and Methods for White-Box Test Case design –Test Adequacy Criteria – Evaluating Test Adequacy Criteria – Levels of Testing and different types of testing – OO Testing.

UNIT IV TEST MANAGEMENT 9

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

UNIT V CONTROLLING AND MONITORING 8

Measurement and Milestones for Controlling and Monitoring – Status Meetings – Reports and Control Issues – Criteria for Test Completion – SCM – Types of reviews – Developing a review program – Components of Review Plans – Reporting review results.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the subject, students will be able to:

- appreciate the importance of software quality assurance
- apply software testing techniques for information systems development
- know the inputs and deliverables of the testing process

TEXTBOOKS

1. Ilene Burnstein, “Practical Software Testing”, Springer International Edition, Chennai, 2003.
2. Stephen Kan, “Metrics and Models in Software Quality”, Addison-Wesley, 2nd Edition, 2004.

REFERENCES

1. Milind Limaye, “Software Quality Assurance”, McGraw Hill, 2011.
2. M G Limaye, “Software Testing – Principles, Techniques and Tools”, McGraw Hill, 2011.
3. Edward Kit, “Software Testing in the Real World – Improving the Process”, Pearson Education, New Delhi, 1995.
4. Elfriede Dustin, “Effective Software Testing”, Pearson Education, New Delhi, 2003.
5. Rajani and Pradeep Oak, “Software Testing – Effective Methods, Tools and Techniques”, Tata McGraw Hill, New Delhi, 2003.
6. Yogesh Singh, “Software Testing” Cambridge University Press India, 2012.

XT7851 CLOUD COMPUTING L T P C
3 0 2 4

OBJECTIVES:

- To introduce the broad perceptive of cloud architecture and model
- To understand the concept of Virtualization and design of cloud Services
- To understand the features of cloud simulator
- To apply different cloud programming model as per need.
- To be familiar with the lead players in cloud.
- To learn to design the trusted cloud Computing system

UNIT I INTRODUCTION 9

Evolution of cloud computing – Need for cloud computing - Benefits - Limitations - Migration into Cloud - Basics of virtualization - Desktop virtualization - Server virtualization - Case study: VMware - Basics of web services - Key concepts

UNIT II CLOUD ARCHITECTURE 9

Three-layer cloud computing architecture - On-demand provisioning - Elasticity in cloud Cloud Computing Services – Infrastructure-as-a-Service – Software-as-a-Service –Platform-as-a-Service - Cloud providers - Cloud deployment models

UNIT III ISSUES IN CLOUD 9

Federation in cloud - Four levels of federation - Privacy in cloud - Security in cloud - Software-as-a-Service security - Case study: Aneka - Service level agreements

UNIT IV CLOUD STORAGE 9

Overview of cloud storage - Cloud storage providers - Case studies: Walrus - Amazon S3 - Cloud file system – Map Reduce - Case study: Hadoop

UNIT V CLOUD DEPLOYMENT TOOLS 9

Study of open source cloud platforms - Eucalyptus - Nimbus - Open Nebula.

TOTAL (45+30):75 PERIODS

OUTCOMES

Upon completion of the subject, students will be able to:

- Articulate the main concepts, key technologies, strengths and limitations of cloud computing
- Identify the architecture, infrastructure and delivery models of cloud computing
- Explain the core issues of cloud computing such as security, privacy and interoperability
- Choose the appropriate technologies, algorithms and approaches for the related issues

TEXTBOOKS

1. Toby Velte, Anthony Velte, Robert Elsenpeter, “Cloud Computing: A Practical Approach”, Tata McGrawHill, 2009.
2. John W.Rittinghous, James F.Ransome, “Cloud Computing: Implementation, Management and Security”, CRC Press, 2010.

REFERENCES

1. Danielle Ruest and Nelson Ruest, ‘Virtualization: A Beginner’s Guide”, McGraw Hill, 2009.
2. Leonard Richardson, Sam Ruby, “RESTful Web Services Web services for the real world”, O’REILLY, 2007.
3. Katarina Stanoevska-Slabeva, Thomas Wozniak, Santi Ristol, “Grid and Cloud Computing - A Business Perspective on Technology and Applications”, Springer, 2009.
4. Tom White, “Hadoop: The Definitive Guide”, O’REILLY Media, 2009.
5. Rajkumar Buyya, James Broberg, Andrzej Goscinski, “Cloud Computing -Principles and Paradigms”, John Wiley and Sons, 2011.
6. James E. Smith, Ravi Nair, “Virtual Machines: Versatile Platforms for Systems and Processes’’, Elsevier/Morgan Kaufmann, 2005.

XT7852 SOFTWARE PROJECT MANAGEMENT L T P C
3 0 0 3

OBJECTIVES

- To study how to plan and manage projects at each stage of the software development life cycle (SDLC)
- To train software project managers and other individuals involved in software project planning and tracking and oversight in the implementation of the software project management process.
- To understand successful software projects that support organization’s strategic goals

UNIT I FUNDAMENTALS 9

Conventional software management - Evolution of software economics - Improving software economics - Conventional Vs Modern software project management.

UNITII SOFTWARE MANAGEMENT PROCESS FRAMEWORK 9

Lifecycle phases - Artifacts of the process - Model based software architectures -Workflows of the process - Checkpoints of the process.

UNIT III SOFTWARE MANAGEMENT DISCIPLINES 9

Iterative process planning - Organization and Responsibilities - Process automation - Process control and process instrumentation - Tailoring the process.Project planning - Scheduling - Tracking and Control - Time and Cost overruns - Project organization - Staffing - Group working - Team dynamics.

UNIT IV MANAGED AND OPTIMIZED PROCESSES 9

Quality management and ISO 9000 quality assurance method - Configuration management - Quality reviews - Software standards - Tracking of defects - Process improvements - SCI/CMM models - Other process models - Data gathering and analysis Principles of data gathering - Data gathering process - Software measures - Data analysis - Managing software quality - Defect prevention.

UNIT V CASE STUDIES 9

COCOMO Cost estimation model - Change metrics - Case studies.

TOTAL: 45 PERIODS

OUTCOMES

- To match organizational needs to the most effective software development model
- To understand the basic concepts and issues of software project management
- To effectively Planning the software projects
- To implement the project plans through managing people, communications and change
- To select and employ mechanisms for tracking the software projects
- To conduct activities necessary to successfully complete and close the Software projects
- To develop the skills for tracking and controlling software deliverables
- To create project plans that address real-world management challenges

TEXTBOOKS

1. Bob Hughes, Mike Cotterell, “Software Project Management”, 5th edition, Tata McGraw Hill, 2009.
2. Walker Royce “Software Project Management A Unified Framework”, Pearson Education, 2004.

REFERENCES

1. Ramesh Gopalaswamy, “Managing Global Software Projects”, Tata McGraw Hill, 2001.
2. Humphrey Watts, “Managing the software process”, Addison Wesley, 1989.

XC7861 SOFTWARE TESTING LABORATORY L T P C
0 0 4 2

Testing of the following software using software engineering methodology:

Use Rational Suite and other Open source Tools.

1. Perform experiments to do the following:

a. Unit Testing

b. System and Integration Testing

c. Regression Testing

d. User Acceptance Testing (UAT)

e. Performance Testing – Front-end and Back-end

2. Mini projects on any relevant current topics. Suggested topics:

a. Insurance Management Application

b. Reservation Systems for Air lines, Railways etc.

c. Knowledge Management System in education

d. Remote Procedure Call Implementation

e. Banking Applications

TOTAL: 60 PERIODS

XC7951 OPERATIONS RESEARCH L T P C
4 0 0 4

OBJECTIVES

- The objective of the course is to give the student experience in modeling, solving and analyzing problems using linear programming.
- Emphasis will be stressed on theory, applications, and computer usage.

UNIT I LINEAR PROGRAMMING 12

Formulation of linear programming models - Graphical solution -The simplex method –Transportation and Assignment problems.

UNIT II INTEGER PROGRAMMING 12

Introduction – Cutting plane Algorithm – Branch and Bound Algorithm – Zero-one Programming.

UNIT III NON-LINEAR PROGRAMMING 12

Lagrange multipliers – Equality constraints – Inequality constraints – Kuhn-Tucker conditions – Quadratic programming.

UNIT IV GAME THEORY 12

Optimal solution of two person zero-run games – Mixed strategies – Graphical solutions of (2 xn) and (m x 2) games – Solution of (m x n) games by linear Programming.

UNIT V DETERMINISTIC DYNAMIC PROGRAMMING 12

Recursive nature of computations in dynamic programming – Forward and backward recursion – Applications: Resource Allocation model, Cargo-loading model, Work-force size model, Investment model.

TOTAL: 60 PERIODS

OUTCOMES

Upon completion of the subject, students will be able to:

- By the end of the course the student should have developed the skills to consider real-world problems and determine whether or not linear programming is an appropriate modeling framework
- develop linear programming models that consider the key elements of the real world problem
- solve the models for their optimal solutions
- interpret the models' solutions and infer solutions to the real-world problems.

TEXTBOOKS

1. H.A. Taha, "Operations Research: An Introduction", Pearson Education, 9th Edition, New Delhi, 2012.
2. J.K. Sharma, "Operations Research: Theory and Applications", Macmillan India Ltd., 2nd Edition, New Delhi, 2003.

REFERENCES

1. Richard Bronson and Govindasami Naadimuthu, "Operations Research, (Schaum's Outlines – TMH edition), Tata McGraw Hill Publishing Company Ltd., 2nd Edition, New Delhi, 2004.
2. Pradeep Prabhakar Pai: Operations Research and Practice, Oxford University Press, New Delhi, 2012.
3. F.S. Hillier and G.J. Lieberman, "Introduction to Operations Research", Tata McGraw Hill, 8th Edition, New Delhi, 2005.
4 J. P. Singh and N. P. Singh: Operations Research, Ane Books Pvt. Ltd., New Delhi, 2014.

XT7951 INFORMATION MANAGEMENT L T P C
3 0 0 3

OBJECTIVES

- To aware the significance of information in the business scenario
- To familiarize method of restoring, retrieving and presenting the information.

UNIT I **9**

Management - Definition - The Evolution of Management Thought - Nature - Functions – Roles of Managers – Managerial skills - Nature and Purpose of Planning - Objectives - Strategies, Policies and Planning Premises - Decision Making.

UNIT II **9**

Organizing – Definition-Organizational Structure : Departmentation - Line/Staff Authority and Decentralization - Effective Organizing and Organizational Culture - Motivation - Leadership - Communication - Controlling - Control Techniques and Information Technology.

UNIT III **9**

Information system – Evolution - Roles of information systems - System concept - components of Information systems - IS Activities - Types of IS.- DSS, KMS., GIS., International Information system.

UNIT IV **9**

Legal issues in IT-IT Act,2000-Computer crimes, securing the web, Software audit. Ethics for IS Professionals - Social challenges.

UNIT V **9**

Role of Information management in ERP-e-Business, e-Governance, EDI., SCM., e-CRM- Business Intelligence.

TOTAL: 45 PERIODS

OUTCOMES

- discuss the process of information systems innovation as a sociotechnical endeavour that comprises both technology and organisational change
- identify the main trends in the socio-economic context of organisations that affect IS innovation
- critically discuss the relationship between ICT and organisational change

- discuss the strategic value of information systems for organisations and methods used for information systems planning
- critically discuss the options organisation have to acquire the technologies they need for their information systems
- critically discuss some of the most frequently used methods for developing and implementing information systems
- describe the tasks involved in managing IS development and implementation projects
- discuss the challenges facing information systems management
- explain the notion enterprise governance of IT
- identify the security risks confronting information systems and the mechanisms used to address them
- critically discuss threats to privacy associated with the use of ICTs in organisations.

REFERENCES

1. Koontz & Weirich, "Essentials of Management", Tata McGraw Hill Publishing Company, New Delhi.
2. Stoner, Freeman & Gilbert, "Management", PHI, 6th Edition.
3. Robbins.S.P., "Fundamentals of Management", Pearson, 2003.
4. James A O'Brian, "Management Information System".
5. Effy Oz, "Management Information System", 3rd Edition.
6. Laudon & Laudon, "Management Information System", 8th Edition.

XT7952 MOBILE AND PERVASIVE COMPUTING L T P C
3 0 0 3

OBJECTIVES

- To introduce the characteristics, basic concepts and systems issues in mobile and pervasive computing
- To illustrate architecture and protocols in pervasive computing and to identify the trends and latest development of the technologies in the area
- To design successful mobile and pervasive computing applications and services research project
- To evaluate critical design tradeoffs associated with different mobile technologies, architectures, interfaces and business models and how they impact the usability, security, privacy and commercial viability of mobile and pervasive computing services and applications

UNIT I INTRODUCTION 9

History of wireless communication – applications of wireless networks and mobile communications – wireless transmission- frequencies for radio transmission- signals – antennas – signal propagation- multiplexing – modulation – spread spectrum – cellular systems – medium access control.

UNIT II TELECOMMUNICATION AND SATELLITE SYSTEMS 9

GSM – Functional architecture of a GSM system – Handover in GSM – security – DECT – TETRA – UMTS and IMT -2000 – Bluetooth - WiFi, WiMAX, 3G, 4G ,WATM.- Mobile IP protocols -WAP push architecture-WML scripts and applications - Data networks – SMS – GPRS – EDGE – Hybrid Wireless Networks – ATM – Wireless ATM.

UNIT III PERVASIVE COMPUTING 9

Introduction - Principles, Characteristics- interaction transparency, context aware, automated experience capture. Architecture for pervasive computing- Pervasive devices-embedded controls - smart sensors and actuators -Context communication and access services.

UNIT IV PROTOCOLS 9

Open protocols- Service discovery technologies- SDP, Jini, SLP, UpnP protocols–data synchronization- SyncML framework - Context aware mobile services - Context aware sensor networks, addressing and communications- Context aware security.

UNITV TECHNOLOGIES, PLATFORMS AND RECENT TRENDS 9

Past, Present and Future-Device Technology-Device Connectivity-Web application Concepts-WAP and Beyond-Voice Technologies-Personal Digital Assistants -Network simulators: NS2 – GLOMOSIM – SENSIM – OPNET – Programming Platforms – J2ME – SYMBIAN OS – Recent advances in Wireless Networks.

TOTAL: 45 PERIODS

OUTCOMES

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

- To deploy 3G networks.
- To develop suitable algorithms for 4G networks.
- To use sensor and mesh networks to develop mobile computing environment.
- To develop mobile computing applications based on the paradigm of context aware computing.

TEXTBOOKS

1. Jochen Schiller, “Mobile Communications”, Pearson, 2012.
2. Seng Loke, Context-Aware Computing Pervasive Systems, Auerbach Pub., New York, 2007.

REFERENCES

1 Uwe Hansman etl ,Pervasive Computing, Springer, New York,2001.
2. Jochen Burkhardt,, Stefan Heper, Klaus Rindtorf, Thomas Schaeck ,”Pervasive Computing-Technology and Architecture of Mobile Internet Application”, Pearson Education, 6th Edition 2009.

XT7953 SERVICE ORIENTED ARCHITECTURE L T P C
3 0 0 3

OBJECTIVES

- To provide fundamental concepts of Service Oriented Architecture.
- To gain knowledge about SOAP, UDDI and XML to create web services.
- To know about the Cloud Computing architecture and services.

UNIT I SOFTWARE ARCHITECTURE AND SOA 9

Types of IT Architecture-SOA (Service Oriented Architecture)-Evolution-key components- Enterprise-wide SOA-Enterprise Applications-Software platforms for Enterprise Applications-contents Service-Oriented Enterprise Applications.

UNIT II SOA DESIGN AND GOVERNANCE 9

Service Oriented Analysis and Design-Technologies for SOA-Business case for SOA- SOA Implementation and Governance-Trends in SOA.

UNIT III WEB SERVICES **9**

XML-Web Service standards-SOAP-WSDL-UDDI-ebXML-Web Service Security-XML Digital signature-Canonical XML-XML Encryption-SAML.

UNIT IV WEB SERVICES IMPLEMENTATION **9**

Java implementation - JAXP-JAX-RPC-JAXM-JAXR-JAXB - .NET framework - Web Service through .NET.

UNIT V ADVANCED TOPICS **9**

Semantic web-Web 2.0 standard- web ontology-RDF-OWL-Transaction Management- Transaction model for web services- current trends.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the subject, students will be able to:

- Known about the basic principles of service oriented architecture , its components and techniques
- Understand the architecture of web services
- Able to design and develop web services using protocol
- Understand technology underlying the service design
- Acquire the fundamental knowledge of cloud computing

TEXTBOOKS

1. Shankar Kambhampaly, ”Service-Oriented Architecture for Enterprise Applications”, Wiley India Pvt Ltd, 2008. (UNIT I, II).
2. James McGovern, and et.al, “Java Web Service Architecture”, MORGAN KAUFMANN PUBLISHER, 2003. (UNIT III, IV, V).

REFERENCES

1. Eric Newcomer and Greg Lomow, ”Understanding SOA with web services”, Pearson Education publisher, 2005.
2. Ron Schmelzer and et.al.”XML and Web Services Unleashed”, Pearson Education publisher, 2008.
3. H.M. Deitel and P.J.Deitel ”C# 2008 for programmers”, 3rd Edition, Pearson Education, 2009.

XT7961 SERVICE ORIENTED ARCHITECTURE LABORATORY **L T P C**
0 0 4 2

1. XML-RPC and SOAP implementation.
2. Web services using Java.
3. Web services using .NET.
4. Web services using Database Connectivity.
5. Creation of a BPEL module and a composite application.
6. Implementation of XML Encryption and Decryption.
7. Integration of heterogeneous Web services.
8. Mini Project. (Application of the above experiments)

TOTAL: 60 PERIODS

MA7071 ALGEBRA AND NUMBER THEORY L T P C
3 0 0 3

UNIT I FIELDS 9

Groups and Cyclic groups - Rings and Polynomials – Fields.

UNIT II FINITE FIELDS AND POLYNOMIALS 9

Finite Fields – Irreducible Polynomials over Finite fields – Factorization of Polynomials over Finite Fields.

UNIT III DIVISIBILITY THEORY AND CANONICAL DECOMPOSITIONS 9

Division algorithm- Base-b representations – Prime and composite numbers – Prime number theorem - GCD – Euclidean Algorithm – Fundamental theorem of Arithmetic – LCM.

UNIT IV DIOPHANTINE EQUATIONS AND CONGRUENCES 9

Linear Diophantine equations – Congruence's – Linear Congruence's – Modular exponentiation - Applications: Divisibility tests– Chinese remainder theorem – 2x2 linear systems.

UNIT V CLASSICAL THEOREMS AND MULTIPLICATIVE FUNCTIONS 9

Wilson's theorem – Fermat's Little theorem – Euler's theorem – Euler's Phi functions – Tau and Sigma functions– Mobius Function.

TOTAL : 45 PERIODS

TEXT BOOKS

1. Grimaldi, R. P., "Discrete and combinatorial Mathematics", 4th Edition, Pearson Education, (Singapore) Pte. Ltd., 2002.
2. Thomas Koshy, "Elementary Number Theory with Applications", Elsevier Publications, New Delhi, 2002.

REFERENCES

1. Lidl. R., and Pilz. G., "Applied Abstract Algebra", Springer-Verlang, New Delhi, 2nd Edition, 2006.
2. Niven.I, Zuckerman.H.S., and Montgomery, H.L., "An Introduction to Theory of Numbers" , John Wiley and Sons, Singapore, 2004.

XC7071 COMPUTATION COMPLEXITY L T P C
3 0 0 3

OBJECTIVES

- To address the theoretical and practical limitations of computation.
- To provide a theoretical framework for modelling computation.
- The concepts of undecidability and intractability are introduced through a number of examples.
- The course will convey the proof techniques that are used to classify problems and it is intended that students learn how to apply them in order to classify unfamiliar problems for themselves.

UNIT I TIME AND SPACE BOUNDED COMPUTATIONS AND MODELS OF COMPUTATIONS 9

Finite Automaton, Turing machines , Non-deterministic Turing Machines, Oracle Turing Machines – Order of magnitude, running time and work space of TMs – Time and Space constructability

UNIT II CENTRAL COMPLEXITY CLASSES 9

Basic definitions and relationships – Computing functions – Invertibility and honesty – Polynomial time many-one reducibility – Natural Np Complete Sets – Natural PSPACE complete sets.

UNIT III TURING REDUCIBILITY AND NON-UNIFORM COMPLEXITY 9

Polynomial Turing reducibility – Strong nondeterministic polynomial time reducibility – Self reducibility Non-uniform complexity – Classes defined by advice functions – Boolean circuits – Polynomial advice – Logarithmic advice – Self-producible circuits.

UNIT IV UNIFORM DIAGONALIZATIONS 9

Uniform Deagonalization – Presentability and other properties – Recursive sets and diagonalization – Applications to recursively presentable sets – Delayed diagonalization.

UNIT V POLYNOMIAL TIME HIERARCHY 9

Polynomial time hierarchy – Characterization – Relations with quantifies – Complete sets and presentability – Alternating TM.

TOTAL: 45 PERIODS

OUTCOMES

Upon successful completion of this course students should be able to:

- Understand basic properties of formal languages and formal grammars
- Understand basic properties of deterministic and nondeterministic finite automata
- Understand the relation between types of languages and types of finite automata
- Understand basic properties of Turing machines and computing with Turing machines
- Understand the concepts of tractability and decidability, the concepts of NP-completeness and NP-hard problems
- Understand the challenges for Theoretical Computer Science and its contribution to other sciences
- analyse the complexity of a variety of problems and algorithms
- reduce one problem to another; prove that a problem is undecidable
- find a polynomial time reduction from one problem to another
- determine the complexity class of a decidable problem
- categorise the complexity of a language

TEXTBOOK

1. Balcazar, J.I., Diaz.J and Gabarro, J. “Structural Complexity-I”, Springer Verlag, 1988.

REFERENCES

1. Balcazar, J.I., Diaz.J and Gabarro, J. “Structural Complexity-I I ”, Springer Verlag, 1990.
2. Garey, M.R. and Johnson, D.S. “Computer and Intracibility, A guide to the theory of NP Completeness” , WH Freeman and Co, 1979.
3. Papadimitriou, C., “Computational Complexity”, Addison Wesley, 1994.

XC7072 EMBEDDED SYSTEMS L T P C

3 0 0 3

OBJECTIVES

- To understand the architecture of embedded processor, microcontroller and peripheral devices.
- To interface memory and peripherals with embedded systems.
- To study the embedded network environment.
- To understand challenges in Real time operating systems.
- To study, analyze and design applications on embedded systems.

UNIT I INTRODUCTION TO EMBEDDED SYSTEMS 9

Challenges of Embedded Systems – fundamental components – examples of embedded systems – hardware fundamentals – gates – timing diagrams – memory – direct memory access – buses – interrupts – schematics – build process of embedded systems.

UNIT II INTERRUPT SERVICE ROUTINES 9

Watch dog timers – Flash Memory basic – Host based debugging – Remote debugging – ROM emulators – Logic analyser – Hardware break points - In Circuit Emulators

UNIT III REAL-TIME OPERATING SYSTEMS 9

Desktop Operating Systems versus Real-Time Operating Systems – need for Board Support Packages – task management – race conditions – priority inversion – scheduling – inter task communication – timers – semaphores – queues.

UNIT IV BUSES AND PROTOCOLS 9

Defining Buses and Protocols – On-board buses for Embedded Systems – External Buses – Automotive Buses – Wireless Communications Protocols.

UNIT V EMBEDDED SOFTWARE DEVELOPMENT TOOLS 9

Host and target machines – cross compilers – linker and locators for embedded software – address resolution – locating program components – initialized data and constant strings – PROM programmers – ROM emulators – Flash memory.

TOTAL : 45 PERIODS

OUTCOMES

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

- Understand different architectures of embedded processor, microcontroller and peripheral devices.
- Interface memory and peripherals with embedded systems.
- Familiar with embedded network environment.
- Understand challenges in Real time operating systems.
- Design and analyze applications on embedded systems.

TEXTBOOKS

1. Lyla B. Das,"Embedded Systems – An Integrated Approach", Pearson Education, 2013.
2. Raj Kamal, "Embedded Systems", Tata McGraw Hill. 2nd Edition, 2008.

REFERENCES

1. Frank Vahid and Tony Givargis, "A unified Hardware/Software Introduction to Embedded System Design", John Wiley & Sons publishers, 2002.

XC7073 FAULT TOLERANT SYSTEMS L T P C

3 0 0 3

OBJECTIVES

- To define common terms such as availability, reliability, dependability etc.
- To List common threats to dependability and their mitigation methods
- To Solve reliability block diagrams involving series, parallel and networks of components. Apply the laws of discrete probability to evaluating systems.
- To Evaluate simple redundancy schemes through the laws of continuous probability, provided the failures are exponentially distributed.
- To Apply fault-tolerance techniques such as error correcting circuits and duplicate execution to the design of hardware systems.
- To Model systems using Markov models and Stochastic Activity Networks (SAN)
- To Evaluate the reliability of systems through fault-injections and simulations

UNIT I FUNDAMENTALS OF RELIABILITY 11

Reliability and the Failure Rate – Relation between Reliability and MTBF – Maintainability – Availability – Series and Parallel Systems – Dependability – Error Detecting and Correcting Codes: Parity Code – Multiple error Detecting Codes – Residue Codes – Cyclic Codes – Error Correcting Codes

UNIT II FAULT TOLERANT DESIGN 8

Hardware Redundancy – Information Redundancy – Time Redundancy - Software Redundancy – System Level Fault Tolerance

UNIT III NETWORK FAULT TOLERANCE 8

Hypercube – Star Graphs – Fault Tolerant ATM Switches – Dependable Channels – Survivable Networks – Fault Tolerant Routing – Fault Tolerant Distributed Systems.

UNIT IV SOFTWARE RELIABILITY MODELING 9

General Model Characteristics – Model Classification scheme – Markovian models – General concepts – Poisson-Type Models – Binomial Type Models – Fault reduction factor for Poisson Type models.

UNIT V COMPARISON OF SOFTWARE RELIABILITY MODELS 9

Comparison Criteria – Failure Data – Comparison of Predictive Validity of Model Groups – Comparison of Time Domains – Calendar Time Modeling – Limiting Resource Concept – Resource Usage model – Resource Utilization – Calendar Time Estimation and confidence Intervals.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the subject, students would have learnt to:

Define the traditional measures of fault tolerance

- Discuss the various hardware fault tolerance techniques used
- Point out the processor level fault tolerance techniques
- Discuss error detecting and correcting codes
- Critically analyze the different types of RAID levels
- Discuss the different network topologies and their resilience
- Discuss techniques like recovery blocks and N-version programming
- Define check pointing and models for optimal check pointing
- Identify techniques for check pointing in distributed and shared memory systems
- Distinguish between symmetric key ciphers and public key ciphers
- Provide techniques to detect injected faults in ciphers

TEXTBOOKS

1. Paray K.Lala, “Self-Checking and Fault Tolerant Digital Design”, Morgan Kauffman publishers, 2001.
2. D. K. Pradhan, “Fault Tolerant Computer System Design”, PHI.

REFERENCES

1. D. K. Pradhan, “Fault Tolerant Computer System Design”, PHI.
2. Pankaj Jalote, “Fault Tolerance in Distributed Systems”, PHI.
3. Michael R. Lyu, “Handbook of Software Reliability Engineering”, IEEE Computer Society Press, 1996.
4. John D.Mura, “Software Reliability Engineering”, Tata McGraw Hill, 1998.

XC7074 **HIGH SPEED NETWORKS** **L T P C**
3 0 0 3

OBJECTIVES

- To facilitate the students on the basis of ATM and Frame relay concepts and explain the various types of LAN's and to know about their applications.
- To provide an overview of high-speed networking technologies.
- To learn the enhanced set of functionalities for high-speed networking.
- To understand the underlying concept involved for high performance
- To Enable the students to know techniques involved to support real-time traffic and congestion control

UNIT I HIGH SPEED NETWORKS 9

Frame Relay Networks – Asynchronous transfer mode – ATM Protocol Architecture, ATM logical Connection – ATM Cell – ATM Service Categories – AAL. High Speed LAN's: Fast Ethernet – Gigabit Ethernet– Fibre Channel – Wireless LAN's: applications, requirements – Architecture of 802.11.

UNIT II CONGESTION AND TRAFFIC MANAGEMENT 8

Queuing Analysis – Queuing Models – Single Server Queues – Effects of Congestion – Congestion Control – Traffic Management – Congestion Control in Packet Switching Networks – Frame Relay Congestion Control.

UNIT III TCP AND ATM CONGESTION CONTROL 12

TCP Flow control – TCP Congestion Control – Retransmission – Timer Management – Exponential RTO backoff – KARN's Algorithm – Window management – Performance of TCP over ATM. Traffic and Congestion control in ATM – Requirements – Attributes – Traffic Management Frame work, Traffic Control – ABR traffic Management – ABR rate control, RM cell formats – ABR Capacity allocations – GFR traffic management.

UNIT IV INTEGRATED AND DIFFERENTIATED SERVICES 8

Integrated Services Architecture – Approach, Components, Services- Queuing Discipline – FQ – PS – BRFQ – GPS – WFQ – Random Early Detection – Differentiated Services - RSVP - RTCP.

UNIT V MPLS NETWORKS 8

Multiprotocol Label Switching – Operations - Label Stacking - Protocol Details – Congestion Control and Routing in MPLS networks – MPLS Virtual Private Networks - MPLS Traffic Engineering.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the subject, students would be able to :

- Understand the building blocks and operation of high speed networking technology including the hardware and software components.

TEXTBOOKS

1. William Stallings, "High speed networks and internet", 2nd Edition, Pearson Education, 2010.
2. Irvan Pepelnjk, Jim Guichard, and Jeff Apcar, "MPLS and VPN architecture", Cisco Press, Volume 1 and 2, 2003.

REFERENCES

1. Warland, Pravin Varaiya, "High performance communication networks", 2nd Edition , Jean Harcourt Asia Pvt. Ltd., 2000.
2. Sumit Kasera, "ATM Networks: Concepts and Protocols", McGraw-Hill Professional, 2006.

XC7075	INTELLECTUAL PROPERTY RIGHTS	L T P C 3 0 0 3

UNIT I INTRODUCTION TO IPR 9

Basic types of property - Tangible and Intangible property - Movable Property and Immovable Property - Intellectual Property – Invention and Creativity - Innovation – Intellectual Property (IP) – Importance – Protection of IPR.

UNIT II CLASSIFICATIONS OF IPR 9

IP – Patents – Copyrights and related rights – Trade Marks and rights arising from Trademark registration – Definitions – Industrial Designs and Integrated circuits – Protection of Geographical Indications at national and International levels – Application Procedures.

UNIT III INTERNATIONAL TREATIES ON IPR 9

International convention relating to Intellectual Property – TRIPS Agreement - Madrid Agreement - Hague Agreement - Budapest Treaty; Berne convention-Patent cooperation treaty-Paris convention-Lisbon Agreement – Establishment of WIPO – Mission and Activities – History – General Agreement on Trade and Tariff (GATT).

UNIT IV INDIAN IPR LEGISLATIONS 9

Indian Position Vs WTO and Strategies – The Patent Act, 1970 – Inventions Non-Patentable – Compulsory licensing – Patents of Addition – commitments to WTO-Patent Ordinance and the Bill – Draft of a national Intellectual Property Policy – Present against unfair competition.

UNIT V IPR IN ELECTRONICS AND INFORMATION TECHNOLOGY 9

IPR in Electronics & Information Technology -Case Studies on – Patents pertaining to Electronics & Information Technology – Software patents International scenario – Patent & Copyright Protection for software& Electronic inventions - IPR in Electronics and Information Technology.

TOTAL: 45 PERIODS

TEXTBOOKS

1. BARE ACT, Indian Patent Act 1970 Acts & Rules, Universal Law Publishing Co. Pvt. Ltd., 2007.
2. Stim, “Intellectual Property Copyrights, trademarks, and Patents,” Cengage Learning India Private Ltd, 2004.
3. Deborah E. Bouchoux, “Intellectual Property Rights,” Cengage Learning India Private Ltd, 2005.

REFERENCES

1. Prabuddha Ganguli, “Intellectual Property Rights,”, TMH, 2001.
2. A. Primer, R. Anita Rao and Bhanoji Rao, Intellectual Property Rights, Lastain Book company.
3. V. Sople Vinod, Managing Intellectual Property by (Prentice hall of India Pvt.Ltd), 2006.
4. Lal, C.S, “Intellectual property handbook: copyright, designs, patent and trademarks”, Law Publishers Allahabad, 2000.
5. P.Narayanan, “Patent Law”, 3rd Edition; Eastern law house, 1998.

XC7076 **PATTERN RECOGNITION** **L T P C**
3 0 0 3

OBJECTIVES

- To know about Supervised and unsupervised Learning.
- To study about feature extraction and structural pattern recognition.
- To explore different classification models.
- To understand Fuzzy Pattern Classifiers and Perception.

UNIT I OVERVIEW OF PATTERN RECOGNITION 9

Discriminant functions - Supervised learning - Parametric estimation - Maximum Likelihood estimation - Bayesian parameter estimation - Problems with Bayes Approach - Pattern classification by distance functions - minimum distance Pattern classifier.

UNIT II UNSUPERVISED CLASSIFICATION 9

Clustering for unsupervised learning and classification, clustering concepts C – means algorithm – hierarchical clustering – Graph theoretic approach to pattern clustering - Validity of clustering solutions.

UNIT III FEATURE EXTRACTION AND STRUCTURAL PATTERN RECOGNITION 9

KL Transforms – feature selection through functional approximation – Binary selection – Elements of formal grammars, syntactic description, stochastic grammars, Structural representation.

UNIT IV AI TECHNIQUES 9

Search and control strategies – Uniformed search – Informed search – searching AND/OR graphs - Matching techniques – Knowledge for recognition and Classification process – Visual image understanding - Expert system architectures.

UNIT V RECENT ADVANCES AND IMAGE APPLICATIONS 9

Learning of neural pattern recognition - Fuzzy logic – Fuzzy pattern classifiers – image segmentation – Credit scoring – Applications in Computer vision, Automated Target recognition, Finger print Identification, Industrial Inspection.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the subject, students would have learnt about:

- Classification of data and identifying patterns.
- How to Extract feature set and select the features from given data set

TEXTBOOK

1. Duda R.O., and Hart P.G., “Pattern Classification and Scene Analysis”, John Wiley, New York, 1973.

REFERENCES

1. Elaine Rich, “Artificial Intelligence”, McGraw Book Company, Singapore, 1991.
2. Robert J. Schalkoff, “Pattern recognition: Statistical Structural and Neural approaches”, John Wiley and Sons inc, New York, 1992.
3. Morton Nadier and Eric Smith P., “Pattern Recognition Engineering”, John Wiley and sons, New York, 1993.
4. Dan Patterson, “Introduction to artificial Intelligence and Expert Systems”, Prentice Hall of India, 1997.
5. Andrew Webb, “Statistical Pattern Recognition”, Third Edition, John Wiley & Sons, 2011.
6. Earl Gose, Richard Johnson baugh, Stene Jost, “Pattern Recognition and Image analysis”, Prentice hall of India, New Delhi-2007.

XC7077 **VISUAL PROGRAMMING** **L T P C**
3 0 0 3

OBJECTIVES

- To introduce the concepts of visual programming
- To introduce GUI programming using Microsoft foundation classes.
- To enable the students to develop programs and simple application using Visual C++.

UNIT I VB.NET FUNDAMENTALS 9

Introduction to .NET Framework - Controls – Menus and Dialog Boxes – Variables and Operators – Decision Structures –Loops and Timers - Debugging -Trapping and Handling Errors

UNIT II VB.NET PROGRAMMING 9

Modules and Procedures – Arrays and Collections – Exploring Text Files and String Processing – Automating Microsoft Office Applications – Deployment of VB.NET Applications.

UNIT III VB.NET UI DESIGN AND DATABASE APPLICATIONS 9

Windows Forms – Graphics and Animation - Inheriting Forms and Creating Base Classes – Working with Printers – ADO.NET – Data Grid Control

UNIT IV VC++ FUNDAMENTALS 9

Windows Programming Fundamentals - Event Driven Programming – Visual C++ components - MFC Library Application Framework – App Wizard – Class Wizard –Event Handling – Message Mapping – Device Context Interface, Color, Fonts – Dialog Data Exchange and Validation (DDX and DDV)

UNIT V VC++ UI DESIGN AND DATABASE APPLICATIONS 9

Dialog Based Applications - Windows Common Controls – Using ActiveX Controls -– Document View Architecture - Splitter Windows - Serialization – Reading and Writing Documents - SDI and MDI applications – ODBC – MFC Database Classes

TOTAL : 45 PERIODS

OUTCOMES

Upon completion of this course, the student will be able to:

- Design, create, build, and debug VB.net and VC++ applications.
- Explore VB.net and VC++ s Integrated Development Environment (IDE).
- Implement syntax rules in VB.net and VC++.
- Explain variables and data types used in program development.
- Apply arithmetic operations for displaying numeric output.
- Write and apply decision structures for determining different operations.
- Write and apply loop structures to perform repetitive tasks.
- Write and apply procedures, sub-procedures, and functions to create manageable code.
- Create one and two dimensional arrays for sorting, calculating, and displaying of data.
- Write VB.net and VC++ programs using object-oriented programming techniques including classes, objects, methods, instance variables, composition, and inheritance, and polymorphism.
- Write Windows applications using forms, controls, and events.

TEXTBOOKS

1. Michael Halvorson, “Visual Basic.NET”, Prentice Hall of India, New Delhi, 2002.
   (Units 1, 2, 3 – Chapters 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20)
2. David J. Kruglinski, “Programming VC++”, Microsoft Press, 1998.
   (Units 4, 5 – Chapters 1, 2, 3, 4, 5, 6, 7, 8, 17, 18, 20, 31)

REFERENCES

1. Chris H. Pappas & William H. Murray, "The Complete Reference Visual C++", Tata McGraw Hill Publishing Co. Ltd., 2002.
2. Deitel & Deitel, " Visual Basics .NET, How to Program", 2nd edition, Pearson Education (Asia) Pvt. Ltd., 2004.
3. MSDN Library

XC7851 MACHINE LEARNING TECHNIQUES L T P C
3 0 0 3

OBJECTIVES

- To enable students to understand different techniques like task oriented studies, cognitive simulation and theoretical analysis for machine learning

UNIT I INTRODUCTION 9

Machine Learning - Machine Learning Foundations –Overview – applications - Types of machine learning - basic concepts in machine learning Examples of Machine Learning -Applications - Linear Models for Regression - Linear Basis Function Models - The Bias-Variance Decomposition - Bayesian Linear Regression - Bayesian Model Comparison.

UNIT II SUPERVISED LEARNING 9

Linear Models for Classification - Discriminant Functions -Probabilistic Generative Models - Probabilistic Discriminative Models - Bayesian Logistic Regression. Decision Trees - Classification Trees- Regression Trees - Pruning. Neural Networks -Feed-forward Network Functions - Error Back-propagation - Regularization - Mixture Density and Bayesian Neural Networks - Kernel Methods - Dual Representations - Radial Basis Function Networks. Ensemble methods- Bagging- Boosting.

UNIT III UNSUPERVISED LEARNING 9

Clustering- K-means - EM - Mixtures of Gaussians - The EM Algorithm in General -Model selection for latent variable models - high-dimensional spaces -- The Curse of Dimensionality -Dimensionality Reduction - Factor analysis - Principal Component Analysis - Probabilistic PCA- Independent components analysis.

UNIT IV PROBABILISTIC GRAPHICAL MODELS 9

Directed Graphical Models - Bayesian Networks - Exploiting Independence Properties - From Distributions to Graphs -Examples -Markov Random Fields - Inference in Graphical Models - Learning –Naive Bayes classifiers-Markov Models – Hidden Markov Models – Inference – Learning-Generalization – Undirected graphical models- Markov random fields- Conditional independence properties - Parameterization of MRFs - Examples - Learning - Conditional random fields (CRFs) - Structural SVMs.

UNIT V ADVANCED LEARNING 9

Sampling – Basic sampling methods – Monte Carlo. Reinforcement Learning- K-Armed Bandit-Elements - Model-Based Learning- Value Iteration- Policy Iteration. Temporal Difference Learning-Exploration Strategies- Deterministic and Non-deterministic Rewards and Actions- Eligibility Traces-Generalization- Partially Observable States- The Setting- Example. Semi - Supervised Learning. Computational Learning Theory - Mistake bound analysis, sample complexity analysis, VC dimension. Occam learning, accuracy and confidence boosting.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the subject, students will be able to:

- set up a well-defined learning problem for a given task
- select and define a representation for data to be used as input to a machine learning algorithm
- select and define a representation for the model to be output by a machine learning algorithm
- compare different algorithms according to the properties of their inputs and outputs
- compare different algorithms in terms of similarities and differences in the computational methods used
- develop and describe algorithms to solve a learning problem in terms of the inputs, outputs and computational methods used
- express key concepts from the foundations of computational and statistical learning theory and demonstrate their applicability
- express knowledge of general capabilities and limitations of machine learning from computational and statistical theory
- use or extend or invent algorithms in applications to real-world data sets and collect results to enable evaluation and comparison of their performance

REFERENCES

1. Christopher Bishop, “Pattern Recognition and Machine Learning” Springer, 2006.
2. Kevin P. Murphy, “Machine Learning: A Probabilistic Perspective”, MIT Press, 2012.
3. Ethem Alpaydin, “Introduction to Machine Learning”, Prentice Hall of India, 2005.
4. Tom Mitchell, "Machine Learning", McGraw-Hill, 1997.
5. Hastie, Tibshirani, Friedman, “The Elements of Statistical Learning” (2nd ed)., Springer, 2008.
6. Stephen Marsland, “Machine Learning –An Algorithmic Perspective”, CRC Press, 2009.

XT7071 ADHOC AND SENSOR NETWORKS L T P C

3 0 0 3

OBJECTIVES

- To gain knowledge of mobile ad hoc networks, design and implementation issues, and available solutions.
- To gain knowledge of routing mechanisms and the three classes of approaches: proactive, on-demand, and hybrid.
- To gain knowledge of clustering mechanisms and the different schemes that have been employed, e.g., hierarchical, flat, and leaderless.
- To gain knowledge of the 802.11 Wireless Lan (WiFi) and Bluetooth standards.

UNIT I INTRODUCTION TO MANET AND ROUTING 9

Introduction to MANET – Applications of MANETS – Challenges – Routing – Unicast – Proactive – reactive – Position based and QoS routing – Multicasting and geocasting.

UNIT II ADHOC MAC LAYERS 9

MAC LAYER – IEEE 802.11 (for wireless LANs) – IEEE 802.15 – Bluetooth technology – Wireless Mesh Networks.

UNIT III ADHOC TRANSPORT LAYERS 9

Cognitive Radio and Networks – TCP over ADHOC Networks – Applications of sensor networks – Necessity for mesh networks – Heterogeneous mesh networks – Vehicular mesh networks.

UNIT IV SENSOR NETWORKS **9**

Introduction – Sensor networks Design Considerations – Sensor networks in controlled Environment and actuators – Data Dissemination – Data gathering – MAC protocols for sensor networks – Location discover – Quality of sensor networks.

UNIT V ENERGY MANAGEMENT AND SECURITY **9**

Need for Energy management – Classification of Energy management schemes – Battery management and Transmission power management schemes – Network layer and Data link layer solutions - System power management schemes - Security in Adhoc and sensor networks – Integrating MANETS WLANS and Cellular networks.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the subject, students will be able to:

- understand the principles of mobile ad hoc networks (MANETs) and what distinguishes them from infrastructure-based networks.
- have an understanding of the principles and characteristics of wireless sensor networks (WSNs).
- understand how proactive routing protocols function and their implications on data transmission delay and bandwidth consumption.
- understand how reactive routing protocols function and their implications on data transmission delay and bandwidth consumption.
- understand how hybrid routing protocols function and their ability to balance speed and bandwidth consumption.

TEXTBOOKS

1. Carlos de morais cordeiro and Dharma Prakage Agarwal, “Adhoc and Sensor Networks: Theory and Applications”, Second Edition, World Scientific Publications, 2011.
2. Sivaram Murthy C. and Manoj B.S., “Adhoc Wireless Networks – Architecture and Protocols”, Pearson Education, 2004.

REFERENCES

1. Prasant Mohapatra and Srirama Murthy,” ADHOC Networks: Technologies and Protocols”, Springer International Edition, 2009.
2. Kazem Sohraby, Daniel Minoli, Toieb Zhati,” Wireless Sensor Networks”, A John Willey and Sons Inc. Publications, 2007.

XT7072 BIOINFORMATICS **L T P C**
3 0 0 3

OBJECTIVES

- To impart knowledge on basic techniques of Bioinformatics.
  working knowledge of biology and its applications
- To increase proficiency in computer languages
- To gain skills in data mining
- To gain skills in data visualization
- experience with systems biology tools

UNIT I INTRODUCTION **9**

Over view and need for Bioinformatics technologies – Role of Structural bioinformatics – Data format and processing – Secondary resources and applications - Biological Data Integration System.

UNIT II DATAWAREHOUSING AND DATAMINING IN BIOINFORMATICS 9

Bioinformatics data – Datawarehousing architecture – Data quality – Biomedical data analysis – DNA data analysis – Protein data analysis – Machine learning – Neural network architecture – Applications.

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 - Molecular modeling – Computer programs for molecular modeling.

UNIT IV PATTERN MATCHING AND VISUALIZATION 9

Gene regulation – Motif recognition and detection – Strategies for motif detection – Visualization – Fractal analysis – DNA walk models – One dimension –Two dimension - 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 – Cost Matrix – Evaluation model - Benchmark – Tradeoffs.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the subject, students would have learnt about:

- Sequencing Alignment and Dynamic Programming, Sequence Databases, Evolutionary Trees and Phylogeny
- Prepare large-scale expression and sequence data for bioinformatics analyses
- Write programs to manipulate files and directories
- Extract useful information from text files
- Learn genomics resource and how to annotate genes

TEXTBOOKS

1. Yi-Ping Phoebe Chen (Ed), “BioInformatics Technologies”, First Indian Reprint, Springer Verlag, 2007.
2. Zoe lacroix and Terence Critchlow, “BioInformatics – Managing Scientific data”, First Indian Reprint, Elsevier, 2004.

REFERENCES

1. Bryan Bergeron, “Bio Informatics Computing”, 2nd Edition, Pearson Education, 2003.
2. Arthur M Lesk, “Introduction to Bioinformatics”, 2nd Edition, Oxford University Press, 2005.

XT7073 DIGITAL IMAGE PROCESSING L T P C
3 0 0 3

OBJECTIVES

- Learn the fundamental concepts and applications of digital image processing.
- Learn the concepts of and how to perform Intensity transformations and spatial filtering.
- Understand the relationship between Filtering in the spatial and frequency domains.
- Understand the concepts of and how to perform Image restoration and reconstruction, Color image processing, Wavelets and multiresolution processing, Image compression and watermarking, Morphological image processing, Image segmentation, Representation and description.

UNIT I FUNDAMENTALS OF IMAGE PROCESSING 9

Introduction – Steps in Image Processing Systems – Image Acquisition – Sampling and Quantization – Pixel Relationships – Colour Fundamentals and Models, File Formats, Image operations – Arithmetic, Geometric and Morphological.

UNIT II IMAGE ENHANCEMENT 9

Spatial Domain Gray level Transformations Histogram Processing Spatial Filtering – Smoothing and Sharpening. Frequency Domain : Filtering in Frequency Domain – DFT, FFT, DCT – Smoothing and Sharpening filters – Homomorphic Filtering.

UNIT III IMAGE SEGMENTATION AND FEATURE ANALYSIS 9

Detection of Discontinuities – Edge Operators – Edge Linking and Boundary Detection – Thresholding – Region Based Segmentation – Morphological WaterSheds – Motion Segmentation, Feature Analysis and Extraction.

UNIT IV MULTI RESOLUTION ANALYSIS AND COMPRESSIONS 9

Multi Resolution Analysis : Image Pyramids – Multi resolution expansion – Wavelet Transforms.Image Compression : Fundamentals – Models – Elements of Information Theory – Error Free Compression – Lossy Compression – Compression Standards.

UNIT V APPLICATIONS OF IMAGE PROCESSING 9

Image Classification – Image Recognition – Image Understanding – Video Motion Analysis – Image Fusion – Digital Compositing – Mosaics – Colour Image Processing.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the subject, students would have learnt about:

- apply knowledge of mathematics, science, and engineering.
- design and conduct experiments, as well as to analyze and interpret data.
- identify, formulate, and solve engineering problems.
- use the techniques, skills, and modern engineering tools necessary for computer engineering practice.

REFERENCES

1. Rafael C.Gonzalez and Richard E.Woods, “Digital Image Processing”, 2nd Edition, Pearson Education, 2003.
2. Milan Sonka, Vaclav Hlavac and Roger Boyle, “Image Processing, Analysis and Machine Vision”, 2nd Edition, Thomson Learning, 2001.
3. Anil K.Jain, “Fundamentals of Digital Image Processing”, Person Education, 2003.
4. S.Sridhar, “Digital Image Processing”, Oxford University Press, 2011.

XT7074 DIGITAL SIGNAL PROCESSING L T P C

3 0 0 3

OBJECTIVES

- To introduce the basic concepts and techniques for processing signals on a computer.
- To familiarize with the most important methods in DSP, including digital filter design, transform-domain processing and importance of Signal Processors.
- To emphasize intuitive understanding and practical implementations of the theoretical concepts.

UNIT I SIGNALS SYSTEMS 9

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

UNIT II FAST FOURIER TRANSFORMS 9

Introduction To DFT – Efficient Computation of DFT Properties of DFT – FFT Algorithms – Radix-2 And Radix-4 FFT Algorithms – Decimation in Time – Decimation in Frequency Algorithms – Use of FFT Algorithms in Linear Filtering And Correlation.

UNIT III IIR FILTER DESIGN 9

Structure of IIR – System Design of Discrete Time IIR Filter From Continuous Time Filter – IIR Filter Design By Impulse Invariance – Bilinear Transformation – Approximation Derivatives – Design of IIR Filter In The Frequency Domain.

UNIT IV FIR FILTER DESIGN 9

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

UNIT V FINITE WORD LENGTH EFFECTS 9

Quantization Noise – Derivation For Quantization Noise Power – Fixed Point And Binary Floating Point Number Representation – Comparison – Over Flow Error – Truncation Error – Co-Efficient Quantization Error–Limit Cycle Oscillation – Signal Scaling –Application Of DSP – Model Of Speech Wave Form – Vocoder – Multirate Signal Processing – Adaptive Filter.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the subject, students would have learnt about:

- How to represent discrete-time signals analytically and visualize them in the time domain. The meaning and implications of the properties of systems and signals.
- The Transform domain and its significance and problems related to computational complexity.
- How to specify and design any digital filters using MATLAB.

TEXTBOOK

1. John G Proakis, and Dimtris G Manolakis, “Digital Signal Processing Principles, Algorithms and Application”, 4th Edition, Pearson Education, 2007.

REFERENCES

1. Sanjit K.Mitra, “Digital Signal Processing – A Computer Base Approach”, Tata Mcgraw Hill, 4th Edition, 2007.
2. Alan V. Oppenheim, Ronald W. Schafer, and John R. Back, “Discrete Time Signal Processing”, Pearson Education, New Delhi, 2003.
3. Johny R. Johnson, “Introduction to Digital Signal Processing”, Prentice Hall, 1989.
4. N. Sarkar, “Elements of Digital Signal Processing”, 2nd Edition, Khanna Publishers, 2000.
5. Proakis, “A Self-Study Guide for Digital Signal Processing”, 1st Edition, Pearson Education, 2003.
6. Itearchor, “Digital Signal Processing”, 2nd Edition, Pearson Education, 2002.

XT7075 **ELECTRONIC COMMERCE** **L T P C**
3 0 0 3

OBJECTIVES

To introduce the concept of electronic commerce,
To understand how electronic commerce is affecting business enterprises, governments, consumers and people in general.
To study the development of websites using relevant software tools.

- Acquaint students with a fundamental understanding of the environment and strategies in the New Economy.
- Provide analytical tools to understand opportunities in unserved or underserved New Economy markets.
- Provide a fundamental understanding of the different types and key components on business models in the New Economy.
- Provide guiding principles behind the design and strategy of the customer web interface.
- Understand the traditional and new communication/marketing approaches that create competitive advantage in the New Economy.
- Provide insights on how to implement strategy in the New Economy.
- Understand the metrics that New Economy firms to use to measure progress, customer satisfaction, and financial performance.
- Understand the fundamentals of financially valuing New Economy companies.
- Provide an overview of the hardware, software, servers, and the parts that make up the enabling "railroad" for the New Economy.

UNIT I INTRODUCTION TO ELECTRONIC COMMERCE 9

Electronic commerce framework- Electronic commerce and media convergence- Anatomy of Electronic commerce application – consumer and organization application – components of the i-way – Network access equipment – Global information networks – Public policy issues shaping the i-way.

UNIT II INFRASTRUCTURE FOR ELECTRONIC COMMERCE 9

Internet terminology – Chronological history of the internet – Internet governance – Online companies – Regional and local level ISP – Services provider connectivity – client and server network security – Security threats – Firewalls - data and message security – Encrypted documents – Regulations.

UNIT III WEB BASED ELECTRONIC COMMERCE 9

Architectural framework – WWW - HTML – XML – Consumer oriented application – Mercantile process models – Electronic payment system – inter organizational commerce and EDI – Supply chain management - Advertising and marketing on the internet.

UNIT IV ELECTRONIC COMMERCE RESOURCES 9

Search and resource discovery paradigms – Information filtering – on demand education – digital copy rights – software agents – internet protocol suite.

UNIT V CURRENT TRENDS 9

Multimedia and digital video – Broad band telecommunication – Mobile and wireless computing framework – Mobile computing application – Personal communication services – current topics and issues.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the subject, students is expected to:
to realise the problems involved in designing and building e-commerce systems;
understand the need to design EC systems that fully meet the requirements of the intended users;
appreciate the need to ensure that the implementation of a design is adequately tested to ensure that the completed EC system meets the specifications;

be fully aware of the principles and practice of an O-O approach to the design and development of EC systems; be able to apply these principles in practice.

- Explain the components and roles of the Electronic Commerce environment.
- Explain how businesses sell products and services on the Web.
- Describe the qualities of an effective Web business presence.
- Describe E-Commerce payment systems.
- Explain how to meet the needs of Web site visitors.
- Identify and reach customers on the Web.
- Understand Web marketing approaches and elements of branding.
- Explain the client/server infrastructure that supports electronic commerce.
- Explain basic electronic commerce functions.
- Understand legal and ethical issues related to E-Commerce.

TEXTBOOK

1. Ravi Kalakota and Andrew B. whinsters , Frontiers of Electronic Commerce, Pearson Education, 2009.

REFERENCES

1. Gary P Schneider “Electronic commerce ” Thomson learning & james t peny, Cambridge USA, 2001.
2. Manlyn Greenstein and Miklos, “Electronic commerce” ,McGraw-Hill, 2002.
3. Efraim Turvan J. Lee, David kug and chung, ‘’Electronic commerce’’ Pearson education, Asia , 2001.
4. Brenda kienew, “E- commerce Business”, Prentice Hall, 2001.

XT7076 FREE AND OPEN SOURCE SOFTWARE L T P C

3 0 0 3

OBJECTIVES

- To expose to the context and operation of free and open source software (FOSS)
- communities and associated software projects.
- To familiaze with participating in a FOSS project
- To Learn scripting language like Python
- To Learn some important FOSS tools

UNIT I PHILOSOPHY 6

Linux,GNU and Freedom, Brief history of GNU, Licensing free software – GPL and copy Left, trends and potential – global and Indian, overview and usage of various Linux Distributions – user friendliness perspective – scientific perspective.

UNIT II SYSTEM ADMINISTRATION 10

GNU and linux installation – Boot process, Commands Using bash features, The man pages, files and file systems, File security, Partitions, Processes, Managing processes, I/O redirection, Graphical environment, Installing software, Backup techniques.

UNIT III FOSS PROGRAMMING PRACTICES 10

GNU debugging tools, Using source code versioning and managing tools, Review of common programming practices and guidelines for GNU/Linux and FOSS, Documentation.

UNIT IV PROGRAMMING TECHNIQUES 10

Application programming – Basics of X Windows server architecture – QT programming – GTK + Programming- Python programming – Open source equivalent of existing Commercial software.

UNIT V PROJECTS AND CASE STUDIES 9

Linux for portable Devices, Creation of Bootable CD and USB from command line, Case Studies – Samba, Libreoffice, Assistive technology.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, the student should be able to:

- Install and run open-source operating systems.
- Gather information about Free and Open Source Software projects from software releases and from sites on the internet.
- Build and modify one or more Free and Open Source Software packages.
- Use a version control system.
- Contribute software to and interact with Free and Open Source Software development projects.

TEXTBOOK

1. Ellen Siever, Stephen Figgins, Robert Love, Arnold Robbins, Linux in a nutshell, 6th Edition, OReilly media, September 2009.

REFERENCES

1. Philosophy of GNU URL: http://www.gnu.org/philosophy/
2. Overview of Linux Distributions URL: http://distrowatch.com/dwres.php?resource=major
3. Introduction to Linux – A Hands on Guide, URL: http://tldp.org/guides.html
4. Linux: Rute's User tutorial and exposition , URL: http://rute.2038bug.com/index.html.gz
5. Version control system , URL: http://git-scm.com/
6. SVN version control , URL: http://svnbook.red-bean.com/
7. GTK+/GNOME
8. Application
9. Development,
10. Havoc
11. Pennington.
12. URL:
13. http://developer.gnome.org/doc/GGAD
14. Python Tutorial, Guido van Rossum, Fred L. Drake, Jr., Editor. URL:
15. http://www.python.org/doc/current/tut/tut.html
16. Doug Abbot, Linux for Embedded and Embedded and Real time applications, Newnes
17. Case study SAMBA: URL : http://www.samba.org/
18. Case study., Libre office: http://www.libreoffice.org/
19. Case study, ORCA: http://live.gnome.org/Orca

XT7077 **GAME PROGRAMMING** **L T P C**
3 0 0 3

OBJECTIVES

- To get subsequent understanding of game design and development, which includes the processes, mechanics, issues in game design, game engine development, modeling, techniques, handling situations, and logic. At the end, the student will be in a position to create interactive games. To learn this course an exposure to 3D graphics principles and animation techniques are the prerequisite.

UNIT I GRAPHICS FOR GAME PROGRAMMING 9

Coordinate Systems, Ray Tracing, Modeling in Game Production, Vertex Processing, Rasterization, Fragment Processing and Output Merging, Illumination and Shaders, Parametric Curves and Surfaces, Shader Models, Image Texturing, Bump Mapping, Advanced Texturing, Character Animation, Physics-based Simulation.

UNIT II GAME DESIGN PRINCIPLES 9

Game Logic, Game AI, Path Finding, Game Theory, Character development, Story Telling, Narration, Game Balancing, Core mechanics, Principles of level design, Genres of Games, Collision Detection.

UNIT III GAMING ENGINE DESIGN 9

Renderers, Software Rendering, Hardware Rendering, and Controller based animation, Spatial Sorting, Level of detail, collision detection, standard objects, and physics.

UNIT IV GAMING PLATFORMS AND FRAMEWORKS 9

Flash, DirectX, OpenGL, Java, Python, XNA with Visual Studio, Mobile Gaming for the Android, iOS, Game engines - Adventure Game Studio, DX Studio, Unity.

UNIT V GAME DEVELOPMENT 9

Developing 2D and 3D interactive games using OpenGL, DirectX – Isometric and Tile Based Games, Puzzle games, Single Player games, Multi Player games.

TOTAL: 45 PERIODS

OUTCOMES

Upon successful completion of this subject students should be able to:

- Illustrate an understanding of the concepts behind game programming techniques.
- Implement game programming techniques to solve game development tasks.
- Construct a basic game engine using open-source programming libraries.

TEXTBOOKS

1. David H. Eberly, “3D Game Engine Design, Second Edition: A Practical Approach to Real-Time Computer Graphics” Morgan Kaufmann, 2nd Edition, 2006.
2. JungHyun Han, “3D Graphics for Game Programming”, Chapman and Hall/CRC, 1st Edition, 2011.
3. Mike McShaffrfy, “Game Coding Complete”, 3rd Edition, Charles River Media, 2009.
4. Jonathan S. Harbour, “Beginning Game Programming”, Course Technology PTR, 3rd Edition, 2009.

REFERENCES

1. Ernest Adams and Andrew Rollings, “Fundamentals of Game Design”, Prentice Hall 1st Edition, 2006.
2. Roger E. Pedersen, “Game Design Foundations”, Edition 2, Jones & Bartlett Learning, 2009.
3. Scott Rogers, “Level Up!: The Guide to Great Video Game Design”, Wiley, 1st Edition, 2010.

4. Jason Gregory, “Game Engine Architecture”, A K Peters, 2009.
5. Jeannie Novak, “Game Development Essentials”, 3rd Edition, Delmar Cengage Learning, 2011.
6. Andy Harris, “Beginning Flash Game Programming For Dummies”, For Dummies; Updated edition, 2005.
7. John Hattan, “Beginning Game Programming: A GameDev.net Collection”, Course Technology PTR, 1st Edition, 2009.
8. Eric Lengyel, “Mathematics for 3D Game Programming and Computer Graphics”, 3rd Edition, Course Technology PTR, 2011.
9. Dino Dini, **“**Essential 3D Game Programming”, Morgan Kaufmann, 1st Edition, 2012.
10. Jim Thompson, Barnaby Berbank-Green, and Nic Cusworth, “Game Design: Principles, Practice, and Techniques - The Ultimate Guide for the Aspiring Game Designer”, 1st Edition, Wiley, 2007.

XT7078 GEOGRAPHIC INFORMATION SYSTEM L T P C
3 0 0 3

OBJECTIVES

- To Develop an understanding of the world’s quickly-growing spatial data infrastructure and of how to put it to work for producing location-based information.
- To Identify the relevant spatial characteristics of diverse application areas enabling professionals to integrate spatial thinking and GIS analysis into their careers.
- To have an ability to use geospatial technologies to gain a significant advantage in the information technology field.

UNIT I **7**

GIS – Definition -History of GIS -Basic Components of GIS – Hardware, Software, Data, Methods, People – List of GIS Software: Popular software, Open Source software

UNIT II **10**

Data: Spatial and Non-Spatial Data – Spatial Data: Points, Lines, Polygons/Area and Surface - Non-Spatial Data - Levels of Measurement: Nominal, Ordinal, interval, ratio – Data Base – Functions -Data Base Structures – Hierarchical, Network, Relational-Relational Data Base Management System – Normalization, E-R Diagram

UNIT III **10**

Raster Data Model – Grid Cell/Pixel -Tesselations – Regular, Irregular – Geometry of Regular Tesselations: Shape, Adjacency, Connectivity, Orientation - Size of Grid Cell – Data Encoding: Rule of dominance, Rule of importance, Centre of Cell -Data Compression: Runlength, Chain, Block and Quadtree coding -Vector Data Model – Topology - Euler Equation, Rules for Topological Consistency – Arc-Node Data Structure – Raster vs. Vector Comparison.

UNIT IV **9**

Vector Data Input – Digitizer: Principles, Co-ordinate transformation – Errors in digitizing – Scanner: Principles, On Screen Digitization, Georeferencing – Raster File Formats, Vector File formats – Import/Export Functionality – Linking Non-spatial data with Spatial data – Linking digital databases: ODBC – GPS data integration.

UNIT V **9**

Discrete and Continuous Surfaces – Interpolation Techniques - Digtial Elevation Models – Sources of DEM: Ground Survey, Photogrammetry, Stereo Satellite data, Airborne Laser Terrain Mapping- DEM representation – Gridded DEM, TIN structure – Extraction of Topographic Parameters: Slope, Aspect, Delienation of Watershed and Drainage Network – DEM Applications.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the subject, students would have learnt about:

- How to describe what GIS is; name the major GIS software available; know where to find more information;
- How to explain the components and functionality of a GIS and the differences between GIS and other information systems;
- The nature of geographic information and explain how it is stored in computer (including map projection) and the two types of GIS data structure;
- How to conduct simple spatial analysis using GIS software;
- How to design and complete a GIS project from start to finish (data capture, data storage and management, analysis, and presentation)

TEXTBOOK

1. Lo, C.P. and Yeung, Albert K.W., Concepts and Techniques of Geographic Information Systems Prentice Hall, 2/E, 2006.

REFERENCES

1. Peter A. Burrough, Rachael A. McDonnell, Principles of GIS, Oxford University Press, 2000.
2. Robert Laurini and Derek Thompson, Fundamentals of Spatial Information Systems, Academic Press, 1996
3. Paul Longley , Geographic Information Systems and Science, John Wiley & Sons Inc ,2001.

XT7079 **INFORMATION CODING TECHNIQUES** **L T P C**
3 0 0 3

OBJECTIVES

- To introduce information theory leading to the channel capacity theorem.
- To introduce the fundamentals of error control coding techniques

UNIT I INFORMATION ENTROPY FUNDAMENTALS **9**

Uncertainty – Information and entropy – Source coding theorem – Huffman coding – Shannon Fano coding – Discrete memory less channels – Channel capacity – Channel coding theorem -Channel capacity theorem.

UNIT II DATA AND VOICE CODING **9**

Differential pulse code modulation – Adaptive differential pulse code modulation – Adaptive sub-band coding – Delta modulation – Adaptive delta modulation – Coding of speech signal at low bit rates (Vocoders – LPC).

UNIT III ERROR CONTROL CODING **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.

UNIT IV COMPRESSION TECHNIQUES 9

Principles – Text compression – Static Huffman coding – Dynamic Huffman coding – Arithmetic coding – Image compression – Graphics interchange format – Tagged image file format – Digitized documents – Introduction to JPEG standards.

UNIT V AUDIO AND VIDEO CODING 9

Linear predictive coding – Code excited LPC – Perceptual coding – MPEG audio coders – Dolby audio coders – Video compression - Principles – Introduction to H.261 & MPEG video standards.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the subject, students would have learnt about:

- The basic notions of information and channel capacity.
- Convolutional and block codes, decoding techniques, and automatic repeat request (ARQ) schemes.
- How error control coding techniques are applied in communication systems.

TEXTBOOKS

1. R. Bose, "Information Theory, Coding and Cryptography", Tata McGraw-Hill, 2007.
2. Fred Halsall, "Multimedia Communications: Applications, Networks, Protocols and Standards", Pearson Education Asia, 2002.

REFERENCES

1. K. Sayood, "Introduction to Data Compression", Third Edition, Elsevier, 2006.
2. S. Gravano, " Introduction to Error Control Codes", Oxford University Press, 2007.
3. Amitabha Bhattacharya," Digital Communication", Tata McGraw-Hill, 2006.

XT7080 INFORMATION SECURITY L T P C
3 0 0 3

OBJECTIVES

- To Understand basic information security principles and approaches.
- To Recognize the major information security threats and countermeasures.

UNIT I INTRODUCTION 9

History, What is Information Security?, Critical Characteristics of Information, NSTISSC Security Model, Components of an Information System, Securing the Components, Balancing Security and Access, The SDLC, The Security SDLC

UNIT II SECURITY INVESTIGATION 9

Need for Security, Business Needs, Threats, Attacks, Legal, Ethical and Professional Issues.

UNIT III SECURITY ANALYSIS 9

Risk Management: Identifying and Assessing Risk, Assessing and Controlling Risk.

UNIT IV LOGICAL DESIGN 9

Blueprint for Security, Information Security Policy, Standards and Practices, ISO 17799/BS 7799, NIST Models, VISA International Security Model, Design of Security Architecture, Planning for Continuity

UNIT V PHYSICAL DESIGN 9

Security Technology, IDS, Scanning and Analysis Tools, Cryptography, Access Control Devices, Physical Security, Security and Personnel.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the subject, students would have learnt about:

- How to Identify both external and internal vulnerabilities to enterprise computer infrastructures and sensitive digital assets anddevise a mitigation plan against them.
- Have comprehensive information about security policies, establishing necessary organizational processes /functions for information security and will be able to arrange necessary resources.
- Differentiating among the models, architectures, challenges and global legal constraints of secure electronic commerce technologies used to ensure transmission, processing and storage of sensitive information.
- About cyber law and ethics.

REFERENCES

1. Michael E Whitman and Herbert J Mattord, “Principles of Information Security”, Vikas Publishing House, New Delhi, 2003.
2. Micki Krause, Harold F. Tipton, “ Handbook of Information Security Management”, Vol 1-3 CRC Press LLC, 2004.
3. Stuart Mc Clure, Joel Scrambray, George Kurtz, “Hacking Exposed”, Tata McGraw-Hill, 2003.
4. Matt Bishop,“ Computer Security Art and Science”, Pearson/PHI, 2002.

XT7081 MODELING AND SIMULATION L T P C

3 0 0 3

OBJECTIVES

- To introduce students to basic simulation methods and tools for modelling and simulation of continuous, discrete and combined systems.

UNIT I INTRODUCTION 3

Simulation – Advantages and Disadvantages – Applications of Simulation – Systems and System environment – Components of a system – Discrete and Continuous systems – Model of a system – Types of models – Discrete-Event system simulation – Steps in a simulation study

UNIT II RANDOM NUMBERS AND RANDOM-VARIATE GENERATION 9

Properties of random numbers – Generation of Pseudo-random numbers – Techniques for generating random numbers – Linear congruential method – Combined linear congruential generators – Random-number streams – Tests for Random numbers – Frequency tests – Tests for autocorrelation - Inverse-Transform Technique – Acceptance-Rejection technique – Special properties

UNIT III QUEUEING MODELS 12

Characteristics of queueing systems – Long-run measures of performance of queueing systems – Little’s Formula – Steady-state behavior of Finite and Infinite population Markovian queueing models Networks of Queues

UNIT IV ANALYSIS OF SIMULATION DATA 12

Data collection – Identifying the distribution with data – Parameter estimation – Goodness of fit tests – Fitting a non-stationary Poisson process – Selecting input models without data – Multi-variate and Time series input models

UNIT V SIMULATION OF NETWORKED COMPUTER SYSTEMS 9

Simulation tools – Model Input – Mobility models in wireless systems – The OSI stack model – Physical layer in wireless systems – Media Access control – Data link layer – TCP – Model construction

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the subject, students will be able to

- understand the system concept and apply functional modeling method to model the activities of a static system;
- understand the behavior of a dynamic system and create an analogous model for a dynamic system
- simulate the operation of a dynamic system and make improvement according to the simulation results.

REFERENCES

1. Jerry Banks John S. Carson II, Barry L. Nelson, and David M.Nicol, "Discrete -Event System Simulation", 5th Edition, Pearson, India, 2013
2. Geoffrey Gordon, "System Simulation", 2nd Edition, Prentice Hall, India, 2002.
3. Narsingh Deo, "System Simulation with Digital Computer, "Prentice Hall, India, 2001.
4. Shannon, R.E. Systems simulation, The art and science, Prentice Hall, 1975.
5. Thomas J. Schriber, Simulation using GPSS, John Wiley, 1991.

XT7082 PERFORMANCE EVALUATION OF SYSTEM AND NETWORKS L T P C
3 0 0 3

OBJECTIVES

- To understand the mathematical foundations needed for performance evaluation of computer systems
- To understand the metrics used for performance evaluation
- To understand the analytical modeling of computer systems
- To enable the students to develop new queueing analysis for both simple and complex systems
- To appreciate the use of smart scheduling and introduce the students to analytical techniques for evaluating scheduling policies

UNIT I QUEUEING MODELS 9

Performance Characteristics – Requirement Analysis: Concepts –User, Application, Device, Network Requirements – Single Queueing systems: M/M/1 Queueing System – Little's Law – Reversibility and Burke's theorem – M/M/1/N – M/M/∞ - M/M/m – M/M/m/m – M/M/1/∞ - M/G/1 Queueing System.

UNIT II QUEUEING NETWORKS 9

Network of Queues: Product form solution – Algebraic Topological interpretation of the product form solution – Recursive solution of Nonproduct form networks – Queueing Networks with negative customers.

UNIT III QUEUES IN COMPUTER SYSTEMS 9

Stochastic Petri Nets: Bus oriented multiprocessor model – Toroidal MPN Lattices – Dining Philosophers problem – Station oriented CSMA/CD protocol model – The Alternating Bit Protocol – SPN's without product form solutions.

UNIT IV DISCRETE TIME QUEUEING MODELS 9

Discrete Time Queueing Systems – Discrete time Arrival Processes – Geom/Geom/m/N – Geom/Geom/1/N – Geom/Geom/1 Queueing Systems.

UNIT V NETWORK PERFORMANCE 9

Network Traffic Modeling: Continuous Time Models – Discrete Time Models – Solution Methods – Burstiness – Self Similar Traffic.

TOTAL : 45 PERIODS

OUTCOMES

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

- Identify the need for performance evaluation and the metrics used for it
- Discuss open and closed queueing networks
- Define Little'e law and other operational laws
- Apply the operational laws to open and closed systems
- Use discrete-time and continuous-time Markov chains to model real world systems
- Develop analytical techniques for evaluating scheduling policies

TEXTBOOKS

1. Thomas G.Robertazzi, "Computer Networks and Systems – Queueing Theory and Performance Evaluation", 3rd Edition, Springer Verlag, New York Inc, 2009.
2. James D.McCabe, "Network Analysis, Architecture and Design", 2nd Edition, Elsevier, 2003.
3. Bertsekas & Gallager, "Data Networks", 2nd Edition, PHI Learning Private Limited, New Delhi, 2009.

REFERENCES

1. D. Bertsekas, A. Nedic and A. Ozdaglar, "Convex Analysis and Optimization", Athena Scientific, Cambridge, Massachusetts, 2003.
2. Nader F.Mir, "Computer and Communication Networks", Pearson Education, 2007.
3. Paul J.Fortier and Howard E.Michel, "Computer Systems Performance Evaluation and Prediction", Elsevier, 2003.
4. Jerry Banks, John S. Carson, Barry L. Nelson and David M. Nicol," Discrete Event Systems Simulation" 5th Edition, Pearson, 2013.

XT7083 PERSONAL SOFTWARE PROCESSES L T P C
3 0 0 3

OBJECTIVES

- To study how to manage and track the time for software processes
- To study how to plan a product and how to measure size of a product
- To learn how to schedule a process
- To learn about software Development process
- To learn how to estimate the product and process quality.

UNIT I OVERVIEW AND PLANNING PROCESS 9

Overview of Software Development Life cycle – Overview of PSP – Different levels of PSP – Importance of Statistical data - Why do planning? – Size and Time – Process and sequencing – Tracking – Making the plan – Common planning tools – Software size.

UNIT II SOFTWARE SIZE, PROBE SIZE ESTIMATION AND SCHEDULE ESTIMATION 9

Estimation Process - Common estimation techniques – Function points – PROBE overview - Time estimation – size estimation – Time in phase - Planning development time – Estimating task time – Schedule estimating -– Software size estimation

UNIT III DESIGN AND CODE METHODOLOGIES AND REVIEWS 9

Advantages – Effectiveness data – justifying time investment – setting up a review process – Heuristics for design review – - Design and Coding methodologies - Review metrics – Derived metrics – checklists – Different Review Mechanism – Importance of review – Different types of testing

UNIT IV SOFTWARE QUALITY MANAGEMENT AND PROCESS DESCRIPTION 9

Quality Management, Hurdles to Quality – Different Statistical tools - Quality economics – Metrics for cost of quality – Effects of yield variance on schedule – Defect removal process – using casual analysis – Benefits of process definition – process components – Defining phases

UNIT V DATA SUMMARY AND CAUSAL ANALYSIS AND DEVELOPING PSP PROCESS SCRIPTS 9

Defect removal – Basic resource – Causal Analysis Techniques –— Tracking – Overall defect rates – Reduce compile and test defects –Refining time estimation – Developing PSP Process scripts Tailoring PSP Process Scripts to the needs.

TOTAL : 45 PERIODS

OUTCOMES

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

- Explain software development life cycle
- Adopt a suitable process for software development
- Elicit functional and quality requirements
- Analyze, prioritize, and manage requirements
- Perform trade-off among conflicting requirements
- Identify and prioritize risks and create mitigation plans
- Estimate the efforts required for software development
- Perform planning and tracking activities
- Control the artifacts during software development
- Perform various tests to ensure quality
- Define new processes based on the needs
- Adopt best practices for process improvement

TEXTBOOK

1. Humphrey, W.S., “Introduction to Personal Software Process”, Pearson Education (Singapore) Pvt., Ltd., Delhi, 2003.

REFERENCES

1. Raghav S. Nandyal, “ Making Sense of Software Quality Assurance”, 1st Edition, Tata McGraw Hill, 2007.
2. Steve McConnell,” Code Complete” A Practical Handbook of Software Construction”, 2nd Edition, Microsoft Press, 2004.

XT7084 **SOFT COMPUTING** **L T P C**
3 0 0 3

OBJECTIVES

- To learn the key aspects of Soft computing and Neural networks.
- To study the fuzzy logic components.
- To gain insight onto Neuro Fuzzy modeling and control.
- To know about the components and building block hypothesis of Genetic algorithm
- To gain knowledge in machine learning through Support Vector Machines.

UNIT I INTRODUCTION TO SOFT COMPUTING AND NEURAL NETWORKS 9

Evolution of Computing – Soft Computing Constituents – From Conventional AI to Computational Intelligence – Neural Networks - Adaptive Network - Supervised Learning -Perceptrons - Back propagation Multilayer Perceptrons - Learning from Reinforcement -Temporal Difference - Q-Learning - A Cost Path Problem - Unsupervised learning Networks -Kohonen Self-Organizing Networks - Learning Vector Quantization - Principal Component Networks.

UNIT II FUZZY SETS AND FUZZY LOGIC 9

Fuzzy Sets – Operations on Fuzzy Sets – Fuzzy Relations - Fuzzy Rules Non – interactive fuzzy sets – Fuzzification – Intuition , inference, Rank ordering – Defuzzification – Max-membership principle, Centroid method, Center of sums, Center of largest area.

UNIT III GENETIC ALGORITHMS 9

Introduction - Traditional vs. Genetic algorithm - Basic genetic operation - Schema Theorem Classification of genetic algorithm - Holland Classifier Systems - Genetic programming, gene encoding, fitness function and reproduction, GA optimization problems, JSPP (Job Shop Scheduling Problem), TSP (Travelling Salesman Problem), Applications of GA.

UNIT IV NEURO-FUZZY MODELING 9

Adaptive Neuro-Fuzzy Inference Systems – Coactive Neuro-Fuzzy Modeling – Classification and Regression Trees – Data Clustering Algorithms – Rule base Structure Identification – Neuro-Fuzzy Control – Case studies.

UNIT V APPLICATIONS OF SOFT COMPUTING 9

ANFIS Applications - Printed Character Recognition - Nonlinear system identification - Channel Equalization - Fuzzy Filtered Neural Networks - Hand written Numeral Recognition - Soft computing for color recipe Prediction - CANFIS modeling

TOTAL : 45PERIODS

OUTCOMES

- Upon Completion of the course, the students should be able to
- To discuss on machine learning through Neural networks.
- Apply knowledge in developing a Fuzzy expert system.
- Able to model Neuro Fuzzy system for clustering and classification.
- Discover knowledge to develop Genetic Algorithm and Support vector machine based machine learning system.

TEXTBOOKS

1. Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, “Neuro-Fuzzy and Soft Computing”, Prentice-Hall of India, 2003.
2. S.N. Sivanandam and S.N. Deepa, "Principles of Soft Computing", Wiley India, 2007.

REFERENCES

1. Mitchell Melanie, “An Introduction to Genetic Algorithm”, Prentice Hall, 1998.
2. David E. Goldberg, “Genetic Algorithms in Search, Optimization and Machine Learning”, Addison Wesley, 1997.
3. S. N. Sivanandam, S. Sumathi and S. N. Deepa, “Introduction to Fuzzy Logic using MATLAB”, Springer, 2007.
4. S.N.Sivanandam · S.N.Deepa, “ Introduction to Genetic Algorithms”, Springer, 2007.
5. George J. Klir and Bo Yuan, “Fuzzy Sets and Fuzzy Logic-Theory and Applications”, Prentice Hall, 1995.
6. James A. Freeman and David M. Skapura, “Neural Networks Algorithms, Applications and Programming Techniques”, Pearson Education, 2003.

XT7085	SOFTWARE METRICS	L	T	P	C
		3	0	0	3

OBJECTIVES

- To acquire methods to evaluate software artifacts with a rigorous and modern approach.
- To learn how to manage software development projects to produce high quality software.
- To gain experience of how, where and when improving real software products and processes with the application of basic mathematical concepts.

UNIT I MEASUREMENT IN SOFTWARE ENGINEERING 9

Scope of software metrics- key stages of formal measurement- McCabe’s cyclomatic computing – Direct and Indirect measurement –Measurement for prediction - Measurement scales and scale types-Meaning fullness in Measurement –statistical operations on measures-objective and subjective measures- measurement in extended number systems

UNIT II GOAL BASED FRAMEWORK AND EMPRICAL EVALUATION 9

Classifying software measures – determining what to measure-applying the framework-software measure validation- software measurement validation in practice-four principles of empirical investigation-planning formal experiments- planning case studies .

UNIT III DATA COLLECTION AND ANALYZING DATA 9

Good data- define data- how to collect data- how to store and extract data – analyzing results of experiments- examples of simple analysis technique-more advanced methods-overview of statistical tests

UNIT IV INTERNAL PRODUCT ATTRIBUTES 9

SIZE –aspects of software size- length – reuse- functionality – complexity - STRUCTURES –types of structural measures – control-flow structure- modularity and information flow attributes- object-oriented metrics- data structures- difficulties with general complexity measures

UNIT V EXTERNAL PRODUCT ATTRIBUTESAND EMPRICAL RESEARCH IN SOFTWARE ENGINEERING 9

Modeling software quality- measuring aspects of quality – problems with empirical research-investigating products – investigating resources- investigating processes- measurement present and future.

TOTAL : 45 PERIODS

OUTCOMES

Upon completion of the subject, students would have learnt about:

- the objectives and general principles of measurement
- assess different software products with a critical decision process based on a rigorous mathematical and deductive approach.

TEXTBOOKS

1. Norman E.Fentar, and Shari Lawrence Pfleeger, “Software Metrics”, Thomson Publications, Second Edition.
2. Stephen H.Kin, "Metric and Models in Software Quality Engineering", Addison Wesley, 1995.

XT7086 TOTAL QUALITY MANAGEMENT L T P C
3 0 0 3

OBJECTIVES

- To understand the various principles, practices of TQM to achieve quality.
- To learn the various statistical approaches for Quality control.
- To understand the TQM tools for continuous process improvement.
- To learn the importance of ISO and Quality systems

UNIT I INTRODUCTION TO QUALITY 9

Introduction - Need for quality - Evolution of quality - Definition of quality - Dimensions of product and service quality - Basic concepts of TQM – TQM Framework - Contributions of Quality Gurus – Barriers to TQM – Cost of Quality.

UNIT II TQM PRINCIPLES 9

Quality statements - Customer focus – Customer orientation, Customer satisfaction, Customer complaints, Customer retention - Continuous process improvement – PDCA cycle, 5s, Kaizen service quality frameworks and gaps – Control charts for variables and attributes.

UNIT III TQM TOOLS & TECHNIQUES I 9

The seven traditional tools of quality – New management tools – Six-sigma: Concepts, methodology, applications to manufacturing, service sector including IT – Bench marking – Reason to bench mark, Bench marking process – FMEA – Stages, Types.

UNIT IV TQM TOOLS & TECHNIQUES II 9

Quality circles – Quality Function Deployment (QFD) – Taguchi quality loss function – TPM – Concepts, improvement needs – Performance measures - BPR.

UNIT V QUALITY SYSTEMS 9

Need for ISO 9000- ISO 9000-2000 Quality System – Elements, Documentation, Quality auditing- QS 9000 – ISO 14000 – Concepts, Requirements and Benefits – Quality Council – Leadership, Employee involvement – Motivation, Empowerment, Team and Teamwork, Recognition and Reward.

TOTAL : 45 PERIODS

OUTCOMES

Upon successful completion of the module students will be able to:

- Develop an understanding on quality management philosophies and frameworks
- Develop in-depth knowledge on various tools and techniques of quality management
- Learn the applications of quality tools and techniques in both manufacturing and service industry.

- Develop analytical skills for investigating and analysing quality management issues in the industry and suggest implement able solutions to those.
- Assess exactly where an organization stands on quality management with respect to the ISO 9000 quality management standard and the Baldrige Award criteria.
- Successfully implement process improvement teams trained to use the various quality tools for identifying appropriate process improvements.

TEXTBOOK

1. Dale H.Besterfiled, et al., "Total Quality Management", Pearson Education Asia, 3rd Edition, Indian Reprint , 2006.

REFERENCES

1. James R. Evans and William M. Lindsay, "The Management and Control of Quality", 6th Edition, South-Western (Thomson Learning), 2005.
2. Shridhava Bhat, "Total Quality Management" Himalaya Publishing house, 1st Edition, 2002.
3. Suganthi, L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd., 2006 .
4. Janakiraman,B and Gopal, R.K, "Total Quality Management – Text and Cases", Prentice Hall (India) Pvt. Ltd., 2006.

XT7087 WAVELET ANALYSIS L T P C
3 0 0 3

UNIT I SIGNALS AND SYSTEMS 9

Signals-systems-causality and stability-Periodic Signals –Discrete Fourier Transform-Fast Fourier Transform- L^2 Fourier Series.

UNIT II HAAR SYSTEM 9

Dyadic Step Functions-The Haar System-Splitting Lemma-Har Bases on [0,1]-Comparison of Haar System with Fourier Series- Haar Bases on R-Discrete Har Transform-Image analysis with Haar Transform.

UNIT III MULTI RESOLUTION ANALYSIS 9

Orthogonal System of Translates- Definition of MRA-Construction of Orthogonal Wavelet Bases-Necessary Properties of Scaling Functions-Spline Wavelets.

UNIT IV DISCRETE WAVELET TRANSFORM 9

From MRA to Discrete Transform-The Quadrature Mirror Filter Conditions-DWT for finite signals-Scaling functions from scaling sequences-The Cascade Algorithm-Support of Scaling Functions.

UNIT V COMPACTLY SUPPORTED WAVELETS AND APPLICATIONS 9

Vanishing Moments-Daubechies Wavelets-Image Analysis with smooth Wavelets.

TOTAL : 45 PERIODS

TEXTBOOKS

1. David F. Walnut, "An Introduction to Wavelet Analysis, Birkhauser", First Indian Reprint , 2008.

REFERENCES

1. Charles K. Chui, "An Introduction to Wavelets", Academic Press, Inc. 1992.
2. Stephane Mallat, "A Wavelet Tour of Signal Processing", Academic Press, 2008.

XT7451 CRYPTOGRAPHY AND DATA SECURITY L T P C
3 0 0 3

OBJECTIVES

- To introduce the students to basic number theory concepts and algorithms related to cryptography.
- To study variety of existing crypto-systems and develop problem-solving skills for cryptographic problems and applications.
- To introduce to the students the science and study of methods of data protection computer and communication systems from unauthorized disclosure and modification,
- To show how to develop techniques for verification, identification, key safeguarding schemes and key distribution protocols and
- To introduce students to different methods of encrypting data for security purposes

UNIT I INTRODUCTION TO NUMBER THEORY 9

Modular arithmetic – Fermat Theorem-Euler's theorem – Euclid's algorithm –Extended Euclid's Algorithm, Chinese remainder theorem, Modular Exponentiation –Galois Fields, - Discrete logarithm-Primality Testing Using Miller-Rabin-Introduction to AKS algorithm.

UNIT II CONVENTIONAL ENCRYPTION 9

Conventional encryption model – Crypt Analysis of Caesar Cipher- Mono alphabetic Cipher-Hill Cipher-DES – RC 4– AES – Random number generation.

UNIT III PUBLIC KEY CRYPTOGRAHY AND DIGITAL SIGNATURES 9

RSA algorithm – Diffie - Hellman key exchange-Digital Signature – Authentication protocols- Digital Signature Standard, ElGammal.

UNIT IV MESSAGE AUTHENTICATION 9

MAC functions, Hash functions – Authentication requirements – authentication functions – Authentication Mechanisms Using Hash and MACs – Secure Hash Algorithms-SHA-3 --- HMAC, CMAC.

UNIT V NETWORK SECURITY 9

Prettry good privacy – S/MIME-IP Security Overview – Wireless Security ans SSL.

TOTAL : 45 PERIODS

OUTCOMES

Upon completion of the subject, students will be able to:

- explain basic concepts in number theory and apply modular arithmetic in problem solving
- understand the setups, the protocols, and the security issues of some existing cryptosystems
- examine the security of a given cryptosystem
- Implement some simple cryptographic schemes.

TEXTBOOK

1. Stallings, W., "Cryptography and Network Security Principles and Practice", Pearson Education, 4th Edition, 2006.

REFERENCES

1. Menezes A.J, Van Oorschot and Vanstone S.A, "Handbook of Applied Cryptography", CRC Press, 1996.
2. Behrouz A. Forouzan, Cryptography & Network Security, Tata McGraw-Hill, Special Indian Edition, 2007.
3. Kobilitz, N., "A course in Number Theory and Cryptography", Springer Verlag, 1994.
4. Biham, E., and Shamir, A., "Differential Crypt analysis of the data encryption standard", Springer Verlag, 1993.
5. Dennig, D., "Cryptography and data security", Addison Wesley, 1982.
7. Abhiji Das and Veni Madhavan C.E ," Public Key Cryptography – Principles and Practices", Pearson Education, New Delhi, 2009.