B.Tech – Information Technology

CURRICULUM & SYLLABI

Regulation 2016

(Applicable to candidates admitted in the academic year 2016-2017 onwards)

K.S.R. College of Engineering

(Autonomous)
K.S.R. Kalvi Nagar, Tiruchengode – 637 215
Namakkal (Dt), Tamilnadu, India
Email : info@ksrce.ac.in   Website : www.ksrce.ac.in

K.S.R.COLLEGE OF ENGINEERING: TIRUCHENGODE - 637215

(Autonomous)
DEPARTMENT OF INFORMATION TECHNOLOGY
VISION AND MISSION OF THE INSTITUTION
(REGULATIONS 2016)

VISION OF THE INSTITUTION

❖ We envision to achieve status as an excellent educational institution in the global knowledge hub, making self-learners, experts, ethical and responsible engineers, technologists, scientists, managers, administrators and entrepreneurs who will significantly contribute to research and environment friendly sustainable growth of the nation and the world.

MISSION OF THE INSTITUTION

❖ To inculcate in the students self-learning abilities that enable them to become competitive and considerate engineers, technologists, scientists, managers, administrators and entrepreneurs by diligently imparting the best of education, nurturing environmental and social needs.

❖ To foster and maintain a mutually beneficial partnership with global industries and institutions through knowledge sharing, collaborative research and innovation.

VISION AND MISSION OF THE DEPARTMENT

VISION OF THE DEPARTMENT

❖ To produce excellent and competent software professional, researchers and responsible engineers, who can significantly contribute to environment friendly societal industry through quality education.

MISSION OF THE DEPARTMENT

❖ To make the students competitive and efficient in technical field through technological transformations' in Information Technology, by providing them advanced curriculum, infrastructure and nurturing human values.

❖ To provide an excellent forum for higher studies that leads to careers as Computer and IT professionals in the widely diversified domains of industry, government and academia.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO1. Incorporate with necessary background in science and engineering fundamentals to analyze and solve IT problems and to prepare them for skilled manpower in the field of IT for subsequently generation.

PEO2. Enhance in various latest programming languages, technologies, software development process and communication technology.

PEO3. Attain successful career in industry through effective communication skills, team spirit, learning ethical responsibilities, attitude and adapt to emerging technologies.

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PROGRAMME OUTCOMES (POs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs)

	Programme Outcomes (POs)
PO1	**Engineering Graduates will be able to:** **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	**Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	**Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	**Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	**Modern tool usage:** Create, select, and apply appropriate techniques, resource, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	**The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	**Environmental and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	**Individual and team work:** Function effectively as an individual, and as a member or leader diverse teams, and in multidisciplinary settings.
PO10	**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	**Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	**Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadcast context of technological change.
PSO1	**Research Culture:** Analyze a problem, design algorithm, identify and define the computing requirements appropriate to its solution and implement the same.
PSO2	**Core Values:** Contribute core universal values and social good in the community.
Programme Specific Outcomes (PSOs)	
Research Culture: Analyze a problem, design algorithm, identify and define the computing requirements appropriate to its solution and implement the same.	
Core Values: Contribute core universal values and social good in the community.	

	K.S.R. COLLEGE OF ENGINEERING (Autonomous) (Approved by AICTE& Affiliated to Anna University) K.S.R. Kalvi Nagar, Tiruchengode – 637 215		CURRICULUM UG R – 2016

Department	Information Technology
Programme	B.Tech – Information Technology

SEMESTER - I

Sl.No.	Course Code	Course Name	Category	Hours/ Week			Credit	Maximum Marks		
				L	T	P	C	CA	ES	Total
THEORY										
1.	16EN151	Technical English – I (Common To All Branches)	HS	3	0	0	3	30	70	100
2.	16MA152	Engineering Mathematics – I (Common To All Branches)	BS	3	1	0	4	30	70	100
3.	16PH153	Engineering Physics (Common To All Branches)	BS	3	0	0	3	30	70	100
4.	16CY154	Engineering Chemistry (Common To All Branches)	BS	3	0	0	3	30	70	100
5.	16IT115	Computer Programming and Problem Solving	ES	3	0	0	3	30	70	100
6.	16GE141	Basics of Civil and Mechanical Engineering (Common To CS,EC,EE & IT)	ES	3	0	0	3	30	70	100
PRACTICAL										
7.		Physics & Chemistry Laboratory* (Common To All Branches)	BS	-	-	3	-	-	-	-
8.	16IT122	Computer Programming and Problem Solving Laboratory	ES	0	0	3	2	50	50	100
9.	16IT123	PC Hardware and Troubleshooting Laboratory	ES	0	0	3	2	50	50	100
		Total		18	1	9	23	800		

* End Semester Examination only in II Semester

SEMESTER - II										
Sl.No.	Course Code	Course Name	Category	Hours/ Week			Credit	Maximum Marks		
				L	T	P	C	CA	ES	Total
THEORY										
1.	16EN251	Technical English – II (Common To All Branches)	HS	3	0	0	3	30	70	100
2.	16MA242	Engineering Mathematics – II (Common To AU,CE,EC,EE,ME & IT)	BS	3	1	0	4	30	70	100
3.	16PH242	Applied Materials Physics (Common To CS & IT)	BS	3	0	0	3	30	70	100
4.	16CY254	Environmental Science and Engineering (Common To All Branches)	HS	3	0	0	3	30	70	100
5.	16IT215	Data Structures	PC	3	0	0	3	30	70	100
6.	16IT216	IT Essentials	ES	3	1	0	4	30	70	100
PRACTICAL										
7.	16GE228	Physics & Chemistry Laboratory (Common To All Branches)	BS	0	0	3	2	50	50	100
8.	16IT222	Data Structures Laboratory	PC	0	0	3	2	50	50	100
9.	16AU027	Engineering Graphics Laboratory (Common To CS,EC,EE & IT)	ES	0	0	3	2	50	50	100
10.	16HR251	Career Development Skills – I	EEC	0	2	0	0	50	50	100
		Total		18	4	9	26	1000		

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Programme	B.Tech – Information Technology

SEMESTER - III

Sl.No.	Course Code	Course Name	Category	Hours/ Week			Credit	Maximum Marks		
				L	T	P	C	CA	ES	Total
THEORY										
1.	16MA332	Discrete Mathematics	BS	3	1	0	4	30	70	100
2.	16EC331	Digital Principles and System Design	ES	3	0	0	3	30	70	100
3.	16EC333	Principles of Communication	ES	3	0	0	3	30	70	100
4.	16IT313	Object Oriented Programming	PC	3	0	0	3	30	70	100
5.	16IT314	Design and Analysis of Algorithms	PC	3	0	0	3	30	70	100
6.	16IT315	Operating Systems	PC	3	1	0	4	30	70	100
PRACTICAL										
7.	16EC327	Digital Laboratory	ES	0	0	3	2	50	50	100
8.	16IT322	Object Oriented Programming Laboratory	PC	0	0	3	2	50	50	100
9.	16IT323	Operating Systems Laboratory	PC	0	0	3	2	50	50	100
10.	16HR352	Career Development Skills – II	EEC	0	2	0	0	50	50	100
		Total		18	4	9	26	1000		

SEMESTER - IV

Sl.No.	Course Code	Course Name	Category	Hours/ Week			Credit	Maximum Marks		
				L	T	P	C	CA	ES	Total
THEORY										
1.	16MA442	Probability and Decision Models (Common To CS & IT)	BS	3	1	0	4	30	70	100
2.	16IT412	Computer Organization and Architecture	PC	3	0	0	3	30	70	100
3.	16IT413	Computer Networks	PC	3	0	0	3	30	70	100
4.	16IT414	Advanced Programming in Java	PC	3	1	0	4	30	70	100
5.	16IT415	Database Systems	PC	3	0	0	3	30	70	100
6.	16IT416	Software Engineering Principles and Practice	PC	3	0	0	3	30	70	100
PRACTICAL										
7.	16IT421	Computer Networks Laboratory	PC	0	0	3	2	50	50	100
8.	16IT422	Advanced Programming in Java Laboratory	PC	0	0	3	2	50	50	100
9.	16IT423	Database Systems Laboratory	PC	0	0	3	2	50	50	100
10.	16HR463	Career Development Skills – III	**EEC**	**0**	**2**	**0**	**0**	**50**	**50**	**100**
		Total		18	4	9	26	1000		

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SEMESTER - V

SI.No.	Course Code	Course Name	Category	Hours/ Week			Credit	Maximum Marks		
				L	T	P	C	CA	ES	Total
THEORY										
1.	16IT511	Web Technology	PC	3	0	0	3	30	70	100
2.	16IT512	Data Warehousing and Data Mining	PC	3	0	0	3	30	70	100
3.	16IT513	Principles of Embedded systems	PC	3	1	0	4	30	70	100
4.	16IT514	Artificial Intelligence	EEC	3	0	0	3	30	70	100
5.	16IT515	Theory of Computation	PC	3	1	0	4	30	70	100
6.		Professional Elective - I	PE	3	0	0	3	30	70	100
PRACTICAL										
7.	16IT521	Web Technology Laboratory	PC	0	0	3	2	50	50	100
8.	16IT522	Data Mining Laboratory	PC	0	0	3	2	50	50	100
9.	16IT523	App Development Laboratory	EEC	0	0	3	2	50	50	100
10.	16HR564	Career Development Skills – IV	EEC	0	2	0	0	50	50	100
		Total		18	3	9	26	1000		

SEMESTER - VI

SI.No.	Course Code	Course Name	Category	Hours/ Week			Credit	Maximum Marks		
				L	T	P	C	CA	ES	Total
THEORY										
1.	16IT611	Big Data and Analytics	PC	3	0	0	3	30	70	100
2.	16IT612	Distributed Systems	PC	3	0	0	3	30	70	100
3.	16IT613	Cryptography and Network Security	PC	3	1	0	4	30	70	100
4.	16IT614	Principles of Compiler Design	PC	3	0	0	3	30	70	100
5.		Professional Elective - II	PE	3	0	0	3	30	70	100
6.		Open Elective - I	OE	3	0	0	3	30	70	100
PRACTICAL										
7.	16IT621	Big Data and Analytics Laboratory	PC	0	0	3	2	50	50	100
8.	16IT622	Compiler Design Laboratory	PC	0	0	3	2	50	50	100
9.	16IT623	Society Oriented Project	EEC	0	0	3	2	50	50	100
10.	16HR665	Career Development Skills – V	EEC	0	2	0	0	50	50	100
		Total		18	3	9	25	1000		

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SEMESTER - VII

SI.No.	Course Code	Course Name	Category	Hours/ Week			Credit	Maximum Marks		
				L	T	P	C	CA	ES	Total
THEORY										
1.	16HS751	Professional Ethics (Common To All Branches)	HS	3	0	0	3	30	70	100
2.	16IT712	Cloud Computing	PC	3	0	0	3	30	70	100
3.	16IT713	Graphics and Multimedia	PC	3	0	0	3	30	70	100
4.	16IT714	Mobile Computing and Internet of Things	PC	3	0	0	3	30	70	100
5.		Open Elective - II	OE	3	0	0	3	30	70	100
6.		Professional Elective - III	PE	3	0	0	3	30	70	100
PRACTICAL										
7.	16IT721	Cloud Computing Laboratory	PC	0	0	3	2	50	50	100
8.	16IT722	Graphics and Multimedia Laboratory	PC	0	0	3	2	50	50	100
		Total		18	0	6	22		800	

SEMESTER - VIII										
SI.No.	Course Code	Course Name	Category	Hours/ Week			Credit	Maximum Marks		
				L	T	P	C	CA	ES	Total
THEORY										
1.	16HS002	Total Quality Management (Common To AU,CE,CS,ME,EE & IT)	HS	3	0	0	3	30	70	100
2.		Professional Elective - IV	PE	3	0	0	3	30	70	100
3.		Professional Elective - V	PE	3	0	0	3	30	70	100
PRACTICAL										
4.	16IT821	Project Work	EEC	0	0	12	6	50	50	100
		Total		18	0	12	15		400	

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List of Electives		

<table>
<tr><td colspan="14" align="center">PROFESSIONAL ELECTIVE – I (SEMESTER - V)</td></tr>
<tr><td rowspan="2">SI.No.</td><td rowspan="2">Course Code</td><td rowspan="2">Course Name</td><td rowspan="2">Specialization</td><td rowspan="2">Category</td><td colspan="3">Hours/ Week</td><td>Credit</td><td colspan="3">Maximum Marks</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>C</td><td>CA</td><td>ES</td><td>Total</td></tr>
<tr><td>1.</td><td>16MA091</td><td>Numerical Methods</td><td>S2</td><td>PE</td><td>3</td><td>0</td><td>0</td><td>3</td><td>30</td><td>70</td><td>100</td></tr>
<tr><td>2.</td><td>16EC581</td><td>Principles of Digital Signal Processing</td><td>S3</td><td>PE</td><td>3</td><td>0</td><td>0</td><td>3</td><td>30</td><td>70</td><td>100</td></tr>
<tr><td>3.</td><td>16HS003</td><td>Disaster Preparedness and Management
(Common To CS,EE & IT)</td><td>S5</td><td>PE</td><td>3</td><td>0</td><td>0</td><td>3</td><td>30</td><td>70</td><td>100</td></tr>
<tr><td>4.</td><td>16IT561</td><td>Software Practice and Testing</td><td>S4</td><td>PE</td><td>3</td><td>0</td><td>0</td><td>3</td><td>30</td><td>70</td><td>100</td></tr>
<tr><td>5.</td><td>16IT562</td><td>Visual Programming</td><td>S1</td><td>PE</td><td>3</td><td>0</td><td>0</td><td>3</td><td>30</td><td>70</td><td>100</td></tr>
<tr><td>6.</td><td>16IT563</td><td>Information Theory and Coding Techniques</td><td>S4</td><td>PE</td><td>3</td><td>0</td><td>0</td><td>3</td><td>30</td><td>70</td><td>100</td></tr>
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<table>
<tr><td colspan="14" align="center">PROFESSIONAL ELECTIVE – II (SEMESTER - VI)</td></tr>
<tr><td rowspan="2">SI.No.</td><td rowspan="2">Course Code</td><td rowspan="2">Course Name</td><td rowspan="2">Specialization</td><td rowspan="2">Category</td><td colspan="3">Hours/ Week</td><td>Credit</td><td colspan="3">Maximum Marks</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>C</td><td>CA</td><td>ES</td><td>Total</td></tr>
<tr><td>1.</td><td>16IT661</td><td>Wireless Networks</td><td>S3</td><td>PE</td><td>3</td><td>0</td><td>0</td><td>3</td><td>30</td><td>70</td><td>100</td></tr>
<tr><td>2.</td><td>16IT662</td><td>Object Oriented Analysis and Design</td><td>S4</td><td>PE</td><td>3</td><td>0</td><td>0</td><td>3</td><td>30</td><td>70</td><td>100</td></tr>
<tr><td>3.</td><td>16IT663</td><td>E-Commerce</td><td>S5</td><td>PE</td><td>3</td><td>0</td><td>0</td><td>3</td><td>30</td><td>70</td><td>100</td></tr>
<tr><td>4.</td><td>16IT664</td><td>Social Network Analysis</td><td>S2</td><td>PE</td><td>3</td><td>0</td><td>0</td><td>3</td><td>30</td><td>70</td><td>100</td></tr>
<tr><td>5.</td><td>16IT665</td><td>Agile Software Development</td><td>S4</td><td>PE</td><td>3</td><td>0</td><td>0</td><td>3</td><td>30</td><td>70</td><td>100</td></tr>
<tr><td>6.</td><td>16IT666</td><td>Open Source software</td><td>S4</td><td>PE</td><td>3</td><td>0</td><td>0</td><td>3</td><td>30</td><td>70</td><td>100</td></tr>
<tr><td>7.</td><td>16IT667</td><td>Mobile Application Development</td><td>S1</td><td>PE</td><td>3</td><td>0</td><td>0</td><td>3</td><td>30</td><td>70</td><td>100</td></tr>
<tr><td>8.</td><td>16IT668</td><td>Geo-Informatics Systems</td><td>S2</td><td>PE</td><td>3</td><td>0</td><td>0</td><td>3</td><td>30</td><td>70</td><td>100</td></tr>
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Department	Information Technology	
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List of Electives		

PROFESSIONAL ELECTIVE – III (SEMESTER - VII)

Sl.No.	Course Code	Course Name	Specialization	Category	Hours/ Week			Credit	Maximum Marks		
					L	T	P	C	CA	ES	Total
1.	16IT761	Advanced Computer Architecture	S1	PE	3	0	0	3	30	70	100
2.	16IT762	Entrepreneurship Development and Business Management	S5	PE	3	0	0	3	30	70	100
3.	16IT763	Digital Image Processing	S2	PE	3	0	0	3	30	70	100
4.	16IT764	Information Storage and Retrieval	S2	PE	3	0	0	3	30	70	100
5.	16IT765	Service Oriented Architecture	S1	PE	3	0	0	3	30	70	100
6.	16IT766	Unix Internals	S4	PE	2	0	2	3	30	70	100
7.	16IT767	Soft computing	S3	PE	3	0	0	3	30	70	100
8.	16IT768	Semantic Web	S1	PE	3	0	0	3	30	70	100
9.	16IT769	Agent based Intelligent Systems	S4	PE	3	0	0	3	30	70	100
10.	16IT771	Human Computer Interaction	S3	PE	3	0	0	3	30	70	100

PROFESSIONAL ELECTIVE – IV & V (SEMESTER - VIII)

Sl.No.	Course Code	Course Name	Specialization	Category	Hours/ Week			Credit	Maximum Marks		
					L	T	P	C	CA	ES	Total
1.	16IT861	Bio-Informatics	S1	PE	3	0	0	3	30	70	100
2.	16IT862	Intellectual Property Rights	S5	PE	3	0	0	3	30	70	100
3.	16IT863	Green IT : Principles and Practices	S2	PE	3	0	0	3	30	70	100
4.	16IT864	IT Enabled Services	S2	PE	3	0	0	3	30	70	100
5.	16IT865	Cyber Forensics	S3	PE	3	0	0	3	30	70	100
6.	16IT866	Enterprise Resource Planning	S5	PE	3	0	0	3	30	70	100
7.	16IT867	Next Generation Networks	S3	PE	3	0	0	3	30	70	100
8.	16IT868	C# and .Net Framework	S1	PE	3	0	0	3	30	70	100
9.	16IT869	Nano Computing	S1	PE	3	0	0	3	30	70	100
10.	16IT870	Software Project Management	S4	PE	3	0	0	3	30	70	100
11.	16IT871	Game Programming and Frameworks	S2	PE	3	0	0	3	30	70	100
12.	16IT872	Backup Recovery System and Architecture	S4	PE	3	0	0	3	30	70	100

S1 - Computing & Web Services

S2 - Data and Knowledge Engineering

S3 - Networks and Security

S4 - Systems and Software Engineering

S5 - Management Skills

LIST OF PROPOSED ONE CREDIT COURSES

S.No	Course Name	Number of hours	Offered by Internal / External
1	Android Application Development	15	Internal / External
2	Hadoop	15	Internal / External
3	MongoDB	15	Internal / External
4	PERL Programming	15	Internal / External
5	PYTHON Programming	15	Internal / External
6	Google App Scripting	15	Internal / External
7	RedHat Linux	15	Internal / External
8	Software Testing Certification	15	Internal / External
9	Network Simulator	15	Internal / External
10	Data Mining Tool	15	Internal / External

S.no	Subject Area	Credits Per Semester								Total Credits	Percentage Credits
		I	II	III	IV	V	VI	VII	VIII		
1	HS	3	6	0	0	0	0	3	3	15	7.94
2	BS	10	9	4	4	0	0	0	0	27	14.29
3	ES	10	6	8	0	0	0	0	0	24	12.69
4	PC	0	5	14	22	18	17	13	0	89	47.09
5	PE	0	0	0	0	3	3	3	6	15	7.94
6	OE	0	0	0	0	0	3	3	0	6	3.17
7	EEC	0	0	0	0	5	2	0	6	13	6.88
	Total	23	26	26	26	26	25	22	15	189	100.00

Total Credits for Regular students – 189 Credits
Total Credits for Lateral Entry students – 149 Credits

Chairman (BoS)
Dr. G. Singaravel
Professor & Head
Department of Information Technology
K.S.R. College of Engineering (Autonomous)
Tiruchengode - 637 215
Namakkal (Dt), Tamilnadu, India.

PRINCIPAL,
K.S.R. COLLEGE OF ENGINEERING,
TIRUCHENGODE - 637 209.

K.S.R. COLLEGE OF ENGINEERING (Autonomous)   **R 2016**

SEMESTER - I

16EN151	**TECHNICAL ENGLISH – I**	**L**	**T**	**P**	**C**
	(Common to All Branches)	**3**	**0**	**0**	**3**

Prerequisite: *No prerequisite needed for enrolling into the course*

Objective(s):

- *To develop basic conversation skills.*
- *To build vocabulary skills with the right choice of words.*
- *To improve students' understanding of grammar in context progressively.*

UNIT - I   GRAMMAR AND VOCABULARY   [9]

Synonyms & Antonyms – Tenses (Simple Present, Present Continuous, Present Perfect, Simple Past, and Simple Future) – Use of Modal Auxiliaries – Infinitive and Gerund – Preposition of Time, Place and Movement – Concord (Subject & Verb Agreement) – British & American Terminology – Phrasal Verbs (Put, Give, Look, Take, Get, Call) – Pick the Grammatically correct sentences – Impersonal passive – Technical Abbreviations and Acronyms

UNIT - II   LISTENING   [9]

Active Listening - Listening for the main idea - Predicting - Drawing inferences - Listening for specific details - Listening to News – Listening to Dialogues – Listening to Telephonic Conversation.

UNIT - III   PHONETICS AND SPOKEN ENGLISH   [9]

Consonant Sounds – Pronunciation guidelines related to Vowels and Consonant – Drills using Minimal pairs – Welcome Speech – Vote of Thanks – MoC – Anchoring – Role play in academic context.

UNIT - IV   READING   [9]

Intensive Reading – Predicting Content – Interpretation – Skimming and Scanning - Vocabulary Building - Inference – Context Based Meaning – Note making

UNIT - V   WRITING SKILLS   [9]

Need based Correspondence (request for joining hostel, bonafide certificate, In plant training & Industrial Visit) – Writing Instructions - Letter of Invitation (inviting , accepting and declining) – Paragraph writing with given hints - Letter to the Editor of a News paper.

Total : 45 Periods

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

- *Understand and apply Grammar in context for professional communication.*
- *Understand the gist and specific information.*
- *Speak, express and interact in the society and place of study.*
- *Critically interpret by reading a text and comprehend a given text.*
- *Correspond and communicate for jobs.*

Text Books :

1   Dr.P.Rathna, English Work Book – I, VRB Publishers Pvt. Ltd., Chennai,2015

Reference Books :

1   Meenakshi Raman. Technical Communication, Oxford University Press, New Delhi, 2004.

2   Seely, The Oxford Guide to Writing and Speaking, Oxford University Press, New Delhi, 2004.

3   M Ashra Rizvi, Effective Technical Communication, Tata McGRAW HILL, New Delhi, 2005.

4   P.Kiranmani Dutt, A course in Communication Skills, Cambridge University Press, New Delhi, 2008.

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<u>**SEMESTER - I**</u>

16MA152	**ENGINEERING MATHEMATICS – I** **(Common to All Branches)**	L 3	T 1	P 0	C 4

Prerequisite: *No prerequisite needed for enrolling into the course*
Objectives
- *To study the concepts of Matrices and its Applications.*
- *To study the concepts and its applications of Ordinary Differential Equations.*
- *To improve ability in solving geometrical applications of differential calculus problems.*
- *To study the concepts of functions of several variables and three dimensional analytical geometry.*

UNIT - I   MATRICES   [12]
Introduction – types of Matrices- Characteristic equation – Eigen values and Eigen vectors of a real matrix – Properties of Eigen values and Eigen vectors (without proof) – Cayley-Hamilton theorem (statement only) and its applications – Quadratic forms – Reduction of quadratic form to canonical form by orthogonal transformation.

UNIT - II   ORDINARY DIFFERENTIAL EQUATIONS   [12]
Linear differential equations of second and higher order with constant coefficients – Differential equations with variable coefficients – Cauchy's and Legendre's linear equations – Method of variation of parameter - simultaneous first order linear differential equations with constant coefficients.

UNIT - III   DIFFERENTIAL CALCULUS   [12]
Curvature in Cartesian co-ordinates – radius of curvature – Centre of curvature and Circle of curvature – Involutes and Evolutes – Envelopes (except evolutes as the envelope of normals) – Properties of envelopes and evolutes.

UNIT - IV   FUNCTIONS OF SEVERAL VARIABLES   [12]
Partial derivatives – Euler's theorem for homogenous functions – Jacobians – Taylor's series expansion - Maxima and Minima for functions of two variables – Method of Lagrangian multipliers.

UNIT - V   THREE DIMENSIONAL ANALYTICAL GEOMETRY   [12]
Equation of straight line – Angle between two lines - Coplanar lines and Shortest distance between skew lines (symmetrical form only) – Equation of a sphere – Plane section of a sphere – Orthogonal spheres.

Total (L: 45 T:15) = 60 Periods

Course Outcomes: On completion of this course, the student will be able to
- *Interpret the basics of Matrix applications in the field of engineering.*
- *Acquire knowledge in solving ordinary differential equations.*
- *Understand and apply the concepts of differential calculus problems.*
- *Develop and solve the functions of several variables.*
- *Understand the concepts of three dimensional analytical geometry and apply in the field of   engineering.*

Text Book :

1.   Ravish R Singh and Mukul Bhatt, Engineering Mathematics – I, McGraw Hill Publications, 3rd Edition, New Delhi 2013.

Reference Books :

1.
    Grewal B.S, Higher Engineering Mathematics, Tata McGraw Hill Publishing Company, 43rd Edition, New Delhi, 2013.

2.
    Bali N. P and Manish Goyal, Text book on Engineering Mathematics, Laxmi Publications (p) Ltd., 6th Edition, 2015.

3.   H.K. Dass, Advance Engineering Mathematics, S. Chand and company, 11th Edition, 2015.

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<u>**SEMESTER - I**</u>

16PH153	ENGINEERING PHYSICS	L	T	P	C
	(Common to all Branches)	3	0	0	3

Prerequisite: *No prerequisite needed for enrolling into the course*
Objective(s):

- *Understand the fundamentals of physics that have a direct application in the field of engineering.*
- *Compute and analyze various problems related to engineering physics.*
- *Understand the basic concepts behind the Acoustics, Ultrasonics, Lasers, Optical fibers, solar cells & Photo devices, and Quantum mechanics.*

UNIT - I   ACOUSTICS AND ULTRASONICS   [9]

Acoustics – Introduction – Classification of sound – Characteristics of musical sound – Loudness – Weber – Fechner law – Decibel – Absorption coefficient – Reverberation – Reverberation time – Sabine's formula: growth and decay (derivation) – Factors affecting acoustics of buildings and their remedies. Ultrasonics – Production – piezoelectric method – Properties – Velocity measurement: acoustical grating – Engineering applications – SONAR.

UNIT - II   LASERS AND APPLICATIONS   [9]

Introduction – Principle of Spontaneous emission and stimulated emission – Population inversion, pumping – Einstein's A and B coefficients (derivation). Types of lasers – Nd-YAG, CO_2 and Semiconductor lasers (homo-junction and hetero-junction) – Qualitative Industrial Applications: Lasers in welding, heat treatment and cutting – Medical applications – Holography (construction and reconstruction).

UNIT - III   FIBER OPTICS AND APPLICATIONS   [9]

Principle and propagation of light in optical fibers – Numerical aperture and Acceptance angle (derivation) – Types of optical fibers (material, refractive index and mode) – Double crucible technique of fiber drawing – Splicing – Losses in optical fiber: attenuation, dispersion and bending – Fiber optical communication system (Block diagram) – Fiber optic sensors: temperature and displacement sensors – Medical Application: Endoscope.

UNIT - IV   SOLAR CELLS AND PHOTO DEVICES   [9]

Solar cells – classification – working- V-I characteristics – experiment - Materials for solar cell – Applications – Photoconductive devices – PIN and Avalanche photodiode – construction, working and characteristics – Light Emitting Diode – construction, working and characteristics – Applications: Voltage indicator and seven segment display.

UNIT – V   QUANTUM PHYSICS   [9]

Black body radiation – Planck's theory (derivation) – Deduction of Wien's displacement law and Rayleigh – Jeans' Law from Planck's theory – Compton effect – Theory and experimental verification – Matter waves – Schrödinger's wave equation – Time independent and time dependent equations – Physical significance of wave function – Particle in a one dimensional box .

                                                  Total : 45 Periods

Course Outcomes: *On Completion of this course, the students will be able to*

- *Describe the impact of engineering solutions in the constructional and designing environment.*
- *Categorize the types of laser and utilize it for specific application based on their desirable requisite.*
- *Comprehend the fundamental ideas of optical fibers and to fabricate it for the potential applications.*
- *Exploit the concepts of photo devices for fabricating solar cells.*
- *Enumerate the preambles of quantum physics and to implement its concepts to tackle the cumbersome engineering problems.*

Text Books :
1.   Dr.G.Senthil Kumar, "Engineering Physics – I" VRB Publishers Pvt Ltd, (2009)
2.   V. Rajendran, "Engineering Physics" Tata McGraw Hill (2011)

Reference s :
1.   Brij Lal & Subramaniam, "A Text Book of Sound", S. Chand & Co Ltd, New Delhi, (2005).
2.   Dr. P. Mani, "Engineering Physics – I", Dhanam Publications, Chennai, (2012).
3.   S. Selladurai, "Engineering Physics-I",PHI Learning Pvt, Ltd., New Delhi, (2010)
4.   Dr.S.Muthukumaran, G.Balaji and S.Masilamani, "Engineering Physics- I", Sri Krishna HI—Tech Publishing company Pvt. Ltd.(2010).
5.   www.fadooengineers.com

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SEMESTER – I

16CY154	ENGINEERING CHEMISTRY (Common To All Branches)	L	T	P	C
		3	0	0	3

Prerequisite: *No prerequisite needed for enrolling into the course*

Objective(s):
- *To make the students conversant with basic concepts and applications of engineering polymers*
- *To understand the principles and functioning of batteries, fuel cell and solar cell*
- *To Impart knowledge about the manufacture and uses of advanced engineering materials*
- *To gain sound knowledge on the water treatment methods and its industrial applications*
- *To acquaint the students with the basic concepts of corrosion mechanism and its control*

UNIT - I   ENGINEERING POLYMERS   [9]

Polymer – Definition – Degree of polymerization – Functionality. Polymerisation - addition, condensation and co-polymerization – Free radical mechanism of addition polymerization; Plastics – classification –Thermosetting and thermoplastics. Properties of polymers- Glass transition temperature and tacticity. Preparation, properties and uses of Engineering polymers [PVC, nylon-6,6 , PET and SBR] ; Fabrication of polymers – compression and Injection moulding; Composites –FRP only.

UNIT - II   ENERGY STORAGE DEVICES   [9]

Batteries – primary batteries- alkaline batteries, secondary batteries-lead–acid, nickel–cadmium and lithium batteries. Fuel cells –H_2-O_2 fuel cell, solar cells- principle, applications and advantages; Nano batteries and its applications. Nuclear energy – fission and fusion reactions; Nuclear reactor – components and power generation - breeder reactor.

UNIT - III   ADVANCED ENGINEERING MATERIALS   [9]

Abrasives- Moh's scale of hardness- types – natural [Diamond] – synthetic [SiC]; Refractories- characteristics-classifications [Acidic, basic and neutral refractories] – properties- refractoriness- RUL- porosity- thermal spalling; Lubricants – definition – function – characteristics- properties- viscosity index, flash and fire points, cloud and pour points , oiliness. Solid lubricants- graphite and MoS_2. Nano materials-CNT-synthesis [CVD, laser evaporation, pyrolysis] – applications – Medicine, electronics, biomaterials and environment.

UNIT - IV   WATER AND ITS PURIFICATION TECHNIQUES   [9]

Hardness – Types, equivalence of $CaCO_3$ [problems] ,units - estimation of hardness by EDTA method ; Boiler feed water – requirements, disadvantages of using hard water in boilers – scale and sludge –priming and foaming –caustic embrittlement- boiler corrosion. Softening methods- internal conditioning- calgon, carbonate, phosphate - external conditioning – zeolite process and ion exchange process; Desalination – reverse osmosis. Characteristics of potable water – domestic water treatment – break point chlorination.

UNIT - V   CHEMISTRY OF CORROSION AND ITS CONTROL   [9]

Electrochemical cells – types–single electrode potential and its determination – Electrochemical series –applications – corrosion – chemical corrosion – Pilling-Bedworth rule, electrochemical corrosion – mechanism, galvanic corrosion and differential aeration corrosion [Pitting corrosion, water line corrosion]; Factors influencing corrosion; Corrosion control – cathodic protection methods – sacrificial anode and impressed current methods – corrosion inhibitors.

                                                Total: 45 Periods

Course Outcomes: On Completion of this course, the students will be able to
- *Enable to know the preparation and fabrication of various types of polymers and composite materials*
- *Understand the usage of nuclear power plants and batteries for the production of electricity.*
- *Gain knowledge in the manufacture and uses of advanced engineering materials*
- *Be familiarized with the water quality parameters and understand the various water treatment methods*
- *Perceive knowledge on the concept of corrosion and it's control.*

Text Books :
1. P.C. Jain and Monica Jain, Engineering Chemistry, Dhanpat Rai Pub. Co., 16th Edition, 2013.
2. Dr. A.Ravikrishnan, Engineering Chemistry, Srikrishna Hi-tech Publishing Company Pvt. Ltd. 14th Edition, 2014.

Reference Books :
1. B. Sivasankar, Engineering Chemistry, Tata McGraw-Hill Pub. Co. Ltd., 14th Edition, 2011.
2. S.S.Dara, A Text book of Engineering Chemistry, S.Chand & Co.Ltd., 10th Edition, 2005.
3. Dr. S. Vairam, Dr. P. Kalyani, Dr. Subaramesh, Engineering Chemistry, Wiley India Pvt.Ltd., 2nd Edition, 2013.

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<u>**SEMESTER - I**</u>

16IT115	COMPUTER PROGRAMMING AND PROBLEM SOLVING	L	T	P	C
		3	0	0	3

Prerequisite: *No prerequisite needed for enrolling into the course*

Objective(s): *To equip student with comprehensive knowledge of computer fundamentals and problem solving so that they can develop programs on their own for various applications.*

UNIT - I   INTRODUCTION TO COMPUTERS   [9]

Introduction – Evolution of Computers – Generations of Computers – Classification of the Computers – Components of Computer System – Program Development Lifecycle – Algorithm – Flow charts – Pseudo code – Program Control Structures – Software – Categories of Software.

UNIT - II   C FUNDAMENTALS   [9]

Introduction to C – Structure of C Program – Constants – Variables – Data Types – Operators and Expressions – Input and Output in C – Decision Making Statements – Branching and Loop Control Statements – Solving Problems using Factoring Methods.

UNIT - III   ARRAYS AND FUNCTIONS   [9]

Arrays: Introduction – Definition – Types – Character Arrays and Strings – Solving Problems using Array Techniques – Functions – Introduction – Declaration and Prototype – Types – Call by Value – Call by Reference – Recursion – Storage Classes

UNIT - IV   STRUCTURES AND FILES   [9]

Structures – Declaration and Initialization – Structure within Structure – Array of Structures – Structure and Function – Union – File Management : Introduction – Types – Steps for File Operation – File I/O.

UNIT - V   POINTERS   [9]

Pointer : Introduction – Features – Declaration – Arithmetic Operations – Array of Pointers – Pointer to Functions – Pointer to Structures – Pointer to Pointer – Void Pointer – The Preprocessor Directives.

Total : 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

- *Explain the computer fundamentals*
- *Formulate algorithm for simple problems*
- *Analyze different data types and arrays*
- *Perform and understanding with example of array, function ,pointer and structure*
- *Use programming language to solve problems.*

Text Books :

1   Ashok.N.Kamthane, "Computer Programming", Second Edition, Pearson Education, 2012.

2   R.G.Dromey, "How to Solve it by Computer", Fifteenth Impression, Pearson Education, 2014.

Reference Books :

1   E.Balagurusamy, "Programming in ANSI C", Tata McGraw-Hill, 2012.

2   Byron Gottfried, "Programming With C", Second Edition, Indian Adapted Edition, TMH Publications, 2006.

3   Kernighan,B.W and Ritchie,D.M, "The C Programming language", Second Edition, Pearson Education, 2006..

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

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<u>SEMESTER - I</u>

16GE141	BASICS OF CIVIL AND MECHANICAL ENGINEERING	L	T	P	C
	(Common to CS, EC, EE & IT)	3	0	0	3

Prerequisite: *No prerequisites needed for enrolling into the course.*
Objectives:

- *To develop awareness on materials, structures, components and methods in Civil Engineering.*
- *To acquire knowledge on Power Plants, IC Engines, Refrigeration and Air Conditioning systems*

A - CIVIL ENGINEERING
UNIT - I   SURVEYING AND CIVIL ENGINEERING MATERIALS   [9]
Surveying: objects - types - classification - principles - measurements of distances - angles - leveling - determination of areas - illustrative examples. Civil engineering materials: bricks - stones - sand - cement - concrete - steel sections.

UNIT - II   BUILDING COMPONENTS AND STRUCTURES   [9]
Foundations: types, bearing capacity - requirement of good foundations - superstructure - types of bridges and dams - brick masonry - stone masonry - beams - columns - lintels - roofing - flooring - plastering - mechanics - internal and external forces - stress - strain - elasticity.

B - MECHANICAL ENGINEERING
UNIT - III   POWER PLANT ENGINEERING   [9]
Introduction, classification of Power Plants - working principle of steam, Gas, Diesel, Hydro-electric and Nuclear Power plants - merits and demerits - Pumps and Turbines - working principle of Reciprocating pumps (single acting and double acting) - Centrifugal pump.

UNIT - IV   I C ENGINES   [9]
Internal combustion engines as automobile power plant - working principle of Petrol and Diesel Engines - Four stroke and Two stroke cycles-comparison of four stroke and two stroke engines.

UNIT - V   REFRIGERATION AND AIR CONDITIONING SYSTEM   [9]
Terminology of Refrigeration and Air Conditioning. principle of vapour compression and absorption system -layout of typical domestic refrigerator -Window and Split type room Air Conditioner.

Total :45 Periods

Course Outcomes: On Completion of this course, the student will be able to

- *Calculate the areas, volumes and relative positions of the object and to gain knowledge about the various materials used in construction.*
- *Familiar with construction practices and the components of the structures.*
- *Learn the working principle of various types of power plants, pumps and turbines.*
- *Gain the knowledge about the various classifications and terminologies of engines. Such as two stroke and four stroke petrol and diesel engines.*
- *Acquire the knowledge about the refrigeration process and also the working principle of various types of Air conditioners.*

Text Books :
1   Ramesh Babu "Basic civil and Mechanical Engineering", VRB Publishers, 2011.
2   Shanmugam G and Palanichamy M S, "Basic Civil and Mechanical Engineering", TMH Publishing Co., New Delhi, (1996).

Reference Books :
1   Seetharaman.S., "Basic Civil Engineering", Anuradha Agencies, (2005).
2   Ramamrutham. S., "Basic Civil Engineering", Dhanpat Rai Publishing Co. (P) Ltd. (1999).
3   Venugopal. K and Prahu Raja V., "Basic Mechanical Engineering", Anuradha Publishers, Kumbakonam, (2000).
4   Shantha Kumar S.R.J., "Basic Mechanical Engineering", Hi-tech Publications, Mayiladuthurai, (2000).
5   http://nptel.ac.in

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SEMESTER - I

		L	T	P	C
16GE228	**PHYSICS AND CHEMISTRY LABORATORY** (Common to all Branches)	0	0	3	-

Prerequisite: *Knowledge in Engineering Physics , Chemistry and Materials science*

Objective(s):
- To gain the practical knowledge and hands on experiences of understanding the physics concepts applied in optics, sound and thermal physics.
- To gain practical knowledge by applying theoretical principles and performing the following experiments.

List of Experiments in Physics Laboratory

1. Determination of wavelength of laser using grating and the size of the particles.
2. Determination of thickness of the given material by Air – wedge method.
3. Determination of velocity of Ultrasonic waves and compressibility using Ultrasonic interferometer.
4. Spectrometer grating - Determination of wavelength of mercury spectrum.
5. Determination of thermal conductivity of a bad conductor by Lee's disc method.

List of Experiments in Chemistry Laboratory

1. Estimation of hardness in water by EDTA method.
2. Estimation of chloride in water sample by Argentometry.
3. Estimation of dissolved oxygen (DO) in water by Winkler's method.
4. Estimation of copper in brass by EDTA method.
5. Determination of molecular weight and degree of polymerization using viscometry.
6. Determination of rate of corrosion of mild steel by weight loss method.

Total : 30 Periods

Course Outcomes: On Completion of this course, the student will be able to
- *Comprehend the different physical parameters of optics.*
- *Perceive the production of ultrasonic waves through inverse piezoelectric effect and to determine the velocity of sound waves in the given liquid.*
- *Understand the principle of thermal conductivity thereby to calculate the thermal conductivity of various bad conductors like cardboard, mica, etc.*
- *Know the applicability of water in various fields.*
- *Know the composition of brass quantitatively and the molecular weight of the polymer.*
- *Understand the nature of corrosion process.*

Text Book :
1. Physics Lab manual, Department of Physics, K.S.R. College of Engineering.
2. *Chemistry Lab Manual, Department of Chemistry, K.S.R. College of Engineering.*

Reference Books :
1. Dr.G.Senthilkumar, "Physics Lab manual", VRB Publications Pvt. Ltd.,(2006).
2. Advanced Practical Physical Chemistry by J.B. Yadav, GOEL Publishing House.
3. Advanced Practical Inorganic Chemistry by Gurdeep Raj, GOEL Publishing House.

Note:
- **A minimum of five experiments shall be offered in chemistry laboratory.**
- **Laboratory classes on alternate weeks for Physics and Chemistry.**

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<u>**SEMESTER - I**</u>

16IT122	COMPUTER PROGRAMMING AND PROBLEM SOLVING LABORATORY	L	T	P	C
		0	0	3	2

Prerequisite: *No prerequisite needed for enrolling into the course*

Objective(s):

- *To understand the basic programming constructs and articulate how they are used to develop a program with a desired runtime execution flow.*
- *To articulate where computer programs fit in the provision of computer-based solutions to real world problems.*
- *To learn to use user defined data structures.*

List of Experiments:

1. Search, generate, and manipulate data using MS office / Open Office.

2. Presentation and visualization – graphs, charts, 2D, 3D.

3. Problem formulation, problem solving and flowcharts.

4. C Programming using simple statements and expressions.

5. Scientific problem solving using decision making and looping.

6. Simple programming for one dimensional and two dimensional arrays.

7. Solving problems using string functions.

8. Programs with user defined functions.

9. Program using recursive function.

10. Program using structures and unions.

11. Program using pointer.

Total : 45 Periods

Course Outcomes: On Completion of this course, the student will be able to
- *Write and compile programs using C.*

- *Write program with the concept of Structured Programming*

- *Identify suitable data structure for solving a problem*

- *Demonstrate the use of conditional statement.*

- *Write programs using structures and unions.*

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<u>**SEMESTER - I**</u>

	L	T	P	C
16IT123　**PC HARDWARE AND TROUBLE SHOOTING LABORATORY**	0	0	3	2

Prerequisite: *No prerequisite needed for enrolling into the course*

Objective(s):

- *To understand the components of motherboard.*
- *To perform system administration tasks.*
- *To understand system related problems and methods of troubleshooting.*

List of Experiments:

1. Understanding of Motherboard and its interfacing components.
2. Install and configure computer drivers and system components.
3. Disk formatting, partitioning and disk operating system commands.
4. Install and configure Windows operating systems.
5. User creation and assigning privileges.
6. Remote desktop connections and file sharing.
7. Identify, install and manage network connections.
8. Install and configure Linux operating systems.
9. Installation and configuration of networking software.
10. Installation of printer and scanner software.
11. Disassembly and reassembly of hardware.

Total : 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

- *Assemble and upgrade computer systems.*
- *Perform installation, configuration and upgrading of computer hardware and software.*
- *Connect and install associated peripherals.*
- *Install and configure the operating systems.*
- *Diagnose and troubleshoot computer hardware and software.*

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SEMESTER - II

		L	T	P	C
16EN251	**TECHNICAL ENGLISH – II** (Common to All Branches)	3	0	0	3

Prerequisite: *No prerequisite needed for enrolling into the course*

Objective(s):

- *To improve Listening, Speaking, Reading and Writing skills.*

UNIT - I   LANGUAGE FOCUS   **[9]**

Technical Vocabulary – Changing words from one form to another - Articles – Compound Nouns – Numerical Adjectives – Prefixes & Suffixes – Framing Questions – 'Wh' Question – Yes / No Question –Discourse markers - Cause and Effect Expression -Expression of Purpose – Editing text for Spelling and Punctuation.

UNIT - II   SPEAKING   **[9]**

Greetings and Introductions – Making Requests – Seeking Information – Inviting People – Likes & Dislikes- Instructions – Describing – Telephone Etiquette.

UNIT - III   READING   **[9]**

Critical reading, Making inference, Context based meaning - Transcoding (Interpretation of Charts).

UNIT - IV   PROFESSIONAL WRITING   **[9]**

Job Application and Resume - Report Writing - E-mail Writing - Business Correspondence – Calling for Quotations, Seeking Clarification, placing order and Complaint

UNIT - V   LISTENING   **[9]**

Listening to fill up forms and gapped texts – Extensive Listening – Listening and Note taking - Listening for main ideas.

                                                                                              Total : 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

- *Comprehend and apply the enriched vocabulary, by knowing the basic grammatical structures,*
  in academic and professional contexts.

- *Recognize and use standard English in diverse situations.*

- *Critically interpret by reading a text and comprehend a given text.*

- *Wwrite clearly in professional contest.*

- *Enhance the listening skill for academic purposes.*

Text Books :

1.   Dr.P.Rathna, English Work Book – II, VRB Publishers Pvt. Ltd., Chennai, 2016.

Reference Books :

1.   Dr.S.Sumant,Technical English I, Tata McGraw Hill, Chennai (2012).

2.   Dept. of Humanities and social sciences, Anna University, Chennai, English for Engineers and Technologists, Orient Longman, 2008

3.   HorySankarMukerjee, Business Communication, Oxford University Press, New Delhi (2013).

4.   Department of English, English for Technologists and Engineers, Orient Black Swan, Chennai (2012).

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<u>SEMESTER - II</u>

16MA242	**ENGINEERING MATHEMATICS – II** **(Common to AU, CE, EC, EE, ME and IT)**	**L** 3	**T** 1	**P** 0	**C** 4

Prerequisite: *No prerequisite needed for enrolling into the course*

Objective(s):

- *To study the concepts of Laplace transform and inverse Laplace transform techniques.*
- *To study the double and triple integrations and its applications.*
- *To know the basics of vector calculus along with classical theorems involving them.*
- *To understand the concepts of analytic functions, conformal mapping and bilinear transformations.*

UNIT - I   LAPLACE TRANSFORMATION   [12]

Laplace transforms – Conditions for existence – Transform of elementary functions – Basic properties – Transform of derivatives and integrals – Transform of unit step function and impulse functions – Initial and final value theorems Transform of periodic functions.

UNIT - II   INVERSE LAPLACE TRANSFORMATION   [12]

Inverse Laplace transforms – Convolution theorem (excluding proof) – Solution of linear ordinary differential equations of second order with constant coefficients.

UNIT - III   MULTIPLE INTEGRALS   [12]

Double integration – Cartesian coordinates – Change of order of integration – Triple integration in Cartesian co-ordinates – Area as double integral – Volume as triple integral.

UNIT - IV   VECTOR CALCULUS   [12]

Gradient Divergence and Curl – Directional derivative – Irrotational and solenoidal vector fields – Vector integration – Green's theorem in a plane, Gauss divergence theorem and stokes' theorem – Simple problems involving cubes and rectangular parallelopipeds.

UNIT - V   ANALYTIC FUNCTIONS   [12]

Functions of a complex variable – Analytic functions – Necessary conditions, Cauchy – Riemann equation and Sufficient conditions (excluding proof) – Harmonic functions – Harmonic conjugate – Construction of analytic functions – Conformal mapping : w= z+c, cz, 1/z and bilinear transformations.

Total (L: 45 T:15) = 60 Periods

Course Outcomes: On Completion of this course, the student will be able to

- *Understand the fundamentals of Laplace transform and its applications.*
- *Interpret the concepts of Inverse Laplace transforms and solving linear ordinary differential equations of second order with constant coefficients.*
- *Evaluate the area of the surface and volume using double and triple integrations.*
- *Acquire the basics of* vector calculus *and its applications.*
- *Understand and apply the concepts of analytic functions, conformal mapping and bilinear transformations.*

Text Books :

1. Ravish R Singh and Mukul Bhatt, "Engineering Mathematics II", McGraw Hill Publications, New Delhi, (2014), 1st Edition

Reference Books :

1. Grewal B.S,"Higher Engineering Mathematics", Tata McGraw Hill Publishing Company, New Delhi, 9th edition, (2015).

2. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley India, 7th Edition.(2015).

3. Bali N. P and Manish Goyal, "Text book of Engineering Mathematics", Laxmi Pub.(p) Ltd.,6th edition, (2011).

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SEMESTER - II

| 16PH242 | **APPLIED MATERIALS PHYSICS** (Common to CS & IT) | L 3 | T 0 | P 0 | C 3 |

Prerequisite: Knowledge in Engineering Physics
Objective(s):

- Explore the prime concepts of electric and magnetic circuits and its salient features.
- Understand some of the exciting prospects of dielectric materials and its applications.
- Emphasis the properties of semiconducting materials, semiconductor diodes and transistors and its applications.

UNIT - I　　　ELECTRICITY AND MAGNETISM　　　　　　　　　　[9]

Electric potential – Potential difference – Resistance – Factors upon which resistance depends – Effect of temperature on resistance – OHM'S law – Electric power – Electrical energy – Resistance in series – Resistances in parallel – Series parallel circuit – Kirchhoff's laws – Capacitance – Parallel plate capacitor with uniform medium – Capacitors in series – Capacitors in parallel – Electromagnetic induction – Faraday's laws of electromagnetic induction – Lenz's law – Inductor series and parallel.

UNIT - II　　　DIELECTRIC MATERIALS　　　　　　　　　　　　[9]

Dielectrics - Dielectric constant – Polarization in dielectrics – Electronic, Ionic, Orientational and Space charge polarizations (Derivation for polarizability) – Internal or local field – Clausius-Mosotti equation – Dielectric loss – Applications.

UNIT - III　　　SEMICONDUCTING MATERIALS　　　　　　　　[9]

Elemental & Compound semiconductors - Intrinsic semiconductor – Carrier concentration (derivation) – Fermi energy level – Variation of Fermi level with temperature – Electrical conductivity – Band gap determination – Extrinsic semiconductors – Carrier concentration in n - type and p – type semiconductors (Qualitative) – Hall effect – Determination of Hall voltage – Determination of Hall coefficient – Applications.

UNIT - IV　　　DIODES AND APPLICATIONS　　　　　　　　　[9]

Resistance of crystal diode – Forward and Reverse bias - Diode as rectifier - Types of rectifier - Half Wave, Full wave and Bridge rectifier - efficiency – Filter circuits – Types – Capacitor and Choke input – Zener diode – V-I characteristics – Zener diode as voltage regulator.

UNIT - V　　　TRANSISTORS AND APPLICATIONS　　　　　　[9]

Introduction – structure – schematic representation – Formation of depletion region – Biasing – Types of configuration – common base, common collector and common emitter – characteristics of common base connection – Transistor as amplifier and oscillator.

Total : 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

- *Perceive the preambles of electric and magnetic circuits.*
- *Categorize the dielectric materials based on the types of polarization and employing the advanced concepts of dielectrics in electronic appliances.*
- *Comprehend the basics of semiconducting materials with enormous features.*
- *Utilize the conceived concepts and techniques for constructing semiconductor diodes.*
- *Apply the techniques for manufacturing of transistors.*

Text Books :
1. V.K.Mehta, Rohit Mehta, "Principles of Electrical Engineering and Electronics", S.Chand & Company Ltd.(2008).
2. V.K.Mehta, Rohit Mehta, "Principles of Electronics", S.Chand & Company Ltd.(2013).

References :
1. David A. Bell, "Electric Circuits and Electronic Devices '', OXFORD University press, Canada
2. N. Iyandurai, G. Senthil Kumar and G. Vijayalakshmi, "Semiconductor Physics and Optoelectronics", VRB Publications Ltd, Chennai,(2003
3. G.Senthilkumar and N.Iyandurai, "Engineering Physics", VRB Publications Ltd, Chennai,(2008).
4. M.N. Avadhanulu, "Engineering Physics Volume II", S. Chand & Company Ltd., NewDelhi (2009).
5. www.fadooengineers.com

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<u>**SEMESTER - II**</u>

16CY254	ENVIRONMENTAL SCIENCE AND ENGINEERING (Common To All Branches)	L 3	T 0	P 0	C 3

Prerequisite: *No prerequisite needed for enrolling into the course*
Objective(s):

- *To impart knowledge on the principle of environmental science and engineering.*
- *To understand the usages of natural resources, ecosystem and biodiversity.*
- *To create awareness on pollution, value education, population growth and social issues.*

UNIT - I   INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES   [9]
Environment – definition, scope and importance, need for public awareness; Forest resources – use, over exploitation, deforestation, mining, dams and their effects on forests and tribal people; Water resources – use, over- utilization of surface and ground water, floods, drought, conflicts over water; Mineral resources – use, exploitation, environmental effects of extracting and using mineral resources ; Food resources - world food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity; Role of an individual in conservation of natural resources.

UNIT - II   ECOSYSTEMS AND BIODIVERSITY   [9]
Concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers, Forest ecosystem and aquatic ecosystems (Estuary and marine ecosystem); Food chain, food web, energy flow in the ecosystem, ecological pyramids – ecological succession ; Biodiversity – introduction, definition – types (Genetic – species – ecosystem diversity); Values of biodiversity; Hot-spots of biodiversity; Threats to biodiversity; Endangered and Endemic species of India; Conservation of biodiversity – I*n-situ* and E*x-situ* conservation of biodiversity.

UNIT - III   ENVIRONMENTAL POLLUTION   [9]
Pollution – introduction and different types of pollution; Causes, effets and control measures of air pollution, water pollution – BOD and COD (definition and significance), DO and its détermination by Winkler's method- waste water treatment methods ; Primary, secondary and tertiary treaments. Thermal pollution – noise pollution – nuclear pollution (Nuclear wastes, nuclear accident and nuclear holocaust); Solid waste management – causes, effects and control measures of urban and industrial waste; Hazardous waste –medical and e-wastes.

UNIT - IV   SOCIAL ISSUES AND ENVIRONMENT   [9]
Urban problems related to energy; Water conservation – rain water harvesting and watershed management; Resettlement and rehabilitation; Environmental ethics ; Issues and possible solutions; Climate change – global warming and its effects on flora and fauna, acid rain, ozone layer depletion; Wasteland reclamation ; Environment protection act – air (Prevention and control of pollution) act, water (Prevention and control of Pollution) act, wildlife protection act and forest conservation act; Issues involved in enforcement of environmental legislation. Disaster Management- earth quake, cyclone, tsunami, disaster preparedness- response and recovery from disaster.

UNIT - V   HUMAN POPULATION AND ENVIRONMENT   [9]
Sustainable development – from unsustainable to sustainable development – 12 Principles of green chemistry – environmental impact assessment (EIA); Human population – population growth and variation among nations; Population explosion; Family welfare programme and family planning; Environment and human health; Human rights; Value education – HIV / AIDS ; Women and child welfare; Role of information technology in environment and human health.

Total : 45 Periods

Course Outcomes: *On Completion of this course, the student will be able to*

- *Play an important role in conservation of resources for future generation.*
- *Paraphrase the importance of ecosystem and biodiversity*
- *Analyze the impact of pollution and hazardous waste in a global and societal context*
- *Understand contemporary issues that result in environmental degradation that would attempt to provide solutions to overcome the problems*
- *Consider issues of environment and human population in their professional undertakings*

Text Books :
1 Anubha Kaushik and C. P. Kaushik, Environmental Science and Engineering, New Age International Publishers, 14th Edition, 2014.
2 Dr. T. Arun Luiz, Environmental Science and Engineering, S.Chand & Co.Pvt.Ltd.,1st Edition,2016.
Reference Books :
1 G. Tyler Miller, Jr, Environmental Science,Thomson-South western, 11th Edition, 2007.
2 Raman Sivakumar, Introduction to Environmental Science and Engineering, Tata McGraw Hill Education Pvt., Ltd., 4th Edition 2012.
3 Dr. A. Ravikrishnan, Environmental Science and Engineering, Srikrishna Hi-tech Publishing Company Pvt. Ltd., 10th Edition, 2014.
4 Dara S. S., A Text Book of Environmental Chemistry and Pollution Control, S. Chand & Co., 10th Edition, 2005.

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<u>SEMESTER - II</u>

16IT215	DATA STRUCTURES	L 3	T 0	P 0	C 3

Prerequisite: *Computer Programming and Problem Solving*

Objective(s):
* *To be familiar with the basics of C programming.*
* *To introduce the concepts of ADT, learn linear and non- linear Data Structures.*
* *To select suitable data structure implementation for software development.*
* *To be exposed to Sorting, Searching, and Hashing Algorithms.*

UNIT - I   C PROGRAMMING CONCEPTS AND LIST   [9]

Arrays – Strings – Pointers – Structures – Files - Linear and Non- Linear Data Structures – Abstract Data Type (ADT) – List ADT – Array Implementation – Linked List Implementation – Singly Linked Lists, Doubly Linked Lists, Circular Liked List – Applications of Lists.

UNIT - II   LINEAR DATA STRUCTURES – STACK AND QUEUES   [9]

Stack – Definition and Concepts – Operations on Stack – Stack implementation – Using Array, Linked List – Applications of Stacks – Recursion – Conversion of Expression – Queues: Definition – Queue implementations – Applications of Queues – Circular queues – Priority queues.

UNIT - III   NON-LINEAR DATA STRUCTURES   [9]

Trees – Binary Trees – Representation – Tree Traversals – Expression Trees – Binary Search Trees – AVL Trees, Heaps – B-Trees – Implementations.

UNIT - IV   SORTING AND SEARCHING   [9]

Sorting Algorithms: Selection sort – Heap sort – Insertion sort – Shell sort – Exchange sorts – Bubble sort – Quick sort – External sort – Merge sort. Searching: Linear Search – Binary Search – Hashing Methods.

UNIT – V   GRAPHS   [9]

Basic Concepts of Graphs – Operations – Depth-First Traversal – Breath-First Traversal – Minimum Spanning Trees – Kruskal and Prim Algorithm – Shortest Path Algorithm – Dijkstra's Algorithm – Bellman-Ford Algorithm.

Total: 45 Periods

Course Outcomes: On Completion of this course, the student will be able to
* *Use C programming concepts including arrays, functions, pointers, structures and files.*
* *Describe how list ADT is implemented using array & linked list and describe its applications.*
* *Describe how stack, queue are represented in the memory and used by algorithms.*
* *Demonstrate the different methods of traversing and representation of tree non-linear structure.*
* *Discuss and compute the efficiency of algorithms for sorting, searching and hashing.*

Text Books :

1   Richard F.Gilberg & Behrouz A. Forouzan, "Data Structures A Pseudocode Approach with C", Second Edition, Cengage Learning India Pvt. Ltd. 2005
2   Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, "Fundamentals of Data Structures in C", Second Edition, University Press (India), 2008.

Reference Books :

1   M.A.Weiss, "Data Structures and Algorithm Analysis in C", Second Edition, Pearson Education, 2015.
2   Seymour Lipschutz, "Data Structures with C (Schaum's Outline Series)", McGraw Hill, 2011.
3   Kruse R.L. Tondo C.L and Leung B.P, "Data Structure and program Design in C", Second Edition, Pearson Education India, 2007.
4   A.V. Aho, J.E. Hopcraft, and J.D Ullman, "Data structures and algorithms", Pearson Education, Reprint 2001.
5   http://www.nptelvideos.in/2012/11/data-structures-and-algorithms.html

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| **SEMESTER – II** | | | |

16IT216	**IT ESSENTIALS**	**L**	**T**	**P**	**C**
		3	**1**	**0**	**4**

Prerequisite: *Computer Programming and Problem Solving*
Objective(s):

- *To know the fundamentals of Information Technology*
- *To introduce the concept of computer networking and Internet.*
- *To understand scripting languages.*

UNIT - I   INTRODUCTION   [12]
The Information Era – Defining IT – Information Technology in Society – The Sate of IT Careers – Understanding the Digital Domain: Emergence of the Digital Age – Analog and Digital Representations of Information – Manipulating Bits – Advantages of Digital Technology – Number System: The Binary Number System – Alternative Numbering Systems – Representing Text and other Characters in Binary.

UNIT - II   TRANSMISSION OF INFORMATION   [12]
Fundamentals of Communications: Analog and Digital Signaling – Radio Wave Communications – Transmission Media – Managing Errors – Fiber Optics – Wireless Communications – Applications of Radio Frequency – Satellite Systems.

UNIT - III   BASICS OF COMPUTER NETWORKING AND OPERATING SYSTEMS   [12]
Local Area Networks: LAN Design – LAN Types – Wireless LANs – Wide Area Networks – Communication Protocols – Operating systems: Evolution – Types of Operating System – Functions of Operating System.

UNIT - IV   INTERNET AND HTML   [12]
Introduction to Internet – Web Browser – File Transfer Protocol – Introduction to HTML – Images – Lists – Tables – Forms Cascading Style Sheets.

UNIT - V   JAVASCRIPT   [12]
Introduction to Scripting – Control Statements – Functions – Arrays – Objects – Events – Web Servers – Databases.

Total (L: 45 T:15) = 60 Periods

Course Outcomes: On Completion of this course, the student will be able to

- *Describe the fundamentals of IT systems.*
- *Discuss the communication principles.*
- *Describe the basics of networking and Internet.*
- *Design simple web applications.*
- *Design webpages.*

Text Books :

1 Pelin Aksoy, Laura DeNardis, "Introduction to Information Technology", Cengage Learning, Fourth Indian Reprint 2010.

2 Deitel & Deitel "Internet & World Wide Web How To Program" Pearson International Edition Education , Fourth Edition, 2009

Reference Books :

1 Brian.K.Williams, Stacey.C.Sawyer,"Using Information Technology – A Practical Introduction to Computers and Communication", Tata McGraw Hill Publishing Company Ltd., New Delhi, 11th Education, 2015.

2 V.Rajaraman, "Introduction to Information Technology", PHI Learning, Second Edition,2013.

3 Introduction to Information Technology, Pearson Education, ITL Education solutions Ltd., 2012.

4 Robin Nixon, "Learning PHP, MySQL, JavaScript, CSS & HTML5" Third Edition, O'REILLY, 2014.

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		L	T	P	C
16GE228	**PHYSICS AND CHEMISTRY LABORATORY** **(Common to all Branches)**	0	0	3	2

Prerequisite: Knowledge in Engineering Physics , Chemistry and Materials science

Objective(s):

- *To gain the practical knowledge and hands on experiences of understanding the physics concepts applied in materials science, properties of matter and solar cell.*
- *To gain knowledge in utilizing electrochemical methods by using analytical equipments and quantitative procedures.*

<u>**SEMESTER - II**</u>

List of Experiments in Physics Laboratory

1. Determination of Young's modulus of the material of a uniform bar by non – uniform bending method.
2. Determination of Band gap energy of a semiconductor.
3. Determination of Viscosity of a given liquid by Poiseuille's method.
4. Torsional pendulum - Determination of rigidity modulus of a given wire.
5. V-I Characteristics of solar cell.

List of Experiments in Chemistry Laboratory

1. Conductometric Titration – Strong Acid Vs Strong Base.
2. Conductometric Titration – Mixture of Weak and Strong Acids.
3. Conductometric Titration – Precipitation, $BaCl_2$ Vs Na_2SO_4.
4. Estimation of Ferrous ion by Potentiometry – Fe^{2+} Vs $K_2Cr_2O_7$.
5. Estimation of Hydrochloric Acid by pH metry.
6. Estimation of Iron by Spectrophotometry.

Total : 30 Periods

Course Outcomes: On Completion of this course, the student will be able to

- *Confer the experimental counterparts of materials properties such as modulus, solar cell, and energy gap.*
- *Imbibe the concept of capillary action in fluid dynamics and to compare the coefficient of viscosity of the given liquid.*
- *Gain practical knowledge in determining the strength of a solution in a given solution by conductometric titration methods.*
- *Get conceptual knowledge in estimating the concentration of Iron in solution by electrochemical methods.*
- *Determine the role of pH in quantitative analysis of a solution.*

Text Books :
1. Physics Lab manual, Department of Physics, K.S.R. College of Engineering.
2. Chemistry Lab Manual, Department of Chemistry, K.S.R. College of Engineering.

Reference Book :
1. Dr.G.Senthilkumar, "Physics Lab manual", VRB Publications Pvt. Ltd.,(2006).
2. Advanced Practical Physical Chemistry by J.B. Yadav, GOEL Publishing House.
3. Advanced Practical Inorganic Chemistry by Gurdeep Raj, GOEL Publishing House.
Note:
- **A minimum of five experiments shall be offered in chemistry laboratory.**
- **Laboratory classes on alternate weeks for Physics and Chemistry.**

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<u>SEMESTER - II</u>

		L	**T**	**P**	**C**
16IT222	**DATA STRUCTURES LABORATORY**	**0**	**0**	**3**	**2**

Prerequisite: Computer Practices Laboratory

Objective(s):
- To develop programming skills in design and implementation of data structures and their applications.
- To strength the ability to identify and apply to the suitable data structure for the given real world problem.
- To gain the practical knowledge in practical application of data structures.

List of Experiments:

1. Array implementation of List, Stack and Queue ADTs.

2. Linked List implementation of List, Stack and Queue ADTs.

3. Evaluation of expression.

4. Implement array based circular queue.

5. Creation of binary trees and implementation of its operation.

6. Implement of binary tree and produce its pre-order, in-order, post-order traversals.

7. Implement binary search trees.

8. Implement priority queues using heaps.

9. Implement searching and sorting algorithms.

10. Implement hashing techniques.

11. Implement the Dijkstra's Algorithm.

12. Implement the minimum spanning tree using Kruskal's Algorithm.

13. Implement the minimum spanning tree using Prim's Algorithm.

Total : 45 Periods

Course Outcomes: On Completion of this course, the student will be able to
- *Learn elementary data structures such as list, stack, queue, linked list and tree.*
- *Identify the appropriate data structure for a given problem.*
- *Have practical knowledge on the application of data structures.*
- *Discuss different data structures to represent real world problem.*
- *Design algorithms to solve the problem*

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<u>**SEMESTER - II**</u>

		L	T	P	C
16AU027	**ENGINEERING GRAPHICS LABORATORY**	0	0	3	2
	(Common to EE & IT)				

Prerequisite: *No prerequisites are needed for enrolling into the course*

Objective:
- *To develop skill for using software to create 2D and 3D models.*

List of Experiments:

1. Study of basic tools, commands and coordinate system (absolute, relative, polar, etc.) used in 2D software.

2. Draw the conic curves and special curves by using AutoCAD.

3. Draw the front view, top view, side view of objects from the given pictorial view.

4. Draw the projections of straight lines.

5. Draw the projections of polygonal surface.

6. Draw the projections of simple solid objects.

7. Draw the sectional view and the true shape of the given section.

8. Draw the development of surfaces like prism, pyramids, cylinders and cone.

9. Draw the isometric projections of simple solids, truncated prism and pyramids.

10. Draw the isometric projections of cylinder and cone.

LIST OF EQUIPMENT (For a batch of 30 Students)

S. No.	Name of the Equipment	Qty.
1.	Pentium IV computer or better hardware, with suitable graphics facility	30 Nos.
2.	Licensed software for drafting and modeling	15 Nos.
3.	Laser Printer or Plotter to print / plot drawings	2 Nos.

Total : 45 Periods

Course Outcomes: On Completion of this course, the students will be able to
- *Construct various plane curves.*

- *Do orthographic projection of lines and plane surfaces.*

- *Draw projections of solids and development of surfaces.*

- *Prepare isometric sections of simple solids.*

- *Develop the section of solids and surfaces.*

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SEMESTER - II

16HR251	CAREER DEVELOPMENT SKILLS I	L	T	P	C
		0	2	0	0

Prerequisite: - No prerequisite needed for enrolling into the course
Objectives:

- *To help individuals cope with continuous change in the world of work*
- *To help individuals understand their unique abilities, interests, and aptitudes.*

UNIT - I　　　EFFECTIVE ENGLISH –SPOKEN ENGLISH　　　　　　　[6]
Basic Rules of Grammar – Parts of Speech – Tenses – Verbs-Sentence construction – Vocabulary – idioms & Phrases – Synonyms –Antonyms – Dialogues and Conversation –Exercise(Speaking).

UNIT - II　　　ESSENTIAL COMMUNICATION　　　　　　　　　　　[6]
Verbal communication – Effective Communication – Active listening – Paraphrasing – Feedback, Non Verbal Communication – Body language of Self and Others – Importance of feelings in communication – Dealing with feelings in communication – Practice – Exercise.

UNIT - III　　　WRITTEN COMMUNICATION – PART 1　　　　　　　[6]
Usage of noun, pronoun, adjective (Comparative Forms), Verb, Adjectives, Adverb, Tenses, Articles and Preposition – Change of Voice – Change of Speech – One Word Substitution – Using the same word as different parts of Speech – Odd Man Out – Spelling & Punctuation (Editing).

UNIT - IV　　　WRITTEN COMMUNICATION – PART 2　　　　　　　[6]
Analogies – Sentence Formation – Sentence Completion – Sentence Correction – idioms & Phrases -Jumbled Sentences, Letter Drafting (Formal Letters) – Reading Comprehension(Level 1) – Contextual Usage – Foreign Language Words used in English – Exercise.

UNIT - V　　　ORAL COMMUNICATION – PART 1　　　　　　　　[6]
Self Introduction – Situational Dialogues / Role Play (Telephonic Skills) – Oral Presentations – Prepared -'Just A Minute' Sessions (JAM) – Presentation Skills – Exercise.

Total : 30 Periods

Course Outcomes: On Completion of this course, the student will be able to

- *Have competent knowledge on grammar with an understanding of its basic rules*
- *Communicate effectively and enhance interpersonal relationship building skills with renewed self-confidence.*
- *Construct sentence in English and make correction.*
- *Perform oral communication in any formal situation*
- *Develop their LSRW skills*

Reference Books :

1　　Anne Laws, "Writing Skills", Orient Black Swan., Hyderabad,2011.
2　　Raj N Bakshmi, "English Grammar Practice", Orient Black Swan., Hyderabad,2009.
3　　Sarah Freeman, "Written Communication in English", Orient Black Swan., Hyderabad,2015.
4　　Thakur K B Sinha,"Enrich Your English", Vijay Nicole.,Chennai,2005

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<u>**SEMESTER - III**</u>

16MA332	**DISCRETE MATHEMATICS**	**L**	**T**	**P**	**C**
		3	**1**	**0**	**4**

Prerequisite: *- No prerequisite needed for enrolling into the course*

Objective(s):

- *To study the concepts and acquire knowledge of Discrete Mathematical Structures in the areas of Propositional Calculus, Predicate Calculus, set theory, Functions and Graph theory and its applications in the field of Information Technology.*

UNIT - I   PROPOSITIONAL CALCULUS   [12]

Propositions – Logical connectives – Compound propositions - Conditional and biconditional propositions - Truth tables- Tautologies and contradictions -Contra positive - Logical equivalences and implications -Normal forms - Principal conjunctive and disjunctive normal forms - Rules of inference.

UNIT - II   PREDICATE CALCULUS   [12]

Predicates - Statement functions – Variables - Free and bound variables – Quantifiers-Universe of discourse - Logical equivalences and implications for quantified statements - Theory of inference - The rules of universal specification and generalization.

UNIT - III   SET THEORY   [12]

Cartesian product of sets - Relation on sets – Types of relations and their properties - Relational matrix and the graph of a relation - Equivalence relations – Partial ordering – Poset – Hasse diagram.

UNIT - IV   FUNCTIONS   [12]

Definition – Classification of functions - Composition of functions - Inverse functions – Binary and n-ary operations - Characteristic function of set - Permutation functions.

UNIT - V   GRAPH THEORY   [12]

Graphs and graph models – Graph terminology and special types of graphs – Representing graphs and graph isomorphism – connectivity – Euler and Hamilton paths – Planar Graphs.

                                                    Total : 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

- *Apply mathematical techniques to solve logical problems.*
- *Construct algorithms and derive complexities.*
- *Acquire the knowledge of sets that are required for developing computational models.*
- *Perform computational operations associated with functions.*
- *Understand and apply the concepts of Graph theory in network algorithms.*

Text Books :

1   Trembly J.P, and Manohar R, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw–Hill Pubulishing Co. Ltd, New Delhi, 41th Re-print (2012).

Reference Books :

1   Kenneth. H. Rosen, "Discrete Mathematics and its Applications", Tata McGraw Hill P.Co, 2012, 7th Edition.

2   Venkatraman M.K, Sridharan. N and Chandrasekaran N. "Discrete Mathematics, The National Publishing Company, Chennai 2007.

3   Bernard Kolman, Robert C. Busby, Sharan Cutler Ross, "Discrete Mathematical Structures", Pearson Education Pvt Ltd., New Delhi, 2009, Sixth Indian reprint.

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SEMESTER - III

16EC331	DIGITAL PRINCIPLES AND SYSTEM DESIGN	L	T	P	C
		3	0	0	3

Prerequisite: Fundamentals of Electronics
Objective(s):

- *Outline the concept of number system and basic postulates of Boolean algebra.*
- *Familiarize with the methods for simplifying Boolean expressions and implementation of logic functions.*
- *Develop a procedure for analysis and design of combinational circuits.*
- *Understand the concepts of latches, flip-flops and counters.*
- *Develop a design procedure for sequential circuits.*
- *Be exposed to designing using PLD and concepts of memory.*

UNIT - I   BOOLEAN ALGEBRA AND LOGIC GATES   [9]

Review of Number systems – Arithmetic operations – Binary codes – Boolean Algebra and Theorems – Boolean functions – Simplification of Boolean functions using Karnaugh Map and Tabulation methods – Logic gates – Implementation of logic functions using basic gates, NAND-NOR implementations.

UNIT - II   COMBINATIONAL LOGIC   [9]

Combinational circuit – Analysis and design procedure – Circuits for arithmetic operation : Half adder, full adder, Half subtractor, full subtract or , parallel adder, carry look ahead adder & binary adder – 2 bit Magnitude comparator, Code convertors – Decoders and Encoders – Multiplexers and Demultiplexers – Introduction to HDL – HDL models of Combinational circuits.

UNIT - III   MEMORY AND PROGRAMMABLE LOGIC   [9]

Classification of memories-RAM and ROM organization – Memory decoding – Programmable Logic Array – Programmable Array Logic – Field Programmable Gate Arrays (FPGA) – Application Specific Integrated Circuits.

UNIT - IV   SYNCHRONOUS SEQUENTIAL LOGIC   [9]

Latches and Flip Flops – Analysis and design procedure – State reduction and State assignment – Shift registers – Counters – HDL for sequential logic circuits.

UNIT - V   ASYNCHRONOUS SEQUENTIAL LOGIC   [9]

Analysis and design of asynchronous sequential circuits – Reduction of state and flow table – Race-free state assignment – Hazards.

Total=45 Periods

Course Outcomes: On Completion of this course, the student will be able to

- *Analyze different methods used for simplification of Boolean expressions.*
- *Design and implement Combinational circuits and develop their HDL models*
- *Formulate a procedure for analysis and design of synchronous sequential circuits and develop their HDL models*
- *Able to analyze and design asynchronous sequential digital circuits*
- *Acquire knowledge of the nomenclature and technology in the area of memory devices: ROM, RAM, PROM, PLD and ASIC.*

Text Books :

1   M. Morris Mano, "Digital Design", Prentice Hall of India Pvt.Ltd., 4th Edition, Fifth Impression,2012.
2   Thomas L.Floyd, "Digital Fundamentals" 8thEdition,PHI 2003.

Reference Books :

1   John F. Wakerly, "Digital Design Principles and Practices", Pearson Education, Ninth Impression, 2013.
2   Charles H.Roth," Fundamentals of Logic Design", 5th Edition Thomson Learning, 2011.
3   Donald D. Givone, "Digital Principles and Design", Tata Mcgraw Hill, 21st Reprint, 2012.
4   Donald P.Leach ,Albert Paul Malvino and GoutamSaha, "Digital Principles and Applications", McGraw Hill Education, 8th Edition,2015.
5   Kharate G. K., "Digital Electronics", Oxford University Press, 2010.
6   NPTEL Course Link:http://nptel.ac.in/courses/117106086

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SEMESTER - III

		L	T	P	C
16EC333	**PRINCIPLES OF COMMUNICATION**	3	0	0	3

Prerequisite: *Fundamentals of Electronics*
Objective(s):
- *To understand different types of analog and digital communication techniques*
- *To gain knowledge of spread spectrum modulation and multiple access techniques*
- *To learn the concept of satellite and optical communication*

UNIT - I   FUNDAMENTALS OF ANALOG COMMUNICATION   [9]
Introduction - Types of analog modulation - Amplitude modulation: modulation and demodulation, AM envelope, Calculation of modulation index and percentage of modulation, AM frequency spectrum and bandwidth, AM voltage and power distribution. Angle modulation: FM and PM waveforms, phase and frequency deviation, modulation index, Frequency analysis and bandwidth requirements of angle modulated waves.

UNIT - II   DIGITAL COMMUNICATION   [9]
Introduction - Shannon's information capacity theorem - Amplitude Shift Keying - Frequency Shift Keying - Phase Shift Keying -Binary Phase Shift Keying - Differential BPSK - QPSK-Bandwidth Efficiency - Carrier recovery methods - Squaring loop and Costas loop.

UNIT - III   DIGITAL TRANSMISSION   [9]
Pulse modulation: PCM Transmission system, PCM Sampling, Sampling Rate, Signal to Quantization Noise Ratio - Companding: Analog and Digital - Percentage Error - Delta modulation - Adaptive delta modulation - DPCM - Inter symbol interference and eye patterns.

UNIT - IV   SPREAD SPECTRUM AND MULTIPLE ACCESS TECHNIQUES   [9]
Introduction - Pseudo-noise sequences - PN sequence generation - DS spread spectrum with coherent binary PSK - Processing gain - FH spread spectrum - Multiple access techniques - Wireless communication - TDMA and CDMA in wireless communication systems.

UNIT - V   SATELLITE AND OPTICAL COMMUNICATION   [9]
Satellite communication systems - Kepler's laws - Satellite Orbits : LEO, MEO , GEO Orbits, Footprints and Link model - Optical communication systems: Types of optical cable, Elements of an optical fiber transmission link, Losses in optical fiber cables -Optical source : ILD - Optical detector : APD.(Qualitative Treatment only).

Total : 45 Periods

Course Outcomes: On Completion of this course, the student will be able to
- *Understand the concepts of AM and FM waves.*
- *Acquire knowledge on digital communication techniques.*
- *Learnt about the pulse modulation mechanisms.*
- *Analyze different multiple access mechanism.*
- *Learn about satellite and optical communication.*

Text Books :
1   Wayne Tomasi, "Advanced Electronic Communication Systems", Pearson Education, 5th Edition, Reprint 2013.
2   Simon Haykin, "Communication Systems", John Wiley & Sons, 4th Edition, Reprint 2012.

Reference Books :
1   H.Taub, D.L.Schilling, G.Saha, "Principles of Communication", Tata McGraw Hill, 3rd Edition, 2007.
2   B.P.Lathi, Zhi Ding, "Modern Digital and Analog Communication systems", Oxford University Press, 4th Edition, 2010.
3   R.Blake, "Electronic Communication Systems", Thomson Delmar Publications, 2nd Edition, 2002.
4   Martin S.Roden, "Analog and Digital Communication System", PHI, 3rd Edition, 2002.
5   Bernard.Sklar,Pabitrakumar Ray, "Digital Communication Fundamentals and Applications," 2nd Edition Pearson Education 2009.
6   Jeffrey S.Beasley,GrayM.Miller, "Modern Electronic Communication",9th Edition,PHI,2008.
7   NPTEL Course Link: http://nptel.ac.in/courses/117102059/

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SEMESTER - III

		L	T	P	C
16IT313	**OBJECT ORIENTED PROGRAMMING**	3	0	0	3

Prerequisite: *Basic Programming in C*

Objective(s):

- *To develop programming skills from OO perspective.*
- *To get introduced to handling pointer operation in combination with object orientation.*
- *To learn to handle exception in OO operations.*
- *To learn advanced file handling and stream operations.*

UNIT - I   INTRODUCTION TO OBJECT ORIENTED PROGRAMMING   [9]

Introduction – Procedure Vs. Object Oriented Programming – Characteristics of OOPs – Programming Basics – Control Structures – Structures – Functions – Objects and Classes.

UNIT - II   BASICS OF OOP   [9]

Arrays and Strings – Operator Overloading – Inheritance – Pointers – Virtual Functions.

UNIT - III   FILES AND TEMPLATES   [9]

Streams and Files – Multi-file Programs – Templates and Exceptions – Standard Template Library.

UNIT - IV   INTRODUCTION TO JAVA   [9]

Overview of Java – Data Types – Variables and Arrays – Operators – Control Statements – Introducing Classes.

UNIT - V   ESSENTIAL CONCEPTS IN JAVA   [9]

Closer Look at Methods and Classes – Inheritance – Packages and Interfaces.

Total : 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

- *Convert a procedure-oriented program into object-oriented program*
- *Write OO programs using overloading*
- *Write programs that handle exceptions*
- *Write programs using dynamic memory allocation*
- *Write programs using Java packages and interfaces*

Text Books :

1   Robert Lafore, "Object Oriented Programming in C++", Galgotia, Fourth Edition. 2014

2   Herbert Schildt, "Java The Complete Reference", McGrawHill, Ninth Edition, 2015

Reference Books :

1   Paul Deitel, "C++ How to Program", Deitel, Pearson Education, Seventh Edition, 2010

2   E Balagurusamy, "Object Oriented Programming with C++", McGrawHill, Sixth Edition, 2013

3   Paul Deitel, "Java How to Program", Deitel, Pearson Education, Ninth Edition, 2012

4   Joshua Bloch, "Effective Java", Pearson Education, Second Edition, 2012

				L	T	P	C

			L	T	P	C
16IT314	**DESIGN AND ANALYSIS OF ALGORITHMS**		3	0	0	3

Prerequisite: *Data Structures*

Objective(s):

- *To learn the algorithm analysis techniques.*
- *To become familiar with the different algorithm design techniques.*
- *To understand the limitations of Algorithm power.*

UNIT - I   BASIC CONCEPTS OF ALGORITHMS   [9]

Introduction – Notion of Algorithm – Fundamentals of Algorithmic Solving – Important Problem Types – Fundamentals of the Analysis of Algorithm Efficiency – Analysis Framework – Asymptotic Notations and Basic Efficiency Classes.

UNIT - II   MATHEMATICAL ASPECTS AND ANALYSIS OF ALGORITHMS   [9]

Mathematical Analysis of Non-recursive Algorithm – Mathematical Analysis of Recursive Algorithm – Example: Fibonacci Numbers – Empirical Analysis of Algorithms – Algorithm Visualization.

UNIT - III   ANALYSIS OF SORTING AND SEARCHING ALGORITHMS   [9]

Brute Force Strategy: Selection Sort and Bubble Sort, Sequential Search and Brute-force String Matching – Divide and Conquer: Merge sort, Quick Sort, Binary Search, Binary tree Traversal and Related Properties – Decrease and Conquer: Insertion Sort, Depth First Search and Breadth First Search.

UNIT - IV   ANALYSIS OF GRAPH ALGORITHMS   [9]

Transform and Conquer: Presorting, Balanced Search trees – AVL Trees, Heaps and Heap Sort – Dynamic Programming: Warshall's and Floyd's Algorithm, Optimal Binary Search Trees – Greedy Technique: Prim's Algorithm, Kruskal's Algorithm, Dijkstra's Algorithm – Huffman Trees.

UNIT - V   ALGORITHM DESIGN TECHNIQUES TO NP COMPLETE PROBLEMS   [9]

Limitations of Algorithm Power: Lower-bound Arguments – NP Complete Problems – Backtracking: n-Queen's Problem – Hamiltonian Circuit Problem – Subset-Sum Problem – Branch and Bound: Assignment Problem, Knapsack Problem – Traveling Salesman Problem.

           Total : 45 Periods

Course Outcomes: *On Completion of this course, the student will be able to*

- *Critically analyze the various algorithms*
- *Apply different data structures to problem solutions*
- *Analyze the time and space complexity of algorithms*
- *Modify existing algorithms to improve efficiency*
- *Critically analyze the different algorithm design techniques for a given problem*

Text Books :

1   Anany Levitin, "Introduction to the Design and Analysis of Algorithms", Third Edition, Pearson Education, 2012.

2   M. A. Weiss, "Data Structures and Algorithm Analysis in C", Second Edition, Pearson Education, 2015.

Reference Books :

1   Sara Baase and Allen Van Gelder, "Computer Algorithms - Introduction to Design and Analysis", Second Impression, Pearson Education India, 2008.

2   Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, "Data Structures and Algorithms", Pearson Education, Reprint 2006.

3   Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction to Algorithms", Second Edition, Mc Graw Hill, 2002.

4   Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, "Fundamentals of Computer Algorithms", Second Edition, Galgotia Publications, New Delhi, 2003.

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<u>**SEMESTER - III**</u>

16IT315	OPERATING SYSTEMS	L	T	P	C
		3	1	0	4

Prerequisite: Data Structures
Objective(s):

- *To Introduce basic concepts and functions of modern operating systems*
- *To understand the concept of process, thread management, process synchronization and deadlock.*
- *To understand various memory management techniques*
- *To know the concept of I/O and file management*
- *To be aware of latest Operating Systems used in industry.*

UNIT - I   INTRODUCTION   **[12]**
Basics of Operating Systems: Definition – Generations of Operating Systems – Types of Operating Systems: Mainframe, Desktop, Multiprocessor, Distributed, Clustered, Multiprogramming, Real Time, Embedded and Time sharing. Operating System Components – Operating System Services – System Calls – System Call Execution.

UNIT - II   PROCESS MANAGEMENT   **[12]**
Process: Process Concept – Process Control Block – Context Switches – Threads – Necessity and Advantage of Threads – Types of Threads – System Calls – Examples. Process Scheduling: Scheduling Objectives – Types of Schedulers – Scheduling Criteria – Scheduling Algorithms – Inter process Communication and Synchronization: Shared Memory System – Message Passing – Critical Section – Mutual Exclusion – Semaphores. Deadlocks: Deadlock Characteristics – Deadlock Prevention – Deadlock Avoidance – Deadlock Detection and Recovery.

UNIT - III   MEMORY MANAGEMENT   **[12]**
Swapping – Memory Allocation – Contiguous Memory Allocation – Paging – Segmentation – Segmentation with Paging. Virtual Memory – Demand Paging – Page Replacement Policies – Optimal (OPT), First in First Out (FIFO), Not Recently Used (NRU) and Least Recently Used (LRU).

UNIT - IV   FILE AND I/O MANAGEMENT   **[12]**
File Concepts – Access methods – Directory Structure – File sharing – Protection – Access Rights – File System Structure – Byte Sequence, Record Sequence and Tree-based – Recovery – Disk formatting. I/O Management: I/O Buffering – Single and Double Buffer Schemes – Disk Organization. Secondary Storage Management: File Allocation Methods – Contiguous Allocation – Non-contiguous Allocation – Chained, Indexed Allocation – Free Space Management – Disk Scheduling – FCFS, SSTF, SCAN and C- SCAN – Disk Cache.

UNIT - V   LINUX OPERATING SYSTEM   **[12]**
History of Linux – Features of Linux – Differences between UNIX and Linux – Linux Architecture – Popular Flavors of Linux – Memory Management Subsystems – Process and Thread Management – File Management System – Device Drivers. System Administration**:** Installing Linux – Booting the System – Maintaining User Accounts – File systems and Special Files – Backups and Restoration.

Total (L: 45 T: 15) = 60 Periods

Course Outcomes: On Completion of this course, the student will be able to

- *Possess knowledge of the role of Operating Systems and their types.*
- *Apply the concept of a process, thread and scheduling algorithms.*
- *Realize various memory management techniques.*
- *Realize the concept of I/O management and File system*
- *Gain more knowledge in Linux OS and its administration.*

Text Books :
1   Abraham Silberschatz, Operating System Concepts , John Wiley & Sons; 9th Edition, 2012.
2   William Stallings, "Operating Systems – Internals and Design Principles", 7th Edition, Prentice Hall, 2011.
Reference Books :
1   Harvey M. Deitel,Paul Deitel, David R.Choffnes, Operating Systems,Prentice Hall, 3rd Edition, 2004.
2   Andrew S. Tanenbaum , Operating Systems – Design and Implementation, Pearson Education, 2015
3   D.M. Dhamdhere , Operating Systems – A Concept Based Approach, TMGH, 2007.
4   Richard Peterson, Linux: The Complete Reference, Tata McGraw Hill, 6th Edition, 2007.

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SEMESTER - III

		L	T	P	C
16EC327	**DIGITAL LABORATORY**	0	0	3	2

Prerequisite: *Digital principles and system design*
Objective(s):

- *To understand the various logic gates.*

- *To be familiar with various combinational circuits.*

- *To understand the various components used in the design of digital computers.*

- *To be exposed to sequential circuits*

- *To be exposed to HDL*

List of Experiments:

1. Verification of Boolean Theorems using basic gates.

2. Design and implementation of combinational circuits using basic gates for arbitrary functions, code converters.

3. Design and implementation of combinational circuits using basic gates /MSI devices:

    - 4 – bit binary adder / subtractor

    - Parity generator / checker

    - Magnitude Comparator

    - Application using multiplexers / Demultiplexers

4. Design and implementation of sequential circuits:

    - Shift –registers

    - Synchronous and asynchronous counters

5. Coding combinational / sequential circuits using HDL.

Total : 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

- *Use boolean simplification techniques to design a combinational hardware circuit.*

- *Design and Implement combinational and sequential circuits.*

- *Analyze a given digital circuit – combinational and sequential.*

- *Design the different functional units in a digital computer system.*

- *Design and Implement a simple digital system.*

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SEMESTER - III

			L	T	P	C
16IT322	**OBJECT ORIENTED PROGRAMMING LABORATORY**		0	0	3	2

Prerequisite: Basic Programming in C

- *To develop object oriented programming skills using C++*
- *To make the students to solve the problems using object oriented concepts.*
- *To practice the basic structure of Java Programming Language.*
- *To Practice the core packages of java.*

List of Experiments:

Implementation of the following concepts:

1. Class and objects.
2. Friend function and function overloading.
3. Constructors and destructors.
4. Inheritance.
5. Polymorphism.
6. Operator overloading.
7. Templates.
8. Exception HANDLING.
9. Data types, arrays and operators.
10. Inheritance and PACKAGE.

Total : 45 Periods

Course Outcomes: On Completion of this course, the student will be able to
- *Convert a procedure-oriented program into object-oriented program*
- *Write OO programs using overloading*
- *Write programs that handle exceptions*
- * write programs using dynamic memory allocation*
- *Write simple Java programs*

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SEMESTER - III

16IT323	OPERATING SYSTEMS LABORATORY	L	T	P	C
		0	0	3	2

Prerequisite: Computer Programming and Problem Solving

Objective(s):

- *To learn shell programming and the use of filters in the UNIX environment.*
- *To be exposed to programming in C using system calls.*
- *To learn to use the file system related system calls.*
- *To be exposed to process creation and inter process communication.*
- *To be familiar with implementation of CPU Scheduling Algorithms, page replacement algorithms and Deadlock avoidance.*

List of Experiments:

1. Write programs using the following system calls of UNIX operating system, like fork, exec, getpid, exit, wait, close, stat, opendir, readdir.
2. Write programs using the I/O system calls of UNIX operating system (open, read, write, etc.)
3. Write C programs to simulate UNIX commands like ls, grep, etc.
4. Recall Shell programming with some simple examples.
5. Implement the following CPU scheduling algorithms
     a) Round Robin   b) SJF   c) FCFS   d) Priority
6. Implement all file allocation strategies (like Sequential, Indexed, Linked)
7. Implement the Producer – Consumer problem using semaphores.
8. Implement file organization techniques (like Single level directory, Two level, Hierarchical, DAG).
9. Implement Bankers algorithm for dead lock avoidance.
10. Implement an algorithm for dead lock detection.
11. Implement page replacement algorithms (like FIFO, LRU, and LFU.
12. Implement shared memory and IPC.
13. Implement paging technique of memory management.
14. Implement threading & synchronization applications.

Total : 45 Periods

Course Outcomes: On Completion of this course, the student will be able to

- *Use Unix utilities, Unix file system, file access control and perform basic shell control of the utilities*
- *Implement process scheduling & synchronization algorithms, deadlock avoidance, and detection Algorithms*
- *Compare the performance of various CPU Scheduling Algorithm*
- *Critically analyze the performance of the various page replacement algorithms*
- *Create processes and implement IPC.*

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<u>**SEMESTER - III**</u>

16HR352	CAREER DEVELOPMENT SKILLS II	L	T	P	C
	(Common to All Branches)	0	2	0	0

Prerequisite: - *No prerequisite needed for enrolling into the course*
Objective(s):

* *To enhance employability skills and to develop career competency.*

* *To help individuals develop a realistic understanding of themselves in regard to decision making and career alternatives.*

UNIT - I   VERBAL REASONING – PART 1   [6]
Analogies – Alphabet Test – Theme Detection – Family Tree – Blood Relations (Identifying relationships among group of people) – Coding & Decoding – Situation Reaction Test – Statement & Conclusions

UNIT - II   SPEED MATHS AND QUANTITATIVE APTITUDE   [6]
Think Without Ink(TWI) Approach – Speed Math's: Squaring of Numbers – Multiplication of Numbers – Finding Square Roots – Finding Cube Roots - Solving Simultaneous Equations Faster – Number System: HCF, LCM - Decimals – Percentages – Averages – Powers and Roots – Sudoku (level 1) – Series Completion (Numbers, Alphabets, Pictures) –Odd Man Out – Puzzles

UNIT - III   QUANTITATIVE APTITUDE – PART 1   [6]
Problem on Ages – Percentages – Profit and Loss – Simple & Compound Interest – Averages – Ratio, Proportion

UNIT - IV   QUANTITATIVE APTITUDE – PART 2   [6]
Speed, Time & Work and Distance – Pipes and Cisterns – Mixtures and Allegations – Races – Problem on Trains – Boats and Streams Practices : Puzzles, Sudoku, Series Completion, Problem on Numbers

UNIT - V   WRITTEN COMMUNICATION & READING COMPREHENSION   [6]
What is Writing – Sentence – Phrase – Kinds of Sentences – Parts of Sentence – Parts of Speech - Articles - Types of Sentences - Academic Essay Writing - Precise Writing - Report Abstracts - Letter Writing - Memo - Cover Letter - Resume writing READING SKILLS : Importance of Reading - Definition of Reading - Levels of Reading - Requirements of Reading - Types of Reading - Techniques of Reading - Academic Reading Tips - Exercise

Total :30 Periods

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

* *Speak and write appropriately by understanding and applying the basic grammatical rules.*

* *Demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions.*

* *Enhance their communication skills and instructiveness.*

* *Enhance interpersonal relationship building skills with self-confidence.*

* *Critically evaluate various real life situations by resorting to Analysis of key issues and factors*

Reference Books :

1   Aggarwal, R.S. "A Modern Approach to Verbal and Non-verbal Reasoning", Revised Edition 2008, Reprint 2009, S.Chand & Co Ltd., New Delhi.
2   Abhijit Guha, "Quantitative Aptitude", TMH, 3rd Edition.
3   Objective Instant Arithmetic by M.B. Lal & GoswamiUpkar Publications.
4   Word Power Made Easy by Norman Lewis W.R. GOYAL Publications

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SEMESTER - IV

		L	T	P	C
16MA442	**PROBABILITY AND DECISION MODELS** (Common CS & IT)	3	1	0	4

Prerequisite: Computer Programming and Problem Solving

Objective(s):

* *To study the concepts and applications of Probabilistic models and Random Process techniques .*
* *To study the concepts and applications of queuing models, PERT and CPM techniques.*

UNIT - I   ONE DIMENSIONAL RANDOM VARIABLE   [12]

Discrete and Continuous Random Variables – Moments – Moment Generating Functions and their Properties – Standard Distributions: Binomial, Poisson, Exponential and Normal Distributions.

UNIT - II   TWO DIMENSIONAL RANDOM VARIABLES   [12]

Joint Distributions – Marginal and Conditional Distributions – Covariance – Karl Pearson's coefficient of Correlation - Spearman's Rank correlation and Regression equations.

UNIT - III   RANDOM PROCESSES   [12]

Classification – Stationary Process – Markov Process – Markov Chain – Transition Probabilities – Limiting Distributions - Poisson Process and their Properties.

UNIT - IV   QUEUEING MODELS   [12]

Markovian Queues – Little's formula – Single Server Models : $(M/M/1):(\infty/FIFO)$ and $(M/M/1):(N/FIFO)$ – Multi Server Models : $(M/M/C):(\infty/FIFO)$ and $(M/M/C):(N/FIFO)$.

UNIT - V   NETWORK MODELS   [12]

Network Construction – Critical Path Method (CPM) – Computations of total, free and independent floats – PERT Analysis – Computation of expected time and standard deviation.

Total (L: 45 T:15) = 60 Periods

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

* *Understand the importance of one dimensional random variables, discrete and continuous distributions.*
* *Develop their skills in joint, marginal and conditional distributions, and knowing the concept of covariance correlation &regression.*
* *Analyze the theory of stationary process, Markov Process and transition probabilities, and Poisson   Process*
* *Determine Waiting time of arrivals by using queuing models.*
* *Determine critical path of the networks by using PERT and CPM techniques.*

Text Books :

1. Veerarajan. T., Probability, Statistics and Random Processes, Tata McGraw-Hill, New Delhi.

Reference Books :

1. Oliver C. Ibe, "Fundamentals of Applied Probability and Random Processes", Elsevier, 1st Indian Reprint, 2012.
2. HamdyA.Taha, "Operations Research", Pearson Education, 9th Edition, 2013.
3. P.Kandasamy, K.Thilagavathi and K.Gunavathi, "Probability and Queueing Theory", S.Chand Publishers, Reprint, 1st Edition, 2013.

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SEMESTER - IV

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		L	**T**	**P**	**C**
16IT412	**COMPUTER ORGANIZATION AND ARCHITECTURE**	**3**	**0**	**0**	**3**

Prerequisite: Computer Fundamentals

Objective(s): To learn the basic structure of computers, basic processing unit, concept of pipelining, memory system and I/O organization.

UNIT - I   BASIC STRUCTURE OF COMPUTERS   [9]

Block Diagram of Microcomputers – 8085 Architecture – Pin Configuration – Bus Structures – Performance and Metrics – Instructions and Instruction Sequencing – Hardware Software Interface – Instruction Set Architecture – Addressing Modes – RISC – CISC.

UNIT - II   BASIC PROCESSING UNIT   [9]

Fundamental Concepts – Execution of a Complete Instruction – Multiple Bus Organization – Hardwired Control – Micro Programmed Control – Nano Programming.

UNIT - III   PIPELINING   [9]

Basic Concepts – Data Hazards – Instruction Hazards – Influence on Instruction Sets – Data Path and Control Considerations – Performance Considerations – Superscalar Operation.

UNIT - IV   MEMORY SYSTEM   [9]

Basic Concepts – Semiconductor RAM – ROM – Speed – Size and Cost – Cache Memories – Improving Cache Performance – Virtual Memory – Memory Management Requirements – Associative Memories – Secondary Storage Devices: Hard Disk, Blue-ray Disc, Flash Drive, Smart Cards.

UNIT - V   I/O ORGANIZATION   [9]

Accessing I/O Devices – Programmed Input/Output – Interrupts – Direct Memory Access – Buses – Interface Circuits – Standard I/O Interfaces (PCI, SCSI, USB), I/O Devices and Processors – Case Study: Pentium Processor.

Total: 45 Periods

Course Outcomes: On completion of this course, the student will be able to
- *Have a thorough understanding of the basic structure and operation of a computer.*
- *Discuss in detail the execution of instruction and pipelining concepts.*
- *Explain the hierarchical memory system including cache memories and virtual memory.*
- *Explain the different ways of communicating with I/O devices and standard I/O interfaces.*
- *Describe the memory access method*

Text Books :

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

2   Ramesh Gaonkar, "Microprocessor Architecture, Programming, and Applications with the 8085", Fifth Edition, Penram International Publishing (India) Pvt. Ltd, 2011.

Reference Books :

1   David A. Patterson and John L. Hennessy, "Computer Organization and Design: The Hardware/Software interface", Fifth Edition, Elsevier, 2013

2   William Stallings, "Computer Organization and Architecture – Designing for Performance", Ninth Edition, Pearson Education, 2012

3   M.Morris Mano, "Computer System Architecture", Third Edition, Pearson Education, 2007.

4   V.P. Heuring, H.F. Jordan, "Computer Systems Design and Architecture", Second Edition, Pearson Education, 2004.

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<u>SEMESTER - IV</u>

16IT413	COMPUTER NETWORKS	L	T	P	C
		3	0	0	3

Prerequisite: Principles of Communication

Objective(s):
- *To understand the functionalities of each layer*
- *To be familiar with the network protocols, architectures and applications*

UNIT - I   INTRODUCTION   [9]

Data Communications – Data Flow – Networks – The Internet – Protocols and Standards – Network Models: Layered Tasks – The OSI Model – TCP/IP Protocol Suite – Addressing – Transmission Media – Connecting LANs, Backbone Networks, and Virtual LANs: Connecting Devices.

UNIT - II   DATA LINK LAYER   [9]

Introduction – Block Coding – Cyclic Codes – Checksum – Data Link Control: Framing – Flow and Error Control – Noiseless Channels – Noisy Channels – HDLC – Multiple Access: Random Access – Channelization – Wired LANs: IEEE Standards – Standard Ethernet – Wireless LANs: IEEE 802.11.

UNIT - III   NETWORK LAYER   [9]

IPv4 Addresses – IPv6 Addresses – Internetworking – IPv4 – IPv6 – Transition from IPv4 to IPv6 – Network Layer: Delivery, Forwarding, and Routing: Address Mapping – Internet Control Message Protocol (ICMP) – Internet Group Management Protocol (IGMP) – Network Layer: Delivery, Forwarding, and Routing: Delivery – Forwarding – Unicast Routing Protocol – Multicast Routing Protocols.

UNIT - IV   TRANSPORT LAYER   [9]

Process-to-Process Delivery – User Datagram Protocol (UDP) – Transmission Control Protocol (TCP) – Stream Control Transmission Protocol (SCTP) – Congestion Control and Quality of Service: Data Traffic – Congestion Control – Quality of Services (QoS) – Techniques to Improve QoS – Integrated Services – Differentiated Services.

UNIT - V   APPLICATION LAYER   [9]

Domain Name System (DNS): Domain Name Space – Distribution of Name Space – DNS in the Internet – WWW and HTTP – Network Management: Simple Network Management Protocol (SNMP).

Total : 45 Periods

Course Outcomes: On completion of this course, the student will be able to
- *Identify the components required to build different types of networks.*
- *Handle error and flow control*
- *Choose the required functionality at each layer for given application.*
- *Identify solution for each functionality at each layer*
- *Design and build a network.*

Text Books :

1	Behrouz A.Forouzan, "Data Communication and Networking", Fourth Edition,Tata McGraw-Hill, 2011.
2	Larry L. Peterson, Bruce S. Davie, "Computer Networks: A systems approach", Fifth Edition, Morgan Kaufmann Publishers, 2012.

Reference Books :

1	James F. Kurose, Keith W. Ross, "Computer Networking - A Top-Down Approach Featuring the Internet", Fifth Edition, Pearson Education, 2009.
2	Andrew S.Tanenbaum, Computer Networks, 4th Edition 2016.Pearson Education, 2011
3	William Stallings, Data and Computer Communication, Tenth Edition,Pearson Education, 2013.
4	Ying-Dar Lin, Ren-Hung Hwang, Fred Baker, "Computer Networks: An Open Source Approach", Mc Graw Hill Publisher, 2011.

16IT414	ADVANCED PROGRAMMING IN JAVA	L	T	P	C
		3	1	0	4

Prerequisite: *Java Programming Basics*
Objective(s):

- *To examine topics in various Java technologies. Content includes EJB, Java database connectivity (JDBC), remote method invocation (RMI), CORBA (interactive data language), servlets, and Java server pages (JSP).*
- *To develop distributed object applications and write web pages using advanced server side programming through servlets and Java server pages.*

UNIT - I   EXCEPTION HANDLING AND MULTITHREADING   [12]

Exception handling : Fundamentals-Types- Uncaught Exception- Try and Catch- Multiple Catch- Nested Try- Throw- Throws- Finally- Built in Exception- Own Exception- Chained Exception – Multithreaded : Thread Model- Runnable Interface- Main Thread- Creating Thread and Multiple Thread- Thread Priorities- Synchronization- Inter thread communication- Multi threading – Enumeration – Annotation.

UNIT - II   I/O STREAMS AND STRINGS   [12]

I/O Basics: Streams – Reading Console Input – Writing Console Output – Print Writer – Reading and Writing Files – Applet – Strings: Constructor- Length- Operation- Data Types-Character Extraction, String Comparison- Searching and Modifying Strings, String Buffer Class.

UNIT - III   NETWORK PROGRAMMING & JAVA BEANS   [12]

Networking Basics – Classes and Interfaces – InetAddress – TCP/IP Client Socket – URL and Connection – Cookies – Server Sockets – Datagrams – Java Beans: Java Beans, Advantages- Introspection- Bound and Constrained Properties- Persistence- Customizers- Java Beans API.

UNIT - IV   SECURITY AND DATABASE CONNECTIVITY   [12]

Security: Introduction, Secret and Public Key Cryptography, Java Cryptography Extension, Digital Signature, Authentication, Secure Socket Layer – Java Database Connectivity: Introduction- SQL- Database in Cloud- Database Manipulation- Stored Procedure- Batch Processing.

UNIT - V   DISTRIBUTED APPLICATION DEVELOPMENT   [12]

Servlet: Introduction, Overview and Architecture, Handling Request, Session Tracking – RMI: Introduction, Defining and Implementing Remote Interface, Compiling and Executing the Client and Server – EJB: Introduction-Overview, Session Beans- Transactions – CORBA: Overview, Basics and Services – Introduction to Android Platform.

Total (L: 45 T: 15) = 60 Periods

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

- *Understand the deployment descriptor and enterprise application deployment.*
- *Develop distributed applications using RMI*
- *Update and retrieve the data from the databases using SQL*
- *Develop component-based Java software using JavaBeans*
- *Develop server side programs in the form of servlets*

Text Books :

1   Herbert Schildt, "Java The Complete Reference", McGrawHill, Ninth Edition, 2015.
2   H. M.Deitel, P. J. Deitel, S. E. Santry, "Advanced Java 2 Platform How to Program", Prentice Hall, 2012.

Reference Books :

1   Santosh Kumar K ,"JDBC, Servlets and JSP Black Book", Dreamtech Press,New Edition,2008.
2   csvls.blogspot.com/2010/10/video-lecture-of-core-java-and-advance.html
3   http://docs.oracle.com/javaee/6/tutorial/doc/
4   Kanika Lakhani, "Advanced Java Programming", Katson Books, Second Edition, 2013.

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<u>SEMESTER - IV</u>

16IT415	DATABASE SYSTEMS	L	T	P	C
		3	0	0	3

Prerequisite: No prerequisite needed for enrolling into the course

Objective(s):
- *To understand the fundamentals of data models*
- *To be familiar with managing database systems*

UNIT - I   FUNDAMENTALS OF DATABASES   [9]

Purpose of Database System – Views of Data – Data Models – Database Languages – Database System Architecture – Database Users and Administrator – Entity–Relationship Model (E-R model) – E-R Diagrams -- Introduction to Relational Databases – Structure of Relational Model – Types – Keys.

UNIT - II   RELATIONAL MODEL   [9]

Relational Algebra – SQL – Data Definition – Queries in SQL – Updates – Views – Integrity and Security – Sub Queries – Correlated Sub Queries – Relational Database design – Functional Dependencies and Normalization for Relational Databases (up to BCNF).

UNIT - III   DATA STORAGE AND QUERY PROCESSING   [9]

Overview of Physical Storage Media – Magnetic Disks – RAID – Tertiary Storage – File Organization – Organization of Records in Files – Indexing and Hashing – Ordered Indices – B+ tree Index Files – B tree Index Files – Static Hashing – Dynamic Hashing – Query Processing Overview – Selection Operation – Sorting – Join Operation – Database Tuning.

UNIT - IV   TRANSACTION MANAGEMENT   [9]

Transaction Concepts – Transaction Recovery – ACID Properties – Need for Concurrency Control – Schedule and Recoverability – Serializability and Schedules – Concurrency Control – Types of Locks – Two Phases locking – Deadlock – Time Stamp Based Concurrency Control – Recovery Techniques – Concepts – Immediate Update – Deferred Update – Shadow Paging.

UNIT - V   CURRENT TRENDS   [9]

Object Oriented Databases – Need for Complex Data Types – OO Data Model – Nested Relations – Complex Types – Inheritance Reference Types – Distributed Databases – Homogenous and Heterogeneous – Distributed Data Storage – XML – Structure of XML – Data – XML Document – Schema – Querying and Transformation.

Total : 45 Periods

Course Outcomes: On completion of this course, the student will be able to
- *Comprehend the fundamentals of data models*
- *Design SQL and relational database.*
- *Understand the internal storage structures using different file and indexing techniques.*
- *Describe the fundamental concepts of transaction Management Techniques.*
- *Understand new developments and trends in databases.*

Text Books :

1   Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", Sixth Edition, Tata McGraw Hill, 2012.
2   C.J.Date, A.Kannan, S.Swamynathan, "An Introduction to Database Systems", Eighth Edition, Pearson Education, 2012.

Reference Books :

1   Ramez Elmasri and Shamkant B. Navathe, "Fundamental Database Systems", Pearson Education, Fifth Edition 2008.
2   Raghu Ramakrishnan, "Database Management System", Tata McGraw-Hill Publishing Company, 2003.
3   S.K.Singh, "Database Systems Concepts, Design and Applications", First Edition, Pearson Education, 2006.
4   Peter Rob and Corlos Coronel, "Database System, Design, Implementation and Management", Thompson Learning Course Technology, Seventh edition, 2007.

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SEMESTER - IV

	L	T	P	C
16IT416 **SOFTWARE ENGINEERING PRINCIPLES AND PRACTICE**	3	0	0	3

Prerequisite: No prerequisite needed for enrolling into the course
Objective(s):

- *To understand the software life cycle models*
- *To be exposed to techniques for the requirement analysis and design of complex software intensive systems.*
- *To know knowledge of testing and managing the   multi -disciplinary software -intensive product development with an awareness of individual professional and ethical responsibilities.*

UNIT - I   THE SOFTWARE PROCESS   [9]
Software Engineering: Generic View of Process – Software Engineering Practice – Software Process Model: Prescriptive Models, Waterfall Models, Increment, Evolutionary and Specialized model, Comparison Study of Software Process Models – Agile Process and Models.

UNIT - II   REQUIREMENTS ANALYSIS AND SPECIFICATION   [9]
Requirements Analysis: Requirements Engineering Tasks – Initialization of the   Requirement   Engineering   Process – Eliciting Requirements – Building the Analysis Model – Validating Requirements. Building the Analysis Model – Requirements Analysis – Model Approaches – Data Modeling Concepts – Scenario Based – Flow Oriented Modeling – Class Based Modeling – Behavioral Modeling. CASE STUDY – Software Requirements Specification (SRS) for Application Project.

UNIT - III   DESIGN CONCEPTS AND ARCHITECTURAL DESIGN   [9]
Design Engineering: Design within the Context of Software Engineering – Design concepts – Design model. Architectural design: Software Architecture – Architectural Styles – Architectural Design – Mapping Design Flow into Software Architecture. Introduction to Modeling with UML Language and Design Based on CASE STUDY of SRS.

UNIT - IV   SOFTWARE TESTING STRATEGIES AND TACTICS   [9]
Testing strategies: Strategic Approach to Software Testing – Strategic Issues – Testing Strategies for Conventional Software, Object Oriented Software – Validating Testing – System Testing – Art of Debugging. Testing Tactics: Software Testing Fundamentals – White Box Testing – Basis Path Testing – Control Structure Testing – Black Box Testing –Testing for Specialized Environments, Architectures and Applications – Patterns for Software Testing. Study of Software Testing Tools.

UNIT - V   MANAGING SOFTWARE PROJECT   [9]
Project Management – Spectrum- People- Product and Process- Empirical Estimation Models- Scheduling: Timeline Chart and Tracking the Schedule- Risk management: Risk Identification- Projection and RMMM Plan- SCM Process- SQA Activities and Formal Technical Reviews- ISO 9000 Quality Standards- Emerging Trends in Software Engineering.

Total : 45 Periods

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

- *Apply the principles of software engineering to real time application with practicing models.*
- *Perform the requirement specification and design and implementation of software systems.*
- *Design processes and quality architecture to the specific needs.*
- *Make effective reports testing analysis, documentation and effective presentation on software project development activities.*
- *Manage the software project with quality product.*

Text Books :
1   Roger S. Pressman, "Software Engineering: A Practitioner Approach", McGraw-Hill ,Seventh Edition ,2010
2   Ian Sommerville, "Software Engineering", Sixth Edition, Pearson Education, New Delhi, 2001.

Reference Books :
1   Jalote P., "An Integrated Approach to Software Engineering", Third edition, Narosa Publishers, New Delhi, 2005.
2   Ali Behforooz, Frederick J Hudson, "Software Engineering Fundamentals", Second edition, Oxford University Press, Noida, 2003.
3   Shari Lawrence Pfleeger, "Software Engineering Theory and Practice", Second Edition, Pearson Education, New Delhi, 2001.

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SEMESTER - IV

	L	T	P	C
16IT421 **COMPUTER NETWORKS LABORATORY**	0	0	3	2

Prerequisite: *Principles of Communication*
Objective(s):

- *To learn socket programming to build a networking application.*

- *To be familiar with simulation tools.*

List of Experiments:

1. Implementation of stop and wait protocol and sliding window protocol.

2. Study of socket programming and client – server model.

3. Write a code simulating ARP /RARP protocols.

4. Write a code simulating PING and TRACEROUTE commands.

5. Create a socket for HTTP for web page upload and download.

6. Write a program to implement RPC (Remote Procedure Call).

7. Implementation of subnetting.

8. Applications using TCP sockets.

9. Applications using TCP and UDP sockets.

10. Study of Network Simulator (NS) and simulation of congestion control algorithms.

11. Perform a case study about the different routing algorithms.

                                                                                    Total : 45 Periods

Course Outcomes: On completion of this course, the student will be able to
- *Use Simulation tools.*

- *Implement various protocols.*

- *Implement Socket Programming*

- *Implement routing algorithm*

- *Implement congestion control algorithm*

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SEMESTER – IV

		L	T	P	C
16IT422	**ADVANCED PROGRAMMING IN JAVA LABORATORY**	0	0	3	2

Prerequisite: Java Programming Basics

Objective(s):

- *To develop application for distributed environment using advanced java concepts.*

- *To create the web application with high level of security using java security.*

- *To implement the cloud database idea using java database connectivity*

List of Experiments:

1. Study the distributed computing and environments.

2. Develop a Java program to implement exception handling.

3. Create multiple threads in java program and set priorities.

4. Manipulate password strings using I/O and string package in java.

5. Create a package to demonstrate simple java beans.

6. Implement SSL protocol in simple java application.

7. Make remote database connectivity with a java application.

8. Create a java application using servlet and JDBC.

9. Develop a java application to invocate remote methods using RMI.

10. Develop a java package with Enterprise Java Beans.

Total : 45 Periods

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

- *Practice to develop a java application using the advanced concepts of java.*

- *Develop distributed application with higher level of security*

- *Implement the database connectivity using cloud.*

- *Implement RPC and RMI procedure*

- *Develop own java packages*

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<u>**SEMESTER - IV**</u>

		L	T	P	C
16IT423	**DATABASE SYSTEMS LABORATORY**	**0**	**0**	**3**	**2**

Prerequisite: *No prerequisite needed for enrolling into the course*

Objective(s):

To get hands on experience regarding the application of theoretical concepts learnt in this semester.

List of Experiments:

1.   Implementation of DDL Commands.

2.   Implementation of DML Commands.

3.   Implementation of DCL Commands

4.   Implementing high level programming language extensions.

5.   Programming with database connectivity (With a front end).

6.   Forms.

7.   Triggers.

8.   Integrity in SQL.

9.   Importing/ Exporting data.

10.   Report generation in Visual Basic.

11.   Database design and implementation (application development).

Total : 45 Periods

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

- *Create database with different types of integrity constraints and use the SQL Commands.*

- *Access and manipulate data using PL/SQL blocks.*

- *Implement the programming with data connectivity.*

- *Implement the Importing and exporting of data.*

- *Perform the report generation in visual basic.*

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SEMESTER - IV

	L	T	P	C
16HR463 **CAREER DEVELOPMENT SKILLS III**	0	2	0	0

Prerequisite: *- No prerequisite needed for enrolling into the course*

Objectives:

- *To provide the opportunity for individuals to become acquainted with a wide range of occupational and educational opportunities.*

- *To assist individuals in making appropriate educational and occupational choices.*

UNIT - I   WRITTEN AND ORAL COMMUNICATION   [6]

Reading Comprehension Level 3 - Self Introduction - News Paper Review - Self Marketing - Debate- Structured and Unstructured GDs - Psychometric Assessment – Types & Strategies to answer the questions Practices: Sentence Completion - Sentence Correction - Jumbled Sentences - Synonyms & Antonyms - Using the Same Word as Different Parts of Speech - Interpretation of Pictorial Representations - Editing

UNIT - II   VERBAL & LOGICAL REASONING – PART 2   [6]

Syllogism - Assertion and Reasons - Statements and Assumptions - Identifying Valid Inferences - Identifying Strong Arguments and Weak Arguments - Statements and Conclusions- Cause and Effect - Deriving Conclusions from Passages - Seating Arrangements Practices: Analogies - Blood Relations - Statement & Conclusions

UNIT - III   QUANTITATIVE APTITUDE – PART 3   [6]

Probability - Calendar- Clocks - Logarithms - Permutations and Combinations

UNIT - IV   QUANTITATIVE APTITUDE – PART 4   [6]

Algebra - Linear Equations - Quadratic Equations – Polynomials - Problem on Numbers - Ages - Train - Time and Work - Sudoku – Puzzles

UNIT - V   C LANGUAGE   [6]

Data Types – Operators – Control Statements – Branching and Looping Statements – Arrays – Functions – Storage Class – Structures – Pointers – Files – Practices on Programs and Find Output and Errors.

Total : 30 Periods

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

- *Understand the nuances reading various texts*

- *Perform well in verbal and logical reasoning.*

- *Understand and develop the etiquette necessary to present oneself in a professional setting.*

- *Demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions.*

- *Enhance the comprehension skills in core subjects.*

Reference Books :

1	Aggarwal, R.S. "A Modern Approach to Verbal and Non-verbal Reasoning", Revised Edition 2008, Reprint 2009, S.Chand & Co Ltd., New Delhi.
2	Abhijit Guha, "Quantitative Aptitude", TMH, 3rd Edition.
3	M.B. Lal & Goswami ,"Objective Instant Arithmetic", Upkar Publications.
4	Word Power Made Easy by Norman Lewis W.R. GOYAL Publications
5	Yashavant Kanetkar, "Let us C", Bpb Publications,13th Edition, 2012.

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<u>**SEMESTER - V**</u>

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

16IT511　　　　　　　　**WEB TECHNOLOGY**

Prerequisite: *No prerequisite needed for enrolling into the course*

Objective(s):

* *To know the object oriented programming basics using Java*
* *To train the students to acquire knowledge in Object Oriented application development*
* *To acquire knowledge in concurrent programming in Java*
* *To gain skill to develop simple web applications using Java based technologies*
* *To know the basics of python programming*

UNIT - I　　　JAVA BASICS　　　　　　　　　　　　　　　**[9]**

Introduction to Java - Test-driving a java application - Input / Output and operators - Classes, Objects, Methods and strings - control statements - Methods: A deeper look - Arrays and Array Lists - classed and objects: A deeper look - Inheritance - polymorphism and Interfaces

UNIT - II　　　JAVA GUI, FILE STREAM AND CONCURRENCY　　　**[9]**

Exception handling - swing GUI components - Graphics and Java 2d - Strings, characters and Regular Expressions - File streams and object serialization - Generic collections - Lamdas and Streams - Generic classes and methods - advanced Swing GUI components - concurrency - thread states and life cycles - thread synchronization

UNIT - III　　　HTML AND JAVA SCRIPT　　　　　　　　　　**[9]**

HTML5 - HTML forms - Cascading Style Sheets - java script basics - form validation - java script objects and functions - Dynamic HTML - XML basics - DTD - XML schema - DOM - SAX - XSL - Web Servers - Java script HTML DOM - DOM Events - Modules - Angular Javascript - AJAX – JSON-Boots strap

UNIT - IV　　　JAVA SERVER SIDE PROGRAMMING　　　　　　**[9]**

Servlet Overview - Life cycle of a Servlet - Handling HTTP request and response - Using Cookies - Session tracking - Java Server Pages - Anatomy of JSP - Implicit JSP Objects – Accessing database with JDBC - Java Beans – Advantages

UNIT-V　　　WEB DEVELOPEMNT USING FRAMEWORK　　　　　**[9]**

Strings - Operators - Decisions- Functions - Classes and Objects - Files and Directories - Modules - Text processing - Accessing Databases - Simple web application using python-Hypernet-struts-string

　　　　　　　　　　　　　　　　　　　　　　　　Total : 45 Periods

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

* *Have knowledge on the concepts of Java based implementation of Object Oriented system*
* *Write thread based parallel programs using Java*
* *Develop simple web applications using Java based technologies*
* *Write simple programs using Python language*
* *Design webpages for small organization*

Text Books :

1　　　Paul Deitel and Harvey Deitel, "Java SE 8 for programmers", Pearson Education, 2015

2　　　Harvey Deitel, Abbey Deitel," Internet and World Wide Web How To Program", 5th Edition,Pearson Publication, 2012

Reference Books :

1　　　James Payne, Beginning Python - Using Python 2.6 and 3.1, Wiley India Pvt. Ltd., 2010

2　　　Marty Hall and Larry Brown, ―Core Servlets And Javaserver Pages‖, Second Edition

3　　　Bryan Basham, Kathy Siegra, Bert Bates, ―Head First Servlets and JSP‖, Second Edition

4　　　Uttam K Roy, ―Web Technologies‖, Oxford University Press, 2011.

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SEMESTER - V

		L	T	P	C
16IT512	**DATA WAREHOUSING AND DATA MINING**	3	0	0	3

Prerequisite: Database Technology

Objective(s):

- *To be familiar with the concepts of data warehouse*
- *To know the fundamentals of data mining*
- *To understand the importance of association rule mining*
- *To understand the techniques of classification and clustering*
- *To be aware of the recent trends of data mining*

UNIT - I　　　　DATA WAREHOUSING　　　　　　　　　　　　　　　　[9]

Basic concepts – Data Cube – Multidimensional data model – Schemas for multidimensional models – Online Analytical Processing (OLAP) – Data warehouse design and usage – Data warehouse implementation – Data Generalization by Attribute-Oriented Induction – Big data analytics.

UNIT - II　　　　DATA MINING　　　　　　　　　　　　　　　　　　[9]

Introduction – Data – Types of Data – Data Mining Functionalities – Interestingness of Patterns – Classification of Data Mining Systems – Data Mining Task Primitives – Integration of a Data Mining System with a Data Warehouse – Issues – Data Preprocessing.

UNIT - III　　　　ASSOCIATION RULE MINING AND CLASSIFICATION　　　　[9]

Mining Frequent Patterns, Associations and Correlations – Mining Methods – Mining various Kinds of Association Rules – Correlation Analysis – Constraint Based Association Mining – Classification and Prediction - Basic Concepts - Decision Tree Induction - Bayesian Classification – Rule Based Classification – Classification by Back propagation – Support Vector Machines - Other Classification Methods-Facsimile extraction classification.

UNIT - IV　　　　CLUSTERING AND OUTLIER ANALYSIS　　　　　　　　[9]

Cluster Analysis - Types of Data – Categorization of Major Clustering Methods – K-means– 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　　　　WEBMINING TRENDS　　　　　　　　　　　　　　[9]

Web mining-retrieval-Text mining- Sentiment analysis- Descriptive Mining of Complex Data Objects – Spatial Databases – Multimedia Databases– Time Series and Sequence Data – Text Data bases – World Wide Web – Applications and Trends in Data Mining. Case studies involving classification and clustering.

Total : 45 Periods

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

- *Explain the basic concept of data warehousing and multidimensional model.*
- *Discuss the fundamentals of data mining and preprocessing*
- *Develop association rule mining and classification algorithms*
- *Apply different clustering and outlier detection techniques*
- *Apply different clustering and outlier detection techniques*

Text Books :

1　　Jiawei Han and MichelineKamber, "Data Mining Concepts and Techniques",Third Edition, Elsevier, 2012.

2　　Alex Berson and Stephen J. Smith, "Data Warehousing, Data Mining & OLAP", Tata McGraw – Hill Edition, Thirteenth Reprint 2008.

Reference Books :

1　　Pang-Ning Tan, Michael Steinbach and Vipin Kumar, " Introduction to Data Mining", Addison-Wesley, 2013.

2　　K.P. Soman, ShyamDiwakar and V. Ajay, "Insight into Data mining Theory and Practice", Easter Economy Edition, Prentice Hall of India, 2006.

3　　G. K. Gupta, "Introduction to Data Mining with Case Studies", Easter Economy Edition, Prentice Hall of India, 2006.

4　　Margaret H. Dunham, "Data Mining: Introductory and Advanced Topics", Prentice Hall of India, 2006.

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<u>**SEMESTER - V**</u>

16IT513	PRINCIPLES OF EMBEDDED SYSTEM	L	T	P	C
		3	1	0	4

Prerequisite: *No prerequisite needed for enrolling into the course*

Objective(s):

- *To learn the internal architecture of an embedded processor including timers and interrupts*
- *To quantize the core specifications of an embedded processor*
- *To introduce interfacing I/O devices to the processor*
- *To learn programming an embedded processor*
- *To run and debug programs in an IDE*

UNIT - I   8-BIT EMBEDDED PROCESSOR   [12]

8051 Microcontroller – Architecture, Instruction set and programming. Programming parallel ports, Timers and serial port – Memory system mechanisms – Memory and I/O devices and interfacing – Interrupt handling.

UNIT - II   EMBEDDED C PROGRAMMING   [12]

Programming embedded systems in C – Implementing Timers, Interrupts and Serial communication in embedded C- Multi-state systems

UNIT - III   LOW-POWER EMBEDDED PROCESSORS   [12]

ARM7 TDMI processing core - instruction sets and programming – Intel ATOM/Quark Processor – Architecture – Programming- Advanced Low Power Processors - Introduction to IoT

UNIT - IV   RTOS   [12]

Multiple tasks and processes – Context switching – Scheduling policies – Interprocess communication mechanisms – Performance issues - Need for RTOS - Introduction to µC/OS II

UNIT-V   EMBEDDED SYSTEM DEVELOPMENT   [12]

Embedded software development tools – Emulators and debuggers. Challenges of Embedded Systems – Embedded system design process - Design issues – Design methodologies – Case studies – Complete design of example embedded systems.

Total (L: 45 T:15) = 60 Periods

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

- *Design a simple embedded application*
- *Compare various embedded processors*
- *Design and deploy timers and interrupts*
- *Design an embedded processor based system for a real-time application*
- *Run and debug programs in an IDE*

Text Books :

1   Muhammed Ali Mazidi, Janice Gillispie Mazidi and Rolin D. Mc Kinlay, ―The 8051.
2   Microcontroller and Embedded Systems‖, Pearson Education, Second edition, 2007

Reference Books :

1   Michael J. Pont, ―Embedded C‖, Pearson Education , 2007.
2   Steve Heath, ―Embedded System Design‖ , Elsevier, 2005
3   Andrew N Sloss, D. Symes, C. Wright, ‖ Arm system developers guide‖, Morgan Kauffman/ Elsevier, 2006.
4   Arshdeep Bahga, Vijay Madisetti, " Internet of Things: A Hands-on-Approach" VPT First Edition, 2014.

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SEMESTER - V

16IT514	ARTIFICIAL INTELLIGENCE	L	T	P	C
		3	0	0	3

Prerequisite: *No prerequisite needed for enrolling into the course*

Objective(s):

- *To learn the basics of designing intelligent agents.*
- *To solve general purpose problems*
- *To learn logical reasoning of intelligence*
- *To understand the planning issues with respect real world.*
- *To learn from experiences and communicate with other Agents*

UNIT - I   FUNDAMENTALS OF ARTIFICIAL INTELLIGENCE   [9]

Intelligent Agents – Agents and environments - Good behavior – The nature of environments – structure of agents - Problem Solving - problem solving agents – example problems – searching for solutions – uniformed search strategies - avoiding repeated states – searching with partial information

UNIT - II   SEARCHING TECHNIQUES   [9]

Informed search and exploration – Informed search strategies – heuristic function – local search algorithms and optimistic problems – Constraint Satisfaction Problems (CSP) – Backtracking search – Structure of problems - Adversarial Search – Games – Optimal decisions in games – Alpha – Beta Pruning

UNIT - III   LOGICAL REASONING   [9]

First order logic – representation revisited – Syntax and semantics for first order logic – Using first order logic – Knowledge engineering in first order logic - Inference in First order logic – prepositional versus first order logic – unification and lifting – forward chaining – backward chaining - Resolution - Knowledge representation

UNIT - IV   PLANNING   [9]

The Planning Problem-Planning with state-space search – partial-order planning – planning graphs – planning and acting in the real world :Time schedules and resources-planning and acting in non deterministic Domain-Conditional Planning-Execution monitoring and replanning-continuous planning and multi agent planning

UNIT-V   LEARNING AND COMMUNICATIONS   [9]

Learning from observation - Inductive learning – Decision trees – Explanation based learning Communication – Communication as action – Formal grammar for a fragment of English –Syntactic analysis – Augmented grammars – Semantic interpretation – Ambiguity and disambiguation – Discourse understanding – Grammar induction

Total : 45 Periods

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

- *Gain the knowledge about intelligent agent*
- *Understanding optimistic problems of csp*
- *Describe about 1st order logic and syntax –semantics*
- *Obtain the knowledge about planning problems,*
- *Understand the basic concepts of learning and communication*

Text Books :

1   S. Russel and P. Norvig, "Artificial Intelligence – A Modern Approach", Third Edition, Pearson Education, 2010

2   Michael Huth and Mark Ryan," Logic in Computer Science: Modelling and Reasoning about Systems", Cambridge University Press, Second edition, 2004.

Reference Books :

1   Elaine Rich and Kevin Knight and Shivashankar B.Nair, "Artificial Intelligence", 2nd Edition, Tata McGraw-Hill, 2009

2   David Poole, Alan Mackworth, Randy Goebel, "Computational Intelligence : a logical approach", Oxford University Press, 2004

3   G. Luger, "Artificial Intelligence: Structures and Strategies for complex problem solving", Fourth Edition, Pearson Education, 2002

4   Nils J. Nilsson, "Artificial Intelligence: A new Synthesis", Harcourt Asia Pvt. Ltd., 2000

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<u>**SEMESTER - V**</u>

16IT515	THEORY OF COMPUTATION	L	T	P	C
		3	1	0	4

Prerequisite: Discrete Mathematics
Objective(s):
- *To be familiar with regular languages*
- *To learn about grammars and normal forms*
- *To know about pushdown automata and context free languages*
- *To understand the power of Turing Machines*
- *To be aware of Decidability and Un-decidability of various problems.*

UNIT - I   REGULAR LANGUAGES   [12]
Finite Automata (FA) – Deterministic Finite Automata (DFA) – Non-deterministic Finite Automata (NFA) – Finite Automata with Epsilon transitions - Regular Expression – FA and Regular Expressions – Pumping lemma for Regular languages - Equivalence and minimization of Finite Automata.

UNIT - II   GRAMMARS   [12]
Grammar Introduction– Types of Grammar - Context Free Grammars and Languages– Derivations and Languages – Ambiguity- Relationship between derivation and derivation trees – Simplification of CFG – Elimination of Useless symbols - Unit productions - Null productions – Greiback Normal form – Chomsky normal form – Problems related to CNF and GNF

UNIT - III   PUSHDOWN AUTOMATA   [12]
Pushdown Automata- Definitions – Moves – Instantaneous descriptions – Deterministic pushdown automata – Equivalence of Pushdown automata and CFL - pumping lemma for CFL – problems based on pumping Lemma.

UNIT - IV   CLOSURE PROPERTIES AND TURING MACHINES   [12]
Closure properties of Regular Sets: Complement and Intersection – Closure properties of CFL: Union, Concatenation, Kleene Closure, Intersection and Complement – Turing Machines – Language of a Turing machine – Turing machine as a computing device - Various techniques for construction of TMs – Equivalence of one tape and multi-tape Turing machines.

UNIT - V   UNDECIDABILITY   [12]
A language that is not Recursively Enumerable (RE) – An undecidable problem that is RE – Undecidable problems about Turing Machine – Rice theorem for Recursive and Recursively enumerable languages – Post's Correspondence Problem

Total (L: 45 T: 15) = 60 Periods

Course Outcomes: On completion of this course, the student will be able to
- *Design finite automata for the given regular expression*
- *Solve problems related to context free grammar*
- *Design push down automata for the context free language*
- *Construct Turing machine for the computational problems*
- *Explain the Decidability or undecidability of various problems*

Text Books :
1 Hopcroft J.E., Motwani R. and Ullman J.D, "Introduction to Automata Theory, Languages and Computations", Second Edition, Pearson Education, 2008.
2 John C Martin, "Introduction to Languages and the Theory of Computation", Tata McGraw Hill Publishing Company, New Delhi, Third Edition, 2007.

Reference Books :
1 Mishra K L P and Chandrasekaran N, "Theory of Computer Science - Automata, Languages and Computation", Third Edition, Prentice Hall of India, 2004.
2 Harry R Lewis and Christos H Papadimitriou, "Elements of the Theory of Computation", Second Edition, Prentice Hall of India, Pearson Education, New Delhi, 2003.
3 Peter Linz, "An Introduction to Formal Language and Automata", Third Edition, Narosa Publishers, New Delhi, 2002.
4 Kamala Krithivasan and Rama. R, "Introduction to Formal Languages, Automata Theory and Computation", Pearson Education 2009.

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<u>**SEMESTER - V**</u>

		L	T	P	C
16IT521	**WEB TECHNOLOGY LABORATORY**	0	0	3	2

Prerequisite: *IT Essentials*
Objective(s):

- *To learn about web technologies related concepts*

- *To develop Java and HTML based web applications*

- *To implement parsers and XML related concepts*

- *To implement database connectivity*

- *To know about python programming*

List of Experiments:

1. Creating simple applications using JAVA by exploring all the object oriented programming concepts such as inheritance, polymorphism, interfaces and packages.

2. Creating GUI based application using JAVA Swings

3. Developing concurrent and generic programming using Threads

4. Creation of simple websites using HTML 5 Tags

5. Creation of web forms and validating it through javascripts

6. Creation of XML file and validating with DTD and XML schema

7. Working with DOM and SAX parsers

8. Creation of AJAX based application

9. Developing JSON application

10. Creation of dynamic HTML based web applications

11. Creation of servlet based web application with JDBC

12. Developing JSP application

13. Creating simple applications using python

14. Simple database and web application using python

Total : 45 Periods

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

- *Learn about web technologies related concepts*

- *Develop java and html based web applications*

- *Implement parsers and xml related concepts*

- * Implement database connectivity*

- *Implement python programming*

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<u>**SEMESTER - V**</u>

		L	**T**	**P**	**C**
16IT522	**DATA MINING LABORATORY**	**0**	**0**	**3**	**2**

Prerequisite: *Database Technology Laboratory*

Objective(s):

- *To implement various classification algorithms*

- *To be familiar with clustering algorithms*

- *To obtain hands-on experience with WEKA data mining tool*

- *To be acquainted with the techniques used for Knowledge Discovery in Databases.*

- *To be exposed to text mining and web mining*

List of Experiments:

1. Design a data warehouse using star, snowflake and fact constellation schema.

2. Implement Apriori algorithm for association rule.

3. Implement classification using K nearest neighbor classification.

4. Implement decision tree based algorithm for classification.

5. Implement Bayesian classification algorithm.

6. Implement k-means algorithm using clustering.

7. Exploring the Weka machine learning toolkit.

8. Performing data preprocessing tasks for data mining in Weka.

9. Perform classification using WEKA

10. Perform clustering using WEKA

11. A small case study involving all stages of KDD.

Total : 45 Periods

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

- *Build data warehouse*

- *Apply Apriori algorithm*

- *Construct classification algorithms*

- *Build clustering algorithm*

- *Apply WEKA tool for data mining process*

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SEMESTER - V__

	L	**T**	**P**	**C**
16IT523 **APP DEVELOPMENT LABORATORY**	0	0	3	2

Prerequisite: *Java Programming*

Objective(s):

* *To know the components and structure of mobile application development frameworks for Android and windows OS based mobiles.*

* *To understand how to work with various mobile application development frameworks.*

* *To learn the basic and important design concepts and issues of development of mobile applications.*

* *To understand the capabilities and limitations of mobile devices.*

List of Experiments:

1.   Develop an application that uses GUI components, Font and Colours.

2.   Develop an application that uses Layout Managers and event listeners.

3.   Develop a native calculator application.

4.   Write an application that draws basic graphical primitives on the screen.

5.   Develop an application that makes use of database.

6.   Develop an application that makes use of RSS Feed.

7.   Implement an application that implements Multi threading

8.   Develop a native application that uses GPS location information.

9.   Implement an application that writes data to the SD card.

10.   Implement an application that creates an alert upon receiving a message.

11.   Write a mobile application that creates alarm clock .

Total : 45 Periods

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

* *Design and Implement various mobile applications using emulators.*

* *Deploy applications to hand-held devices*

* *Develop application with database connectivity*

* *Implement multithread concept*

* *Develop real time alert system*

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SEMESTER - V

		L	T	P	C
16HR564	**CAREER DEVELOPMENT SKILLS IV**	0	0	2	0

Prerequisite: *No prerequisite needed for enrolling into the course*

Objectives:

- *To help individuals in retaining valued students as they get to know about their skills and competencies and future aspirations as well*

- *To help individuals develop a realistic understanding of themselves in regard to decision making and career alternatives.*

UNIT - I   **Written and Oral Communication – Part 2**   **[6]**

Self Introduction – GD - Personal Interview Skills Practices on Reading Comprehension Level 2 – Paragraph Writing - News paper and Book Review Writing - Skimming and Scanning – Interpretation of Pictorial Representations - Sentence Completion - Sentence Correction - Jumbled Sentences - Synonyms & Antonyms - Using the Same Word as Different Parts of Speech – Editing.

UNIT - II   **Quantitative Aptitude - Part – 5**   **[6]**

Geometry - Straight Line – Triangles – Quadrilaterals – Circles – Co-ordinate Geometry – Cube – Cone – Sphere.

UNIT - III   **Data Interpretation and Analysis**   **[6]**

Data Interpretation based on Text – Data Interpretation based on Graphs and Tables. Graphs can be Column Graphs, Bar Graphs, Line Charts, Pie Chart, Graphs representing Area, Venn Diagram & Flow Charts.

UNIT - IV   **Resume writing & Presentation skills**   **[6]**

An Introduction to the Resume - Types of Resumes - Common Resume Errors - Anatomy of a Resume - What Is a Cover Letter? - Types of Cover Letters - Enhancing the Language and Style of Your Resume and Cover Letter - Assessment

Presentation Skills: Oral presentation and public speaking skills; business presentations. - Understand The Situation - Know Your Tools - Know Yourself - Organize It, Write the Script – Practice - Delivering a Presentation.

UNIT - V   **Department Technical Papers**   **[6]**

Data Structure- -Operating System-Database Technology-Computer Architecture-Computer Networks

         Total :30 Periods

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

- *Perform well in interview type situation*
- *Understand the quantitative aptitude problems in geometry.*
- *Understand the data interpretation and analysis by using various graphs.*
- *Enhance skills in resume writing and presentation*
- *Derive solution to various OS, Database, Architecture and Network based problems*

Reference Books :

1	Aggarwal, R.S. "A Modern Approach to Verbal and Non-verbal Reasoning", Revised Edition 2008, Reprint 2009, S.Chand & Co Ltd., New Delhi.
2	Abhijit Guha, "Quantitative Aptitude", TMH, 3 edition
3	Objective Instant Arithmetic by M.B. Lal & Goswami Upkar Publications.
4	Word Power Made Easy by Norman Lewis W.R. GOYAL Publications

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<u>**SEMESTER -VI**</u>

16IT611	BIG DATA AND ANALYTICS	L	T	P	C
		3	0	0	3

Prerequisite: *Data mining*

Objective(s):

- *To be exposed to big data*
- *To learn the different ways of Data Analysis*
- *To be familiar with data streams*
- *To learn the mining and clustering*
- *To be familiar with the visualization*

UNIT - I   INTRODUCTION TO BIG DATA   [9]

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

UNIT - II   DATA ANALYSIS   [9]

Regression modeling, Multivariate analysis, Bayesian modeling, inference and Bayesian networks, Support vector and kernel methods, Analysis of time series: linear systems analysis, nonlinear dynamics - Rule induction - Neural networks: learning and generalization, competitive learning, principal component analysis and neural networks; Fuzzy logic: extracting fuzzy models from data, fuzzy decision trees, Stochastic search methods.

UNIT - III   MINING DATA STREAMS   [9]

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

UNIT - IV   FREQUENT ITEMSETS AND CLUSTERING   [9]

Mining Frequent itemsets - Market based model – Apriori Algorithm – Handling large data sets in Main memory – Limited Pass algorithm – Counting frequent itemsets in a stream – Clustering Techniques – Hierarchical – K- Means – Clustering high dimensional data – CLIQUE and PROCLUS – Frequent pattern based clustering methods – Clustering in non-euclidean space – Clustering for streams and Parallelism.

UNIT - V   FRAMEWORKS AND VISUALIZATION   [9]

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

Total :45 Periods

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

- *Apply the statistical analysis methods.*
- *Compare and contrast various soft computing frameworks.*
- *Design distributed file systems.*
- *Apply Stream data model.*
- *Use Visualization techniques*

Text Books :

1   Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer, 2007

2   Anand Rajaraman and Jeffrey David Ullman, Mining of Massive Datasets, Cambridge University Press, 2012.

Reference Books :

1   Bill Franks, Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with advanced analystics, John Wiley & sons, 2012.

2   Glenn J. Myatt, Making Sense of Data, John Wiley & Sons, 2007 Pete Warden, Big Data Glossary, O"Reilly, 2011.

3   Jiawei Han, Micheline Kamber "Data Mining Concepts and Techniques", Second Edition, Elsevier, Reprinted 2008..

4   Vincent Granville, Developing Analytic Talent: Becoming a Data Scientist, wiley, 2014.

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SEMESTER - VI				

		L	T	P	C
16IT612	**DISTRIBUTED SYSTEMS**	3	0	0	3

Prerequisite: *Operating System*

Objective(s):

- *To layout foundations of Distributed Systems.*
- *To introduce the idea of middleware and related issues.*
- *To understand in detail the system level and support required.*
- *To understand the issues involves in studying data and design distributed algorithms.*
- *To understand the security techniques*

UNIT - I   INTRODUCTION   [9]

Introduction – Examples of distributed systems–Challenges-Architectural models- Fundamental models - Introduction to inter-Process communications-External data representation and marshalling- multicast communication – Case study: MPI.

UNIT - II   DISTRIBUTED OBJECTS AND FILE SYSTEM   [9]

Introduction - Communication between distributed objects –Request Reply Protocols – Remote procedure call –Remote Method Invocation - Java RMI case Study - Introduction to DFS - File service architecture - Sun network file system - Introduction to Name Services- Name services and DNS - Directory services.

UNIT - III   DISTRIBUTED OPERATING SYSTEM SUPPORT   [9]

The operating system layer – Protection - Process and threads - Communication and invocation - Operating system architecture - Introduction to time and global states - Clocks, Events and Process states - Synchronizing physical clocks - Logical time and logical clocks - Global states - Distributed debugging – Distributed mutual exclusion.

UNIT - IV   TRANSACTION AND CONCURRENCY CONTROL   [9]

Transactions – Nested transaction – Locks - Optimistic concurrency control - Timestamp ordering - Comparison of methods for concurrency control - Introduction to distributed transactions - Flat and nested distributed transactions - Atomic commit protocols - Concurrency control in distributed transactions - Distributed deadlocks - Transaction recovery.

UNIT-V   PARALLEL PROGRAM DEVELOPMENT   [9]

Case studies - n-Body solvers – Tree Search – OpenMP and MPI implementations and comparison

Total : 45 Periods

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

- *Lay foundations of distributed systems*
- *Understand bout distributed object protocol*
- *Know about distributed system clock*
- *Understand about transaction and concurrency control*
- *Describe the security and robust of distributed system*

Text Books :

1   George Coulouris, Jean Dollimore, Tim Kindberg, "Distributed Systems Concepts and Design" Fifth Edition , Addison- Wesley, 2012.

2   A.S.Tanenbaum, M.Van Steen, "Distributed Systems", Pearson Education, 2004.

Reference Books :

1   Peter S. Pacheco, "An Introduction to Parallel Programming", Morgan-Kauffman/Elsevier, 2011.

2   M.L.Liu, "Distributed Computing Principles and Applications", Pearson AddisonWesley, 2004.

3   Nancy A. Lynch, "Distributed Algorithms", Morgan Kaufmann Publishers, 2000

4   Ajay D. Kshemkalyani and Mukesh Singhal, "Distributed computing: principles, algorithms, and Systems", Cambridge University Press, 2008.

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<u>**SEMESTER - VI**</u>

16IT613	**CRYPTOGRAPHY AND NETWORK SECURITY**	L	T	P	C
		3	1	0	4

Prerequisite: *Computer Organization and Architecture, Data Structures ,Discrete Mathematics*
Objective(s):

- *To understand OSI security architecture and classical encryption techniques.*
- *To understand fundamental concepts of finite fields and number theory .*
- *To acquire knowledge on encryption techniques, design principles and modes of operation.*
- *To describe the principles of public key cryptosystems, hash functions and digital signature.*
- *To provide basic concept about system security and attacks.*

UNIT - I   INTRODUCTION AND NUMBER THEORY   **[12]**

The OSI security architecture-Services, Mechanisms and attacks – Network security model – Classical Encryption techniques: Symmetric cipher model - substitution techniques - transposition techniques. Number Theory: Polynomial Arithmetic –Prime numbers-Fermat's and Euler's theorem-Testing for Primality -The Chinese remainder theorem.

UNIT - II   BLOCK CIPHERS   **[12]**

Block cipher principles–Data Encryption Standard–Advanced Encryption Standard (AES)–Block cipher modes of operation–Triple DES–Blowfish– RC5Algorithm.

UNIT - III   PUBLIC KEY CRYPTOGRAPHY   **[12]**

Principles of public key cryptosystems–The RSA algorithm–Key management –Diffie Hellman Key exchange–Elliptic curve arithmetic –Elliptic curve cryptography.

UNIT - IV   HASH FUNCTIONS AND DIGITAL SIGNATURES   **[12]**

Hash functions–Hash Algorithms: MD5–Secure Hash Algorithm–Authentication functions–Message authentication codes–Digital Signatures: Authentication protocols–Digital signature standard.

UNIT - V   SECURITY PRACTICE & SYSTEM SECURITY   **[12]**

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

Total (L: 45 T: 15) = 60 Periods

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

- *Compare various Cryptographic Techniques*
- *Construction of security within the software design*
- *Design Secure applications*
- *Making the data transmission security by the process of Authentication*
- *Evaluation of security among the systems by making the firewall and security standards efficient*

Text Books :

1   William Stallings, "Cryptography and Network Security", Pearson Education,New Delhi, Sixth Edition,2013.

2   Behrouz A Forouzan , "Cryptography and Network Security", Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2007.

Reference Books :

1   AtulKahate,"Cryptography and Network Security", McGraw Hill Education India Pvt Ltd, Second Edition, 2009.

2   Charlie Kaufman, Radia Perlman, Mike Speciner, "Network security", Prentice Hall of India, 2002.

3   CharlesPfleeger, "Security in computing", Prentice Hall of India, Fourth Edition, 2006.

4   UlysessBlack, "Internet Security Protocols", Pearson Education Asia, 2000.

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SEMESTER - VI

16IT614	PRINCIPLES OF COMPILER DESIGN	L	T	P	C
		3	0	0	3

Prerequisite: Theory of Computation
Objective(s):
- *To understand, design and implement a lexical analyzer.*
- *To understand, design and implement a parser.*
- *To know about run time environment.*
- *To understand code generation*
- *To know the importance of code optimization schemes.*

UNIT - I   NOTION AND CONCEPTS   [9]
Compiler: Introduction – Analysis of the source program – phases of a compiler–Compiler construction tools-Lexical analysis – Role of the lexical analyzer – Input buffering –Specification of tokens –Recognition of tokens Design aspect of Lexical Analyzer.

UNIT - II   SYNTAX ANALYSIS   [9]
Syntax Analysis: Role of the parser –Context free grammars–Top-down parsing: shift reduce- predictive parsing; Bottom-up parsing: Operator precedence–LR parsers (SLR, Canonical LR,LALR) - Parser generators - Design aspects of Parser.

UNIT - III   SYNTAX DIRECTED TRANSLATION & RUN TIME ENVIRONMENT   [9]
Syntax directed Definitions-Construction of Syntax Tree-Bottom-up Evaluation of S-Attribute Definitions- Design of predictive translator - Type Systems-Specification of a simple type checker-Equivalence of Type Expressions-Type Conversions. RUN-TIME ENVIRONMENT: Source Language Issues-Storage Organization-Storage Allocation-Parameter Passing-Symbol Tables-Dynamic Storage Allocation-Storage Allocation in FORTAN.

UNIT - IV   CODE GENERATION   [9]
Issues in code generation – Basic blocks - Flow graphs – DAG representation of basic blocks - Target machine description - Register allocation and Assignment - Simple code generator – Code generation from labeled tree – Concept of code generator.

UNIT - V   CODE OPTIMIZATION   [9]
Need for Optimization - Local, global and loop optimization - Optimizing transformations - Compile time evaluation, Common sub-expression elimination, Variable propagation, Code movement, Strength reduction, Dead code elimination, DAG based local optimization - Peephole optimization - Introduction to global data flow analysis - Data flow equations and iterative data flow analysis.

Total: 45 Periods

Course Outcomes: On completion of this course, the student will be able to
- *Recognize the various phases of compiler and the grammar for the generated tokens*
- *Apply top down and bottom up parsing techniques*
- *Analyze the function of syntax directed translation*
- *Investigate the issues in the design of code generator*
- *Apply the various optimization techniques*

Text Books :
1   Alfred V Aho, Monica S. Lam, Ravi Sethi and Jeffrey D Ullman, "Compilers – Principles, Techniques and Tools", 2nd Edition, Pearson Education, 2007.
2   Grune, D., van Reeuwijk, K., Bal, H.E., Jacobs, C.J.H., Langendoen K, "Modern Compiler Design", Springer-Verlag New York, Second Edition, 2012.

Reference Books :
1   Raghavan V, "Principles of Compiler Design", Tata McGraw-Hill, New Delhi, 2009.
2   Allen I. Holub, "Compiler Design in C", Prentice Hall of India, 2008.
3   C. N. Fischer and R. J. LeBlanc, "Crafting a compiler with C", Benjamin Cummings, 2003.
4   K Muneeswaran, "Compiler Design", Oxford University press, 2012.

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<u>**SEMESTER - VI**</u>

		L	T	P	C
16IT621	**BIG DATA AND ANALYTICS LABORATORY**	0	0	3	2

Prerequisite: *C Language, Data mining, Web Technology and Database laboratory*

Objective(s):

- *To understand setting up of Hadoop Cluster*

- *To solve problems using Map Reduce Technique*

- *To solve Big Data problems*

- *To work with NoSQL*

- *To work with mahout library*

List of Experiments:

1. Set up a pseudo-distributed, single-node Hadoop cluster backed by the Hadoop Distributed File System, running on Ubuntu Linux. After successful installation on one node, configuration of a multi-node Hadoop cluster(one master and multiple slaves).

2. MapReduce application for word counting on Hadoop cluster

3. Unstructured data into NoSQL data and do all operations such as NoSQL query with API.

4. K-means clustering using map reduce

5. Page Rank Computation

6. Mahout machine learning library to facilitate the knowledge build up in big data analysis.

7. Application of Recommendation Systems using Hadoop/mahout libraries

Total : 45 Periods

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

- *Set up multi-node Hadoop Clusters*

- *Apply Map Reduce algorithms for various algorithms*

- *Design new algorithms that uses Map Reduce to apply on Unstructured and structured data*

- *Perform operation with NoSQL*

- *Perform operation with mahout library*

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SEMESTER - VI

		L	T	P	C
16IT622	**COMPILER DESIGN LABORATORY**	0	0	3	2

Prerequisite: *Data Structures ,Theory of Computation*

Objective(s):

* *To be exposed to compiler writing tools.*
* *To implement the different Phases of compiler*
* *To be familiar with control flow and data flow analysis*

List of Experiments:

1. Implementation of Symbol Table

2. Develop a lexical analyzer to recognize a few patterns in C. (Ex. identifiers, constants, comments, operators etc.)

3. Implementation of Lexical Analyzer using Lex Tool

4. Generate YACC specification for a few syntactic categories.

a)   Program to recognize a valid arithmetic expression that usesoperator +, - , * and /.

   b)Program to recognize a valid variable which starts with a letter followed by any number of letters or digit

   c)Implementation of Calculator using LEX and YACC

5. Convert the BNF rules into Yacc form and write code to generate Abstract Syntax Tree.

6. Implement type checking

7. Implement control flow analysis and Data flow Analysis

8. Implement any one storage allocation strategies(Heap,Stack,Static)

9. Construction of DAG

10. Implement the back end of the compiler which takes the three address code and produces the 8086 assembly language instructions that can be assembled and run using a 8086 assembler. The target assembly instructions can be simple move, add, sub, jump. Also simple addressing modes are used.

11. Implementation of Simple Code Optimization Techniques (Constant Folding., etc.)

Total : 45 Periods

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

* *Implement the different Phases of compiler using tools*
* *Analyze the control flow and data flow of a typical program*
* *Optimize a given program*
* *Generate an assembly language program equivalent to a source language program*
* *Learn simple optimization techniques*

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SEMESTER - VI

		L	T	P	C
16HR665	**CAREER DEVELOPMENT SKILLS V**	0	0	2	0

Prerequisite: - No prerequisite needed for enrolling into the course

Objectives:

- To assist individuals in making appropriate educational and occupational choices.
- To discuss the importance of using effective action words, keywords, and positioning for a resume, describe how to showcase one's professional skill sets in a cover letter, and perform these tasks.

UNIT - I   WORLD OF TEAMS   [6]

Self Enhancement – Importance of developing assertive skills – developing self confidence – developing emotional intelligence, Importance of Teamwork – Team Vs Group – Attributes of a Successful team – Barriers involved, Working with groups – Dealing with people –Group Decision Making

UNIT – II   INTERVIEW,GD & PRESENTATION SKILLS   [6]

Interview handling skills – self preparation checklist – Grooming tips: do's and don'ts – mock interview & feedback,GD Skills – understanding the objective and skills tested in a GD – General types of GD – Roles in a GD - do's and don'ts –Mock GD & Feedback - Practice

UNIT – III   RESUME WRITING   [6]

Introduction to the Resume - Types of Resumes - The Chronological Resume - The Functional Resume - The Combination Resume - Curricula Vitae - Preparing to Write Your Resume - Common Resume Errors – Presentation - Professional Objective and Education Section – Experience / Fresher - Skills Section - Honors and Awards - Activities and Interests - Polishing Your Resume - Cover Letters

UNIT – IV   BUSINESS ETIQUETTE AND ETHICS   [6]

Grooming Etiquette – Telephone & Email Etiquette – Dining Etiquette - do's and don't's in formal setting – How to Impress .Ethics – Importance of ethics and Value – choice and dilemmas faced – Discussion form news headlines

UNIT – V   DEPARTMENT TECHNICAL PAPER   [6]

Web Technology-Data Mining-Compiler Design-Theory of Computation-Network Secuity.

Total : 30 Periods

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

- *Enhance the team spirit and work in a team effectively.*
- *Organize better and perform well in HR interview.*
- *Tailor own resume according to job needs .*
- *Understand Business etiquette and work globally.*
- *Find solutions to computational, web, security and data mining problems*

Reference Books :

1   Aggarwal, R.S. "A Modern Approach to Verbal and Non-verbal Reasoning", Revised Edition 2008, Reprint   2009, S.Chand & Co Ltd., New Delhi.

2   Abhijit Guha, "Quantitative Aptitude", TMH, 3 edition

3   Objective Instant Arithmetic by M.B. Lal & Goswami Upkar Publications.

4   Word Power Made Easy by Norman Lewis W.R. GOYAL Publications

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SEMESTER - VII

16HS751	PROFESSIONAL ETHICS (Common To All Branches)	L	T	P	C
		3	0	0	3

Prerequisite: *No prerequisite needed for enrolling into the course*

Objective(s):

- *To enable the student to understand the ethical principles and practices to resolve the ethical conflict Situations that arise in their professional lives.*

UNIT - I   ENGINEERING ETHICS   [9]

Senses of 'Engineering Ethics' - Variety of Moral Issued - Types of Inquiry - Moral dilemmas - Moral autonomy - Kohlberg's theory - Gilligan's theory - Consensus and Controversy - Models of Professional roles – Professional Ideals and Virtues- Uses of Ethical Theories.

UNIT - II   ENGINEERING AS SOCIAL EXPERIMENTATION   [9]

Engineering as Experimentation - Engineers as responsible Experimenters - Codes of Ethics –Industrial standards- Balanced Outlook on Law - The Challenger Case Study.

UNIT - III   ENGINEER'S RESPONSIBILITY FOR SAFETY   [9]

Safety and Risk - Assessment of Safety and Risk - Risk Benefit Analysis - Reducing Risk – Liability - The Chernobyl and Bhopal Case Studies.

UNIT - IV   RESPONSIBILITIES AND RIGHTS   [9]

Collegiality and Loyalty - Respect for Authority - Collective Bargaining - Confidentiality - Conflicts of Interest - Occupational Crime - Professional Rights - Employee Rights - Intellectual Property Rights (IPR) - Discrimination.

UNIT-V   GLOBAL ISSUES   [9]

Multinational Corporations - Environmental Ethics - Computer Ethics - Weapons Development - Engineers as Managers- Consulting Engineers-Engineers as Expert Witnesses and Advisors –Honest- Moral Leadership-Sample Code of Conduct.

Total : 45 Periods

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

- *Understand basic perception of ethics, moral and values*
- *Aware of the current industrial standards*
- *Identify and assess the risk and safety benefit in industry*
- *Aware of professional rights and responsibility of an engineers*
- *Acquire knowledge in global issues and able to apply in ethical principles in professional life.*

Text Books :

1   Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw-Hill, 3rd edition, New York, 2014..

2   Dr.K.R.govindan and S.Senthilkumar, "Professional Ethics", Anuradha Agencies, Revised Edition, Chennai, 224.

Reference Books :

1   Govindarajan M, Natarajan S, Senthil Kumar V. S, "Engineering Ethics", Prentice Hall of India,2nd edition, New Delhi, 2012

2   Charles D. Fleddermann, "Engineering Ethics", Pearson Education / Prentice Hall, New Jersey,4th edition, 2009

3   Charles E Harris, Michael S. Protchard and Michael J Rabins, "Engineering Ethics - Concepts and Cases", Thompson Learning,4th edition, 2011

4   John R Boatright, "Ethics and the Conduct of Business", Pearson Education,5th edition, New Delhi, 2009.

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SEMESTER - VII

16IT712	CLOUD COMPUTING	L	T	P	C
		3	0	0	3

Prerequisite: *Operating System, Computer Network and Web Technology*
Objective(s):

- *To understand how Grid computing helps in solving large scale scientific problems.*
- *To gain knowledge on the concept of virtualization that is fundamental to cloud computing.*
- *To learn programming skill the grid and the cloud.*
- *To understand the security issues in the grid and the cloud environment.*
- *To understand various security measures in cloud and grid environment*

UNIT - I   INTRODUCTION   [9]
Evolution of Distributed computing: Scalable computing over the Internet – Technologies for network based systems - Good behavior – clusters of cooperative computers – Grid computing Infrastructures- cloud computing – service oriented architecture–Introduction to Grid Architecture and standards –Elements of Grid – Overview of Grid Architecture

UNIT - II   GRID SERVICES   [9]
Introduction to Open Grid Services Architecture (OGSA) – Motivation – Functionality Requirements – Practical & Detailed view of OGSA/OGSI – Data intensive grid service models – OGSA services.

UNIT - III   VIRTUALIZATION   [9]
Cloud deployment models: public, private, hybrid, community – Categories of cloud computing: Everything as a service: Infrastructure, platform, software – Pros and Cons of cloud computing – Implementation levels of virtualization – virtualization structure – virtualization of CPU, Memory and I/O devices – virtual clusters and Resource Management – Virtualization for data center automation.

UNIT - IV   PROGRAMMING MODEL   [9]
Open source grid middleware packages – Globus Toolkit (GT4) Architecture , Configuration – Usage of Globus – Main components and Programming model – Introduction to Hadoop Framework – Mapreduce, Input splitting, map and reduce functions, specifying input and output parameters, configuring and running a job – Design of Hadoop file system, HDFS concepts, command line and java interface, dataflow of File read & File write.

UNIT-V   SECURITY   [9]
Trust models for Grid security environment – Authentication and Authorization methods – Grid security infrastructure – Cloud Infrastructure security: network, host and application level – aspects of data security, provider data and its security, Identity and access management architecture, IAM practices in the cloud, SaaS, PaaS, IaaS availability in the cloud, Key privacy issues in the cloud.

                                                                              Total: 45 Periods

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

- *Understand the grid computing techniques to solve large scale scientific problems*
- *Apply the grid services in various computing environment.*
- *Learn the concept of virtualization*
- *Use the grid and cloud tool kits*
- *Apply the security models in the grid and the cloud environment.*

Text Books :

1   Kai Hwang, Geoffery C. Fox and Jack J. Dongarra, "Distributed and Cloud Computing: Clusters, Grids, Clouds and the Future of Internet", First Edition, Morgan Kaufman Publisher, an Imprint of Elsevier, 2012.

Reference Books :

1   Jason Venner, "Pro Hadoop- Build Scalable, Distributed Applications in the Cloud", A Press, 2009

2   Tom White, "Hadoop The Definitive Guide", First Edition. O'Reilly, 2009

3   Ian Foster, Carl Kesselman, "The Grid: Blueprint for a New Computing Infrastructure", 2nd Edition, Morgan Kaufmann

4   Frederic Magoules and Jie Pan, "Introduction to Grid Computing" CRC Press, 2009.

5   Barry Wilkinson, "Grid Computing: Techniques and Applications", Chapman and Hall, CRC, Taylor and Francis Group, 2010.

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<u>**SEMESTER - VII**</u>

16IT713	**GRAPHICS AND MULTIMEDIA**	L	T	P	C
		3	0	0	3

Prerequisite: - *No prerequisite needed for enrolling into the course*
Objective(s):

- *To understand fundamental concepts in graphics.*
- *To be familiar with two dimensional geometrical concepts.*
- *To be aware of current trends in 3D geometric and modeling techniques.*
- *To Understand the basic concepts in various multimedia techniques*
- *To be aware of various compression, multimedia I/O, storage and retrieval techniques.*

UNIT - I   OUTPUT PRIMITIVES   [9]

Points and Lines – Line-Drawing algorithms – Loading frame Buffer – Line function – Circle-Generating algorithms – Ellipse-generating algorithm - Examples – Applications - Attributes − Two- Dimensional geometric transformations – Two Dimensional clipping and viewing – Input techniques.

UNIT - II   TWO DIMENSIONAL CONCEPTS   [9]

Basic Transformations – Matrix Representations – Composite Transformations – Other Transformations. 2D Viewing: The Viewing -Viewing Co-ordinate Reference Frame – Window-to-Viewport Co-ordinate Transformation - 2D Viewing Functions – Clipping Operations.

UNIT - III   THREE DIMENSIONAL CONCEPTS   [9]

Three-Dimensional object representations − Three-Dimensional geometric and modeling transformations − Three-Dimensional viewing − Hidden surface elimination − Color models – Virtual reality.

UNIT - IV   MULTIMEDIA FUNDAMENTALS   [9]

Text: Types of Text – Unicode Standard – Text compression – File formats. Image: Image Types – Seeing Color – Color Models – Basic Steps for Image Processing - Interface Standards – Specification of Digital Images – CMS – Device Independent Color Models - Video: Video File Formats and CODECs – Video Editing – Video Editing Software. Animation: Principles of Animation - Types of Animation – Computer Assisted Animation – Creating Movement –— Some Techniques of Animation.

UNIT - V   MULTIMEDIA FILE HANDLING TECHNOLOGIES   [9]

Compression: Compression techniques -MPEG-1 Audio – MPEG-1 Video - MPEG-2Audio – MPEG-2 Video - decompression − Data and file format standards − Multimedia I/O technologies − Digital voice and audio − Video image and animation - Storage and retrieval technologies.

Total : 45 Periods

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

- *Effectively and creatively solve a wide range of graphic design problems*
- *Form effective and compelling interactive experiences for a wide range of audiences.*
- *Use various software programs used in the creation and implementation of multi-media (interactive, motion/animation, presentation, etc.).*
- *Discuss issues related to emerging electronic technologies and graphic design*
- *Discuss multimedia compression technique*

Text Books :

1   Donald Hearn and M. Pauline Baker, "Computer Graphics C Version", Pearson Education, 2nd edition, 2003.
2   Ranjan Parekh, "Principles of Multimedia" Tata McGraw Hill Education 2007.

Reference Books :

1   Amarendra N Sinha, Arun D Udai, "Computer Graphics,", Tata McGraw Hill Education.
2   Tay Vaughan, "Multimedia: Making it Work " , 7th edition, Tata McGraw Hill Education.
3   Judith Jeffcoate, "Multimedia in practice: Technology and Applications", PHI, 1998.

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SEMESTER -VII

16IT714	MOBILE COMPUTING AND INTERNET OF THINGS	L	T	P	C
		3	0	0	3

Prerequisite: *No prerequisite needed for enrolling into the course*
Objective(s): The *student should be made to:*

- *To understand the basic concepts of mobile computing.*
- *To be familiar with the network protocol stack.*
- *To learn the basics of mobile telecommunication system.*
- *To understand the building IOT with Galileo/ARDUINO*
- *To understand case studies and advanced topics.*

UNIT - I　　　　INTRODUCTION　　　　　　　　　　　　　　　　　　[9]

Mobile Computing – Mobile Computing Vs wireless Networking – Mobile Computing Applications – Characteristics of Mobile computing – Structure of Mobile Computing Application. MAC Protocols – Wireless MAC Issues – Fixed Assignment Schemes – Random Assignment Schemes – Reservation Based Schemes.

UNIT - II　　　　MOBILE INTERNET PROTOCOL AND TRANSPORT LAYER　　　　[9]

Overview of Mobile IP – Features of Mobile IP – Key Mechanism in Mobile IP – route Optimization. Overview of TCP/IP – Architecture of TCP/IP- Adaptation of TCP Window – Improvement in TCP Performance.

UNIT - III　　　　MOBILE TELECOMMUNICATION SYSTEM　　　　　　　　[9]

Global System for Mobile Communication (GSM) – General Packet Radio Service (GPRS) – Universal Mobile Telecommunication System (UMTS).

UNIT - IV　　　　IOT FUNDAMENTALS AND DESIGN METHODOLOGY　　　　[9]

Introduction-Characteristics-Physical design - Protocols – Logical design – Enabling technologies IoT systems management – IoT Design Methodology – Specifications Integration and Application Development.

UNIT - V　　　　IOT PHYSICAL DEVICES　　　　　　　　　　　　[9]

Physical device (Rassperry Pi, Galileo) – Interfaces – Programming – APIs / Packages – Web services – Case studies

Total : 45 Periods

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

- *Explain the basics of mobile telecommunication system.*
- *Choose the required functionality at each layer for given application.*
- *Identify solution for functionality at each layer.*
- *Understand case studies and advanced topics.*
- *Understand the building IOT with Galileo/ARDUINO*

Text Book :

1　　Prasant Kumar Pattnaik, Rajib Mall, "Fundamentals of Mobile Computing", PHI Learning Pvt. Ltd, New Delhi – 2012.
2　　Arshdeep Bahga, Vijay Madisetti, "Internet of Things – A hands-on approach", Universities Press, 2015.)

Reference Books :

1　　Jochen H. Schller, "Mobile Communications", Second Edition, Pearson Education, New Delhi, 2007
2　　William.C.Y.Lee,"Mobile Cellular Telecommunications-Analog and Digital Systems", Second Edition,Tata Mc Graw Hill Edition ,2006.
3　　Getting Started with the Internet of Things by Cuno Pfister, O'Reilly Media, Inc.
4　　The Internet of Things (Essential Knowledge) by Samuel Greengard, Massachusetts Institute of Technology.

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SEMESTER - VII

		L	T	P	C
16IT721	**CLOUD COMPUTING LABORATORY**	0	0	3	2

Prerequisite: - *Operating System, Computer Network and Web Technology*

Objective(s):

- *To be exposed to tool kits for grid and cloud environment.*
- *To be familiar with developing web services/Applications in grid framework*
- *To run virtual machines of different configuration.*
- *To learn to use Hadoop*
- *To understand the importance of virtualization in distributed computing and how this has enabled the development of Cloud Computing*

List of Experiments:

Use Globus Toolkit or equivalent and do the following:

1. Develop a new Web Service for Calculator.

2. Develop new OGSA-compliant Web Service.

3. Using Apache Axis develop a Grid Service.

4. Develop applications using Java or C/C++ Grid APIs.

5. Develop secured applications using basic security mechanisms available in Globus Toolkit.

6. Find procedure to run the virtual machine of different configuration. Check how many virtual machines can be utilized at particular time.

7. Find procedure to attach virtual block to the virtual machine and check whether it holds the data even after the release of the virtual machine.

8. Install a C compiler in the virtual machine and execute a sample program.

Total: 45 Periods

Course outcomes: On completion of this course the student will be able to

- *Develop secured applications using the Java or C/C++ Grid APIs*
- *Develop programme using the APIs of Cloud Computing*
- * Create Virtual Machine images and to deploy them on a Cloud.*
- *Use the grid and cloud tool kits.*
- *Design and implement applications on the Grid.*
- *Design and Implement applications on the Cloud.*

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<u>**SEMESTER - VII**</u>

		L	**T**	**P**	**C**
16IT722	**GRAPHICS AND MULTIMEDIA LABORATORY**	**0**	**0**	**3**	**2**

Prerequisite: *C Language*

***Objective(s)**:*

- *To create basic shapes used in computer graphics.*
- *To implement different transformation techniques used in computer graphics.*
- *To be aware of various clipping techniques.*
- *To learn about various compression techniques.*
- *To be ware of animation image editing software.*

List of Experiments:

1. To implement Bresenham's algorithms for line, circle and ellipse drawing.
2. To perform 2D Transformations such as translation, rotation, scaling, reflection and sharing.
3. To implement Cohen–Sutherland 2D clipping and window–viewport mapping
4. To perform 3D Transformations such as translation, rotation and scaling.
5. To implement polygon clipping algorithm
6. To implement liang-bersky line clipping algorithm
7. To visualize projections of 3D images and Hidden Surface Elimination.
8. To convert between color models.
9. To implement text compression algorithm
10. To implement image compression algorithm
11. To perform animation using any Animation software
12. To perform basic operations on image using any image editing software

Total : 45 Periods

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

- *Develop models for computer graphics and animation applications.*
- *Apply 2D and 3D transformation techniques to various graphics models.*
- *Handle various animation and image editing tools.*
- *Implement multimedia compression algorithm*
- *Develop animation program*

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<u>SEMESTER - VIII</u>

16HS002	TOTAL QUALITY MANAGEMENT	L	T	P	C
	(Common To AU,CE,CS,ME,EE & IT)	3	0	0	3

Prerequisite: - No prerequisite needed for enrolling into the course

Objective(s):

- *To understand the Total Quality Management concept, tools available to achieve quality in every process of operations*

UNIT - I   INTRODUCTION   [9]

Introduction - Need for quality - Evolution of quality - Definition of quality - Dimensions of manufacturing and service quality - Basic concepts of TQM - Definition of TQM – TQM implementation steps – Quality council-Importance of leadership and motivation in TQM - Contributions of Deming, Juran and Crosby – Barriers to TQM..

UNIT - II   TQM PRINCIPLES   [9]

Quality statements - Customer perception of quality – Customer complaints, Customer retention. Employee involvement , Empowerment, Team and Teamwork, Recognition and Reward - Continuous process improvement – Juran trilogy, PDSA cycle, 5s, Kaizen - Supplier partnership – Partnering, Supplier selection, Supplier Rating.

UNIT - III   STATISTICAL PROCESS CONTROL   [9]

The seven traditional tools of quality – Measurement of central tendency and dispersion, population and sample, normal curve, control chart (X,R,p) for variable and attributes, process capability - Seven new management tools – Six-sigma Concepts.

UNIT - IV   TQM TOOLS   [9]

Bench marking – reason , process – Quality circles concepts - FMEA – stages, types– Quality Function Deployment (QFD) – Taguchi quality loss function –TPM – concepts, improvement needs –Performance measures-criteria – Quality Cost.

UNIT - V   QUALITY SYSTEMS   [9]

Need for ISO 9000 – ISO 9001-2008, ISO 14000 Quality System – elements, implementation, Documentation. Quality auditing – concepts, requirements and benefits, non conformance report – Case studies of TQM implementation in manufacturing and service sectors.

Total : 45 Periods

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

- *Explore TQM framework to improve the quality of the products and services.*
- *Apply TQM principles for continuous process improvement*
- *Interpret statistical tools to control and improve the quality of the products and services.*
- *Implement the tools and techniques to improve the quality concept*
- *Understand the quality system in manufacturing and service sectors.*

Text Books :

1   Dale H.Besterfiled, et at., "Total Quality Management", Pearson Education Asia,Third Edition, Indian Reprint (2006)..

Reference Books :

1   Janakiraman,B and Gopal, R.K, "Total Quality Management – Text and Cases",Prentice Hall (India) Pvt. Ltd., 2006

2   Suganthi,L and Anand Samuel, "Total Quality Management", Prentice Hall (India)Pvt. Ltd.,2006

3   James R. Evans and William M. Lindsay, "The Management and Control of Quality",6th Edition, South-Western (Thomson Learning), 2005.

4   Subburaj R, Total Quality Management, Tata McGraw Hill, New Delhi 2005

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SEMESTER - VIII (Elective I)

16MA091	NUMERICAL METHODS	L	T	P	C
		3	0	0	3

Prerequisite: No prerequisite needed for enrolling into the course

Objectives: The student should be made to

- *To study the concepts and applications in solving polynomial and transcendental equations, simultaneous linear equations numerically and to acquire knowledge in Interpolation techniques, numerical differentiation and integration.*
- *To understand the concepts of numerical solutions to ordinary differential equations and numerical solutions to boundary values problems.*

UNIT - I   SOLUTION OF EQUATIONS AND EIGEN VALUE PROBLEMS   [9]
Solutions to polynomials and transcendental equations – Newton's method, Regula-falsi method – Solutions to simultaneous linear equations – Gauss Elimination method – Gauss Jordon method - Gauss-Seidel method.

UNIT - II   INTERPOLATION AND APPROXIMATION   [9]
Newton's forward and backward difference interpolation techniques (equal intervals) – Lagrange's interpolation –inverse Lagrange's interpolation and Divided difference method (for unequal intervals).

UNIT - III   NUMERICAL DIFFERENTIATION AND INTEGRATION   [9]
Numerical differentiation using Newton's forward and backward interpolation methods – Numerical integration by trapezoidal and Simpson's 1/3rd and 3/8th rules – Double integrals using trapezoidal rule.

UNIT - IV   INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS   [9]
Solving first order Ordinary Differential Equations by Taylor series– Euler's and Modified Euler's Method – fourth order Runge-Kutta Method – Milne's predictor and corrector method.

UNIT - V   BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS   [9]
Solution of one dimensional heat equation by Bender - Schmidt and Crank - Nicolson method – Solution of One dimensional wave equation – solution of Poisson equations.

Total : 45 Periods

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

- *Solve polynomial, transcendental equations and simultaneous linear equations numerically.*
- *Apply the Interpolation techniques.*
- *Develop their skills in numerical differentiation and integration.*
- *Solve ordinary differential equations numerically.*
- *Understand and apply the concepts of numerical solutions to boundary value problems*

Text Books :

1. Dr. B. S Grewal, "Numerical Methods in Engineering and Science", Khanna Publishers, New Delhi, (2010)9th edition..
2. Burden R.L & Faires.J.D. "Numerical Methods" 9th edition, Cengage Learning, 2016.

Reference Books :

1. Sukhendu Dey and Shishir Gupta "Numerical Methods", Tata Mc Graw Hill Publishing Company, (2013),
2. Dr. M.K. Venkataraman,"Numerical Methods in Science and Engineering", National Publishing Company, (2012), 2nd edition.
3. V. Gerald 'Applied Numerical Analysis' Pearson Education, 6th edition (2012).

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<u>**SEMESTER - V (Elective I)**</u>

16EC581	**PRINCIPLES OF DIGITAL SIGNAL PROCESSING**	L	T	P	C
		3	0	0	3

Prerequisite: *No prerequisite needed for enrolling into the course*
*Objectives***:**

- *To introduce basic signals and systems*
- *To introduce discrete Fourier transform and its applications.*
- *To teach the design of infinite and finite impulse response filters for filtering undesired signals.*
- *To introduce signal processing concepts in systems having more than one sampling frequency.*

UNIT - I   SIGNALS AND SYSTEMS   **[9]**
Basic elements of DSP - concepts of frequency in Analog and Digital Signals - sampling theorem - Discrete - time signals, systems - Analysis of discrete time LTI systems - Z transform - Convolution - Correlation.

UNIT - II   FREQUENCY TRANSFORMATIONS   **[9]**
Introduction to DFT - Properties of DFT - Circular Convolution - Filtering methods based on DFT - FFT Algorithms - Decimation - in - time Algorithms, Decimation - in - frequency Algorithms - Use of FFT in Linear Filtering.

UNIT - III   IIR FILTER DESIGN   **[9]**
Review of design of analogue Butterworth and Chebyshev Filters - Frequency transformation in analogue domain - Design of IIR digital filters using impulse invariance technique - Design of digital filters using bilinear transform - Pre warping - Realization using direct, Cascade and parallel forms.

UNIT - IV   FIR FILTER DESIGN   **[9]**
Symmetric and Antisymmetric FIR filters - Linear phase FIR filters - Design using rectangular, Hamming, Hanning and Blackmann windows - Frequency sampling method - Realization of FIR filters - Transversal, Linear phase and Polyphase structures.

UNIT - V   FINITE WORD LENGTH EFFECTS IN DIGITAL FILTERS   **[9]**
Quantization noise - Derivation for quantization noise power - Coefficient quantization error - Product quantization error - Overflow error - Roundoff noise power - Limit cycle oscillations Multirate signal processing: Interpolation, Decimation – Speech compression – Adaptive filter.

                                                                                          Total: 45 Periods

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

- Understand the types of signals and systems
- Perform frequency transforms for the signals.
- Design IIR and FIR filters.
- Finite word length effects in digital filters

Text Books :

1   John G. Proakis and Dimitris G.Manolakis, "Digital Signal Processing – Principles, Algorithms & Applications", Fourth Edition, Pearson Education, Prentice Hall, 2007.
2   S.Salivahanan, A. Vallavaraj, C. Gnanapriya, "Digital Signal Processing", TMH/McGraw Hill International, 2007.

Reference Books :

1   Emmanuel C.Ifeachor, and Barrie.W.Jervis, "Digital Signal Processing", Second Edition, Pearson Education, Prentice Hall, 2002.
2   Sanjit K. Mitra, "Digital Signal Processing – A Computer Based Approach", Third Edition, Tata McGraw Hill, 2007
3   A.V.Oppenheim, R.W. Schafer and J.R. Buck, Discrete-Time Signal Processing, 8th Indian Reprint, Pearson, 2004.
4   Andreas Antoniou, "Digital Signal Processing", Tata McGraw Hill, 2006.

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SEMESTER –V(Elective I)

16HS003	DISASTER PREPAREDNESS AND MANAGEMENT (Common To CS,EE & IT)	L	T	P	C
		3	0	0	3

Prerequisite: No prerequisite needed for enrolling into the course

Objective(s):

- *To make the students learn about the aspects of disaster and risk management.*

UNIT - I   DISASTER AND DEVELOPMENT   **[9]**
Introduction ,Nature and Dimension of the challenge, Linking Disaster and Development, Sustainable development, Disruption of development by disasters, causes of Disasters – Development opportunities afforded by disasters – Varied impact on states in India. HAZARDS: Definition, principles, Impact of Disasters, Levels of Disaster, Effect of Disasters, Causal factors, Phases of Disaster. .

UNIT - II   DISASTERS DIMENSIONS AND TYPOLOGY   **[9]**
Different calamities – Typology of Disasters: Earthquakes, Tsunamis, Volcanoes, Landslides Tropical cyclones, Floods, Environmental pollution, Deforestation – Desertification, Pest Infestations, Epidemics, Chemical and industrial accidents, Trends in climatology, meteorology and hydrology - seismic activity - Case Study

UNIT - III   DISASTER PREVENTION AND CONTROL   **[9]**
United Nations Disaster Relief Coordinator (UNDRO): Disaster relief and management, prevention, preparedness, Stand by capacity – Coordination, cooperation and leadership Continuum from relief to rehabilitation and development – Checklists and reporting formats by UNDMT and international emergency assistance requirement.

UNIT - IV   DISASTER MANAGEMENT IN INDIA   **[9]**
Issues – National policy – Historical Framework – Funding mechanisms – Calamity Relief Fund (CRF) – The Disaster management Act 2005 – Indian Agencies for disaster management – National Civil Defense Organization

UNIT - V   DISASTER PREPAREDNESS AND PLANNING   **[9]**
Introduction, Objectives – Disaster planning, Strategies for disaster preparedness and planning – Principles, Myths, Factors influencing disaster risk - Assessing risk in a context of uncertainty - Disaster insurance – use of the media in information dissemination – Types of media and their information needs.

       Total : 45 Periods

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

- Understand the nature and causes of disaster
- Assess risk and take steps to mitigate various types of disaster
- Handle psychological trauma and stress
- Approach relief and funded organization to prevent disaster
- Apply recent strategies towards disasters preparedness and planning.

Text Books :

1   Satish Modh, "Introduction to disaster management", first published , macmillian publishers india ltd, New delhi, 2012.

2   Pardeep Sahni, "Disaster Risk Reduction in South Asia", 4th Edition ,PHI Learning, New Delhi, 2011.

Reference Books :

1   M. Saravanakumar, Disaster Management, 1st Edititon, Himalaya Publishing House,2010

2   Singh, Disaster Management: Future Challenges, 1st Edititon, IK International, New Delhi,2007.

3   Arvind Kumar Disaster Management – Recent Approaches Anmol Publications, 1st Edititon, New Delhi, 2006..

4   Goel, S. L, Encyclopedia of Disaster Management, 3rd Edition, Deep & Deep Publications Pvt Ltd, New Delhi, 2010

16IT561	SOFTWARE PRACTICE AND TESTING	L	T	P	C
		3	0	0	3

Prerequisite: *No prerequisite needed for enrolling into the course*
Objective(s):

- *To highlight the strategies for software testing.*
- *To stress the need and conduct of testing levels.*
- *To identify the issues in testing management.*
- *To bring out the ways and means of controlling and monitoring testing activity.*
- *To know about the test cases and review process*

UNIT - I   **INTRODUCTION TO TESTING**   **[9]**

Software Testing – Definition of Software Testing – Objective and limits of testing – Testing Strategy – Roles and Responsibilities of a Software Tester – Independent Verification and Validation.

UNIT - II   **SOFTWARE TESTING REQUIREMENTS**   **[9]**

Software Testing Requirements - Analyzing the requirements -Classifying the Functional and Non Functional Requirements. Software Testing Review Process - Objective of Software Testing Review - Types of Reviews: Peer Review – Walkthrough - Inspection - Checklists of Review Process - Review Log.

UNIT - III   **TESTING TECHNIQUES**   **[9]**

White box testing techniques – Static and Dynamic Testing – Statement Coverage – Decision/Branch Coverage – Basic Path Testing – Control Flow Graph Coverage – Conditional Coverage – McCabe's Cyclomatic Complexity – Mutation Testing. Black Box Test Techniques: Boundary Value Analysis – Equivalent Class Partition – Cause-Effect Analysis – Decision Table – State Transition Table – Pair Wise Testing – Use Case Testing.

UNIT - IV   **TESTING TYPES**   **[9]**

Unit Testing, Functional Testing: Smoke Testing – Integration, System Testing, User Acceptance Testing - Non Functional Testing:– Performance Testing – Recovery Testing – Security Testing – Compatibility Testing – Usability Testing – Ad Hoc Testing – Internationalization Testing – Configuration Testing - Data ware House Testing and Business Intelligence Testing – SOA Testing - Mobile Testing.

UNIT - V   **TEST CASE DESIGN**   **[9]**

Definition of Test Case - Standards, Guidelines and Naming Conventions – Characteristics of Good Test Cases – Test Case templates – Creation of Test Case – Requirement Coverage –Traceability Matrix – Test Case Review Process – Test Execution – Test Log - Reporting of Test Execution – Definition of Risk - Risk Based Testing Approach.

        Total : 45 Periods

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

- *Highlight the strategies for software testing.*
- *Stress the need and conduct of testing levels.*
- *Identify the issues in testing management.*
- *Bring out the ways and means of controlling and monitoring testing activity.*
- *Know about the test cases and review process*

Text Books :

1. S.Subashni, N.Satheesh Kumar, Dr.B.G.Geetha, Dr.G.Singaravel, "Software Testing", Umayam Publications , First edition, 2013.
2. Srinivasan Desikan, Gopalaswamy Ramesh," Software Testing: Principles and Practice", Pearson Education India, First Impression 2006.

Reference Books :

1. MarnieL.Hutchson, "Software Testing Fundamentals Methods and Metrics",Wiley,2003 edition
2. Glenford J.Myess,"The Art of testing", Wiley, 2003 edition.
3. Mauro pezze,Michal young, "Software Testing and Analysis: Process, Principles, and Techniques",Wiley,2008.
4. Elfriede Dustin, "Effective Software Testing", Pearson Education, New Delhi, 2003.

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SEMESTER – V (Elective I)

16IT562	VISUAL PROGRAMMING	L	T	P	C
		3	0	0	3

Prerequisite: *Operating Systems and C++.*

Objective(s):

- *To introduce the concepts of windows programming.*
- *To introduce GUI programming using Microsoft Foundation Classes.*
- *To familiar with ActiveX and OLE.*
- *To work with database applications.*
- *To enable the students to develop programs and simple applications using Visual C++.*

UNIT - I   WINDOWS PROGRAMMING   [9]

Windows Environment – A Simple Windows Program – Windows and Messages – Creating the Window – Displaying the Window – Message Loop – the Window Procedure – Message Processing – Text Output – Painting and Repainting – Introduction to GDI – Basic Drawing – Child Window Controls.

UNIT - II   VISUAL C++ PROGRAMMING – INTRODUCTION   [9]

Application Framework – MFC Library – Visual C++ Components – Event Handling – Mapping Modes – Colors – Fonts – Modal and Modeless Dialog – Windows Common Controls.

UNIT - III   DOCUMENT AND VIEW ARCHITECTURE   [9]

Menus – Keyboard Accelerators – Rich Edit Control – Toolbars – Status bars – Separating Document from Its View – Reading and Writing SDI and MDI Documents – Splitter Window and Multiple Views – Creating DLLs.

UNIT - IV   ACTIVEX AND OBJECT LINKING AND EMBEDDING (OLE)   [9]

ActiveX Controls Vs. Ordinary Windows Controls – Installing ActiveX Controls – Calendar Control – Create ActiveX Control at Runtime – Component Object Model (COM) – OLE Drag and Drop – OLE Embedded Component and Containers.

UNIT - V   ADVANCED CONCEPTS   [9]

Database Management with Microsoft ODBC – Structured Query Language – MFC ODBC Classes – Sample Database Applications – DAO Concepts – Displaying Database Records in Scrolling View – VC++ Networking Issues – Winsock – WinINet– Building a Web Client and Server – Threading – Internet Information Server – Chat application – Playing and multimedia (Sound and video files).

Total : 45 Periods

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

- *Create simple windows program.*
- *Realize the concept of Microsoft Foundation Class(MFC) application framework..*
- *Write programs for creating single and multiple documents .*
- *Create activeX and OLE controls.*
- *Connect database with visual programming.*

Text Books :

1   Charles Petzold, "Windows Programming", Microsoft press, Nineteenth Indian Reprint, 2007.

2   David J.Kruglinski, George Shepherd and Scot Wingo, "Programming Microsoft Visual C++", Fifth Edition, Microsoft press, 2006 Reprint.

Reference Books :

1   Holtzner, "Visual C++ 6 Programming", Wiley Dreamtech India Pvt. Ltd., 2003.

2   Jeff Cogswell, "Visual C++ .NET", Hungry Minds, 2002.

3   Richard C.Leinecker and Tom Archer, "Visual C++ 6 Programming Bible", Wiley DreamTech Press, 2006

4   John Mueller, "Visual C++ 6 From the grounded up ", McGraw –Hill, Indian Reprint2008.

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SEMESTER - V (Elective I)

		L	T	P	C
16IT563	**INFORMATION THEORY AND CODING TECHNIQUES**	3	0	0	3

Prerequisite: *No prerequisite needed for enrolling into the course*
Objective(s):

* *To understand error–control coding.*
* *To understand encoding and decoding of digital data streams*
* *To be familiar with the methods for the generation of these codes and their decoding techniques*
* *To be aware of compression and decompression techniques.*
* *To learn the concepts of multimedia communication.*

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 subband 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

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

* *Understand error control coding.*
* *Understand encoding and decoding of digital data streams*
* *Explain methods for the generation of these codes and their decoding techniques*
* *Aware of compression and decompression techniques.*
* *Learn the concepts of multimedia communication*

Text Books :

1. Simon Haykin, "Communication Systems", 4th Edition, John Wiley and Sons, 2001.
2. Fred Halsall, "Multimedia Communications, Applications Networks Protocols and Standards", Pearson Education, Asia 2002; Chapters: 3,4,5.

Reference Books :

1. Mark Nelson, "Data Compression Book", BPB Publication 1992. 2. Watkinson J, "Compression in Video and Audio", Focal Press, London, 1995.
2. S Gravano, "Introduction to Error Control Codes", Oxford University Press 2007.
3. K Sayood, "Introduction to Data Compression" 3/e, Elsevier 2006.
4. Amitabha Bhattacharya, "Digital Communication", TMH 2006.

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SEMESTER - VI   (Elective II)

		L	T	P	C
16IT661	**WIRELESS NETWORKS**	3	0	0	3

Prerequisite: *No prerequisite needed for enrolling into the course*
Objective(s):

* *To understand the basics of wireless concepts.*
* *To know of MAC layer functionality.*
* *To understand the routing techniques*
* *To know of mobility management*
* *To know of QoS related with wireless network*

UNIT - I   WIRELESS SYSTEMS   [9]
Cellular concept – cellular architecture. Cellular systems – 1G, 2G, 3G. Wireless in Local Loop, Wireless ATM. Broadband Wireless Access – UWB, IEEE802.11a/b(Wi-Fi), IEEE802.16(WiMax) – HIPERACCESS, IEEE802.20(MobileFi), IEEE802.21(MIHS) and IEEE802.22(WRAN). Optical wireless networks.

UNIT - II   MAC   [9]
Introduction – 4G systems. Hybrid 4G network protocols, Channel modeling for 4G-MIMO and UWB. Adaptive and Reconfigurable Link layer, adaptive MAC-AMC, HARQ, CDMA, TDMA/OFDMA. Software radio-DAB, DVB.

UNIT - III   ROUTING   [9]
Network overlay in 4G, Network synchronization and Power optimal routing. Adaptive network layer-routing with topology aggregation. Adaptive resource management, Network deployment and management.

UNIT - IV   MOBILITY MANAGEMENT   [9]
Mobility management – Concept, requirements and operations. Mobility support for LAN/MAN. Mobility management models – Macro mobility and Micro mobility. Mobile IP-MIPv6, HMIP, cellular IP, HAWAII and IDMP. Context-aware mobility management.

UNIT-V   TCP AND QoS   [9]
Adaptive TCP and cross layer optimization. Positioning in wireless networks. QoS – Issues. Classifications of QoS approaches – MAC and Network layer solutions. QoS framework – QoS models, QoS Resource reservation signaling, INSIGNIA, INORA, SWAN and proactive RTMAC.

Total : 45 Periods

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

* *Understand the basics of wireless concepts.*
* *Explain MAC layer functionality.*
* *Understand the routing techniques*
* *Describe mobility management*
* *Analysis QoS related with wireless network*

Text Books :
1   Savo G.Glisic, "Advanced Wireless Networks: 4G Technologies", Kindle Editions, 2006.
2   Savo G.Glisic, "Advanced Wireless Communications: 4G Technologies", Kindle Editions, 2006.

Reference Books :
1   C.Siva Ram Murthy and B.S.manoj, "Ad-Hoc Wireless Networks-Architectures and Protocols", Pearson Education, 2004.
2   Kaveh Pahlavan, Prasanth Krishnamoorthy, "Principles of Wireless Networks", First Edition, Pearson Education, 2003.
3   Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, "Principles of Mobile Computing", Springer, 2003.
4   www.3gpp.org.

		L	T	P	C
16IT662	**OBJECT ORIENTED ANALYSIS AND DESIGN**	3	0	0	3

Prerequisite: *Software Engineering*
Objective(s):

- *To understand the object oriented life cycle.*
- *To know how to identify objects, relationships, services and attributes through UML.*
- *To understand the UML diagrams.*
- *To know the Object Oriented Design process.*
- *To know about software quality and usability.*

UNIT - I   INTRODUCTION   [9]

An Overview of Object Oriented Systems Development - Object Basics – Object Oriented Systems Development Life Cycle - The software development process- Building high quality software.

UNIT - II   OBJECT ORIENTED METHODOLOGIES AND MODELLING   [9]

Rumbaugh Methodology - Booch Methodology - Jacobson Methodology - Patterns – Frameworks – Unified Approach – Unified Modeling Language – Use case diagram - Class diagram - Interactive Diagram - Package Diagram - Collaboration Diagram - State Diagram - Activity diagram.

UNIT - III   OBJECT ORIENTED ANALYSIS   [9]

Identifying use cases - Use case model - Classification – 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.

UNIT - IV   OBJECT ORIENTED DESIGN   [9]

Object Oriented Design Axioms - Designing Classes – Redefining attributes – Designing methods and protocols - Access Layer - Object Storage and Object Interoperability.

UNIT-V   SOFTWARE QUALITY AND USABILITY   [9]

Designing Interface Objects - Software Quality Assurance - System usability - Measuring User Satisfaction.

Total : 45 Periods

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

- *Explain the object oriented life cycle.*
- *Discuss objects, relationships, services and attributes through UML.*
- *Create the UML diagrams.*
- *Develop the Object Oriented Design process.*
- *Discuss software quality and usability.*

Text Books :

1   Ali Bahrami, "Object Oriented Systems Development", Tata McGraw Hill, Ninth Reprint 2011.
2   Mahesh P.Matha, "Object –Oriented Analysis and Design Using UML", PHI, 2008.

Reference Books :

1   Martin Fowler,"UML Distilled", PHI/Pearson Education, Third Edition, 2004.
2   Stephen R. Schach, "Introduction to Object Oriented Analysis and Design", Tata McGraw-Hill, 2004.
3   Hans-Erik Eriksson, Magnus Penker, Brain Lyons and David Fado, "UML Toolkit", OMG Press Wiley Publishing Inc., 2004.
4   Timothy C. Lethbridge and Robert Laganiere, "Object Oriented Software Engineering", Tata MCGraw- Hill, Reprint 2011.

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SEMESTER – VI (Elective II)

		L	T	P	C
16IT663	**E – COMMERCE**	3	0	0	3

Prerequisite: *No prerequisite needed for enrolling into the course*

Objective(s):

- *To study the basics of E-Commerce*
- *To learn the activities involved in the E- commerce process.*
- *To focus the applications related to the EDI*
- *To analyze the security issues in the E –commerce*
- *To apply the E-commerce at various applications*

UNIT - I   INTRODUCTION   [9]

E-Commerce framework – E- Business models - Network infrastructure for E-commerce – Internet as a Network Infrastructure – E-commerce and World Wide Web.

UNIT - II   E-COMMERCE   [9]

Consumer oriented E-Commerce- Applications - Mercantile process models - Electronic Payment Systems – Digital Token based EPS – Smart cards – Credit cards – Risks – designing EPS – Study of e-commerce companies

UNIT - III   INTERORGANIZATIONAL COMMERCE AND EDI   [9]

Electronic Data Interchange: EDI applications in Business – EDI and E-Commerce – EDI standardization and implementation – Internet based EDI.

UNIT - IV   SECURITY ISSUES IN E-COMMERCE   [9]

Network Security – Client-Server Network Security – CS Security Threats – Firewalls – Data & Message Security – Encrypted Documents – Security on the Web.

UNIT-V   INTRAORGANIZATIONAL E-COMMERCE AND MARKETING   [9]

Internal Information System-Work-flow Automation and Coordination-Supply Chain Management-Document Library-Types of Digital Documents-Corporate Data Warehouses – Advertising and Marketing on the Internet .

Total : 45 Periods

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

- *Describe the basics of E-Commerce*
- * Explain the activities involved in the E- commerce process.*
- *Develop the applications related to the EDI*
- *Analyze the security issues in the E –commerce*
- *Apply the E-commerce at various applications*

Text Books :

1 Ravi Kalakota and Andrew B Whinston, "Frontiers of Electronic Commerce", Pearson Education Asia, 2009.

2 Marilyn Greenstein and Todd M Feinman , " Electronic commerce: Security, Risk Management and Control " Tata McGraw-Hill , 2000.

Reference Books :

1 Judy Strauss and Raymond Frost, " E Marketing", PHI, 2002.

2 Brenda Kienan, "Managing E Commerce Business", PHI, 2001.

3 Vivek Sharma and Rajiv Sharma, "Developing E Commerce Sites – an integrated approach", Pearson Education Asia, 2000.

4 Kamalesh K. Bajaj, "E-Commerce: The Cutting Edge & Business", Tata McGraw-Hill, 2003.

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<u>**SEMESTER – VI (Elective II)**</u>

16IT664	SOCIAL NETWORK ANALYSIS	L	T	P	C
		3	0	0	3

Prerequisite: *No prerequisite needed for enrolling into the course*
Objective(s):
- *To understand the components of the social network*
- *To model and visualize the social network*
- *To mine the users in the social network*
- *To understand the evolution of the social network*
- *To mine the interest of the user*

UNIT - I   INTRODUCTION   [9]
Introduction to Web - Limitations of current Web – Development of Semantic Web – Emergence of the Social Web – Statistical Properties of Social Networks -Network analysis - Development of Social Network Analysis - Key concepts and measures in network analysis - Discussion networks - Blogs and online communities - Web-based networks.

UNIT - II   MODELING AND VISUALIZATION   [9]
Visualizing Online Social Networks - A Taxonomy of Visualizations - Graph Representation - Centrality- Clustering - Node-Edge Diagrams - Visualizing Social Networks with Matrix-Based Representations- Node-Link Diagrams - Hybrid Representations - Modelling and aggregating social network data – Random Walks and their Applications –Use of Hadoop and Map Reduce - Ontological representation of social individuals and relationships.

UNIT - III   MINING COMMUNITIES   [9]
Aggregating and reasoning with social network data, Advanced Representations – Extracting evolution of Web Community from a Series of Web Archive - Detecting Communities in Social Networks – Evaluating Communities – Core Methods for Community Detection & Mining -Applications of Community Mining Algorithms - Node Classification in Social Networks.

UNIT - IV   EVOLUTION   [9]
Evolution in Social Networks – Framework - Tracing Smoothly Evolving Communities - Models and Algorithms for Social Influence Analysis - Influence Related Statistics - Social Similarity and Influence - Influence Maximization in Viral Marketing - Algorithms and Systems for Expert Location in Social Networks - Expert Location without Graph Constraints - with Score Propagation – Expert Team Formation - Link Prediction in Social Networks - Feature based Link Prediction - Bayesian Probabilistic Models - Probabilistic Relational Models

UNIT-V   TEXT AND OPINION MINING   [9]
Text Mining in Social Networks -Opinion extraction – Sentiment classification and clustering - Temporal sentiment analysis - Irony detection in opinion mining - Wish analysis - Product review mining – Review Classification – Tracking sentiments towards topics over time.

Total : 45 Periods

Course Outcomes: On completion of this course, the student will be able to
- *Work on the internals components of the social network*
- *Model and visualize the social network*
- *Mine the behaviour of the users in the social network*
- *Predict the possible next outcome of the social network*
- *Mine the opinion of the user*

Text Books :
1   Charu C. Aggarwal, "Social Network Data Analytics", Springer; 2011
2   Peter Mika, "Social Networks and the Semantic Web", Springer, 1st edition, 2007.

Reference Books :
1   Borko Furht, "Handbook of Social Network Technologies and Applications", Springer, 1st edition, 2010.
2   Guandong Xu , Yanchun Zhang and Lin Li, "Web Mining and Social Networking – Techniques and applications", Springer, 1st edition, 2011.
3   Giles, Mark Smith, John Yen, "Advances in Social Network Mining and Analysis", Springer, 2010.
4   Ajith Abraham, Aboul Ella Hassanien, Václav Snášel, "Computational Social Network Analysis: Trends, Tools and Research Advances", Springer, 2009.

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SEMESTER - VI (Elective II)

		L	T	P	C
16IT665	**AGILE SOFTWARE DEVELOPMENT**	3	0	0	3

Prerequisite: *Software Engineering*
Objective(s):

- *To understand agile methodology.*
- *To know about agile process.*
- *To understand agile management.*
- *To study requirement engineering.*
- *To understand agile quality service.*

UNIT - I   AGILE METHODOLOGY   [9]

Theories for Agile management – agile software development – traditional model vs. agile model - classification of agile methods – agile manifesto and principles – agile project management – agile team interactions – ethics in agile teams - agility in design, testing – agile documentations – agile drivers, capabilities and values

UNIT - II   AGILE PROCESSES   [9]

Lean production - SCRUM, Crystal, Feature Driven Development, Adaptive Software Development, Extreme Programming: Method overview – lifecycle – work products, roles and practices.

UNIT - III   AGILITY AND KNOWLEDGE MANAGEMENT   [9]

Agile information systems – agile decision making - Earl's schools of KM – institutional knowledge evolution cycle – development, acquisition, refinement, distribution, deployment , leveraging – KM in software engineering – managing software knowledge – challenges of migrating to agile methodologies – agile knowledge sharing – role of story-cards – Story-card Maturity Model (SMM)

UNIT - IV   AGILITY AND REQUIREMENTS ENGINEERING   [9]

Impact of agile processes in RE – current agile practices – variance – overview of RE using agile – managing unstable requirements – requirements elicitation – agile requirements abstraction model – requirements management in agile environment, agile requirements prioritization – agile requirements modeling and generation – concurrency in agile requirements generation

UNIT - V   AGILITY AND QUALITY ASSURANCE   [9]

Agile product development – Agile Metrics – Feature Driven Development (FDD) – Financial and Production Metrics in FDD – Agile approach to Quality Assurance - Test Driven Development – Agile approach in Global Software Development

Total : 45 Periods

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

- *Discuss agile methodology and software model.*
- *Explain about agile process.*
- *Develop project through agile methodology*
- *Describe reengineering concept in software development.*
- *Explain about metrics and QoS for software product.*

Text Books :

1. David J. Anderson; Eli Schragenheim, Agile Management for Software Engineering: Applying the Theory of Constraints for Business Results, Prentice Hall, 2003
2. Orit Hazzan and Yael Dubinsky, "Agile software engineering", Springer, 2008.

Reference Books :

1. Chetankumar Patel, Muthu Ramachandran, Story Card Maturity Model (SMM): A Process Improvement Framework for Agile Requirements Engineering Practices, Journal of Software, Academy Publishers, Vol 4, No 5
2. Hazza & Dubinsky, Agile Software Engineering, Series: Undergraduate Topics in Computer Science, Springer 2009, VIII, 296 p
3. Craig Larman, Agile and Iterative Development: A manager's Guide, Addison-Wesley, 2004.
4. Kevin C. Desouza, Agile information systems: conceptualization, construction, and management, Butterworth-Heinemann, 2007.

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SEMESTER – VI (Elective II)

16IT666	OPEN SOURCE SOFTWARE	L	T	P	C
		3	0	0	3

Prerequisite: No prerequisite needed for enrolling into the course
Objective(s):

- *To understand concepts, strategies, and methodologies related to open source software development.*
- *To be familiar with open source software products used for storing the information*
- *To develop the software based on the open source programming languages*
- *To understand the basics of the Python programs and its advantages*
- *To utilize open source software PERL for developing a variety of software applications.*

UNIT - I   INTRODUCTION   [9]
Introduction to Open sources – Need of Open Sources – Advantages of Open Sources– Application of Open Sources. Open source operating systems: LINUX: Introduction –General Overview – Kernel Mode and user mode – Process – Advanced Concepts –Scheduling – Personalities – Cloning – Signals – Development with Linux.

UNIT - II   OPEN SOURCE DATABASE   [9]
MySQL: Introduction – Setting up account – Starting, terminating and writing SQL programs – Record selection Technology – Working with strings – Date and Time– Sorting Query Results – Generating Summary – Working with metadata – Using sequences – MySQL and Web.

UNIT - III   OPEN SOURCE PROGRAMMING LANGUAGES   [9]
PHP: Introduction – Programming in web environment – variables – constants – data types – operators – Statements – Functions – Arrays – OOP – String Manipulation and regular expression – File handling and data storage – PHP and SQL database – PHP and LDAP – PHP Connectivity – Sending and receiving E-mails – Debugging and error handling – Security – Templates.

UNIT - IV   PYTHON   [9]
Syntax and Style – Python Objects – Numbers – Sequences – Strings – Lists and Tuples – Dictionaries – Conditionals and Loops – Files – Input and Output – Errors and Exceptions – Functions – Modules – Classes and OOP – Execution Environment.

UNIT-V   PERL   [9]
Perl backgrounder – Perl overview – Perl parsing rules – Variables and Data – Statements and Control structures – Subroutines, Packages, and Modules- Working with Files –Data Manipulation

                                                                      Total : 45 Periods

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

- *Discuss concepts, strategies, and methodologies related to open source software development.*
- *Explain with open source software products used for storing the information*
- *Develop the software based on the open source programming languages*
- *Program the basics of the Python programs and its advantages*
- *Utilize open source software PERL for developing a variety of software applications.*

Text Books :
1   Remy Card, Eric Dumas and Frank Mevel, "The Linux Kernel Book", Wiley Publications, 2003.
2   Steve Suchring, "MySQL Bible", John Wiley, 2002
Reference Books :
1   RasmusLerdorf and Levin Tatroe, "Programming PHP", O'Reilly, 2002.
2   Martin C. Brown, "Perl: The Complete Reference", Tata McGraw-Hill Publishing Company Limited, Indian Reprint 2009.
3   Steven Holzner, "PHP: The Complete Reference",TMG Publishing Company Limited, Indian Reprint 2009.
4   VikramVaswani, "MYSQL: The Complete Reference",TMG Publishing Company Limited, Indian Reprint 2009.

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<u>SEMESTER – VI (Elective II)</u>

16IT667	MOBILE APPLICATION DEVELOPMENT	L	T	P	C
		3	0	0	3

Prerequisite: - Computer Network

Objective(s):

- *To understand system requirements for mobile applications*
- *To generate suitable design using specific mobile development frameworks*
- *To develop mobile application design*
- *To implement the design using specific mobile development frameworks*
- *To deploy the mobile applications in marketplace for distribution*

UNIT - I   INTRODUCTION   [9]

Introduction to mobile applications -Embedded systems - Market and business drivers for mobile applications -Publishing and delivery of mobile applications -Requirements gathering and -Validation for mobile applications

UNIT - II   BASIC DESIGN   [9]

Introduction -Basics of embedded systems design-Embedded OS -Design constraints for Mobile applications, both hardware and software related -Architecting Mobile applications–user interfaces for mobile applications–touch events and gestures-Achieving quality constraints-performance, usability, security, availability and modifiability.

UNIT - III   ADVANCED DESIGN   [9]

Designing applications with multimedia and web access capabilities -Integration with GPS and social media networking applications -Accessing applications hosted in a cloud computing Environment -Design patterns for mobile applications

UNIT - IV   TECHNOLOGY I ANDROID   [9]

Introduction – Establishing the development environment –Android architecture –Activities and views -Interacting with UI –Persisting data using SQLite –Packaging and deployment -Interaction with server side applications -Using Google Maps, GPS and Wifi Integration with social media applications.

UNIT-V   TECHNOLOGY II IOS   [9]

Introduction to Objective C –IOS features–UI implementation–Touch frameworks –Data persistence using Core Data and SQLite –Location aware applications using Core Location and Map Kit –Integrating calendar and address book with social media application –Using Wifi -iPhone marketplace.

Total : 45 Periods

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

- *Describe the requirements for mobile applications*
- *Explain the challenges in mobile application design and development*
- *Develop design for mobile applications for specific requirements*
- *Implement the design using Android SDK*
- *Implement the design using Objective C and iOS*
- *Deploy mobile applications in Android and iPone marketplace for distributio*

Text Books :

1   Jeff McWherter and Scott Gowell, "Professional Mobile Application Development", Wrox,2012.
2   Charlie Collins, Michael Galpin and Matthias Kappler, "Android in Practice", DreamTech, 2012

Reference Books :

1   James Dovey and Ash Furrow, "Beginning Objective C", Apress, 2012
2   David Mark, J ack Nutting, Jeff LaMarche and Frederic Olsson, "Beginning IOS 6 Development: exploring the iOS SDK", Apress, 2013.
3   Reto Meier, "Professional Android 2 Application Development", Wrox Wiley,2010..
4   http://developer.android.com/develop/index.html

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<u>**SEMESTER - VI (Elective II)**</u>

16IT668	GEO INFORMATICS SYSTEM	L	T	P	C
		3	0	0	3

Prerequisite: Data Mining
Objective(s):

- *To obtain professional licensure and/or certifications in the geospatial industry.*
- *To advance in the geospatial industry during their career by becoming involved in local, state, national, or international organizations.*
- *To obtain industry positions requiring increased responsibility.*
- *To assume responsibility for lifelong learning in professional and personal development.*
- *To demonstrate readiness for graduate education and/or advanced technical education.*

UNIT - I   FUNDAMENTALS OF GIS   **[9]**
Introduction to GIS – Basic spatial concepts-CoordinateSystems-GISandInformationSystems–Definitions–History of GIS Components of a GIS–Hardware,Software,Data,People,Methods–ProprietaryandopensourceSoftware-Types of data–patial,Attribute data-types of attributes –scales/ levels of measurements.

UNIT - II   SPATIAL DATA MODELS   **[9]**
Database Structures–Relational,ObjectOriented–Entities–ERdiagram-datamodels-conceptual, logical and physical models - spatial data models–Raster Data Structures–Raster Data Compression-Vector Data Structures- Rastervs Vector Models-TINandGRID data models

UNIT - III   DATA INPUT AND TOPOLOGY   **[9]**
Scanner-Raster Data Input–Raster Data File Formats–Geo referencing–Vector Data Input–Digitiser–Datum Projection and reprojection-Coordinate Transformation–Topology- Adjacency, connectivity and containment–Topological Consistency–Nontopological file formats -Attribute Data linking –Linking External Databases –GPS Data Integration

UNIT - IV   DATAQUALITY AND STANDARDS   **[9]**
Data quality-Basic aspects-completeness, logical consistency, positional accuracy, temporal accuracy, thematic accuracy and lineage –Metadata –GIS Standards–Interoperability -OGC -Spatial Data Infrastructure

UNIT-V   DATA MANAGEMENTAND OUTPUT   **[9]**
Import/Export–Data Management functions-Raster to Vector and Vector to Raster Conversion-Data Output-Map Compilation –Chart/Graphs–Multimedia–Enterprise Vs .Desktop GIS-distributed GIS.

                                                    Total : 45 Periods

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

- *Apply knowledge of mathematics, science, and applied sciences.*
- *Design and conduct experiments, as well as to analyze and interpret data.*
- *Formulate or design a system, process or program to meet desired needs.*
- *Function on multi-disciplinary teams.*
- *Use the techniques, skills, and modern scientific and technical tools necessary for professional practice.*

Text Books :

1   Kang-TsungChang,"Introduction to Geographic Information Systems",2ndEdition, McGrawHillPublishing, 2011.
2   Ian Heywood, Sarah Cornelius, Steve Carver, Srinivasa Raju, "An Introduction Geographical Information Systems, 2ndEdition, Pearson Education, 2007.

Reference Books :

1   The Design and Implementation of Geographic Information Systems John E.Harmon & Steven J Anderson, John Wiley & Sons-2003
2   The International Encyclopedia of Geograph John Kang-Tsung Chang, John Wiley & Sons, Ltd. 2017
3   Managing Geographic Information Systems Nancy J.Obermeyer and Jeffrey K.Pinto Second Edition
4   LoAlbert C.P.YeungK.W.Concepts and Techniques of Geographic Information Systems,PrenticeHallof India Publishers, 2006

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<u>**SEMESTER -   VII (Elective III)**</u>

16IT761	**ADVANCED COMPUTER ARCHITECTURE**	L	T	P	C
		3	0	0	3

***Prerequisite**: Computer Architecture*
Objective(s):

- *To understand the basics of fundamentals of computer design*
- *To understand the concepts of memory hierarchy*
- *To learn the advanced hardware-based techniques for exploiting instruction level parallelism*
- *To learn the data level parallelization of computer code across multiple processors in parallel computing environments*
- *To apply the thread level parallelism in multiprocessor environment*

UNIT - I   FUNDAMENTALS OF COMPUTER DESIGN   [9]

Introduction – Classes of Computers – Computer Architecture - Measuring and Reporting Performance – Quantitative Principles of Computer Design. Instruction set principles – Classifying Instruction Set Architectures-Memory Addressing

UNIT - II   MEMORY HIERARCHY DESIGN   [9]

Introduction – Review of caches – Cache performance – Reducing cache miss penalty – Reducing miss Rate – Miss rate via parallelism – Reducing hit time – Memory Technology – SRAM Technology – DRAM Technology - Protection

UNIT - III   INSTRUCTION LEVEL PARALLELISM   [9]

ILP – Concepts and challenges – Overcoming Data Hazards with Dynamic Scheduling Using Tomasulo's Approach – Hardware Based Speculation – Exploiting ILP Using Static and Dynamic Scheduling - Instruction Delivery and Speculation – Limitations of ILP.

UNIT - IV   DATA LEVEL PARALLELISM   [9]

Introduction – Vector Architecture – Vector Execution Time – Vector length Registers – Vector Mask Registers and Memory Bank – SIMD Instruction set Extensions for Multimedia – Graphics Processing Units - Detecting and Enhancing Loop-Level Parallelism.

UNIT - V   THREAD LEVEL PARALLELISM   [9]

Introduction - Multiprocessor Architecture – Challenges of Parallel Processing – Centralized Shared-Memory Architecture – Limitations in Symmetric shared-memory multiprocessor – Performance of Symmetric shared memory – Distributed Shared-memory and Directory-Based Coherence

Total : 45 Periods

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

- *Discuss the classes of computers, and new trends and developments in computer architecture*
- *Explain the concept of memory hierarchy and memory technology*
- *Discuss the concept of instruction level parallelism and exploiting ILP using dynamic scheduling*
- *Explain about data level parallelism and graphics processing units*
- *Discuss the concept of multiprocessor and thread level parallelism*

Text Books :

1   John L. Hennessey and David A. Patterson, "Computer architecture – A quantitative approach", Morgan Kaufmann / Elsevier Publishers, Fifth edition, 2012.

2.   William Stallings, "Computer Organization and Architecture – Designing for Performance", 8th Edition, Pearson Education, 2010.

Reference Books :

1   William Stallings,"Computer Organization and Architecture – Designing for Performance", Pearson Education, Eight Edition, 2010.

2   Behrooz Parhami, "Computer Architecture", Oxford University Press, 2009.

3   Kai Hwang and Zhi.Wei Xu, "Scalable Parallel Computing", Tata McGraw Hill, New Delhi, 2003.

4   https://www.youtube.com/watch?v=RJ3mvl87b7U&list=PL07FAB55C669A6CF0

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<u>**SEMESTER - VII (Elective III)**</u>

16IT762	**ENTREPRENEURSHIP DEVELOPMENT AND BUSINESS MANAGEMENT**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Prerequisite: No prerequisite needed for enrolling into the course

Objective(s):

- *To know the basics of the entrepreneurship*
- *To study the principles of entrepreneurial environment.*
- *To prepare the business plan for the product.*
- *To launch small business plan.*
- *To manage the small business effectively.*

UNIT - I   **ENTREPRENEURAL COMPETENCE**   **[9]**

Entrepreneurship concept – Entrepreneurship as a Career – Entrepreneurial Personality - Characteristics of Successful, Entrepreneur – Knowledge and Skills of Entrepreneur.

UNIT - II   **ENTREPRENEURAL ENVIRONMENT**   **[9]**

Business Environment - Role of Family and Society - Entrepreneurship Development Training and Other Support Organisational Services - Central and State Government Industrial Policies and Regulations - International Business.

UNIT - III   **BUSINESS PLAN PREPARATION**   **[9]**

Sources of Product for Business - Prefeasibility Study - Criteria for Selection of Product - Ownership - Capital - Budgeting Project Profile Preparation - Matching Entrepreneur with the Project - Feasibility Report Preparation and Evaluation Criteria.

UNIT - IV   **LAUNCHING OF SMALL BUSINESS**   **[9]**

Finance and Human Resource Mobilization Operations Planning - Market and Channel Selection - Growth Strategies - Product Launching – Incubation, Venture capital, IT startups.

UNIT-V   **MANAGEMENT OF SMALL BUSINESS**   **[9]**

Monitoring and Evaluation of Business - Preventing Sickness and Rehabilitation of Business Units- Effective Management of small Business.

     Total : 45 Periods

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

- *Know the basics of the entrepreneurship*
- *Study the principles of entrepreneurial environment.*
- *Prepare the business plan for the product.*
- *Launch small business plan.*
- *Manage the small business effectively.*

Text Books :

1   Hisrich," Entrepreneurship", Tata McGraw Hill, New Delhi, 2001.

2   S.S.Khanka, Entrepreneurial Development, S.Chand and Company Limited, New Delhi, 2001.

Reference Books :

1   Mathew Manimala, "Entrepreneurship Theory at the Crossroads", Paradigms & Praxis, Biztrantra ,2nd Edition ,

2   Prasanna Chandra, "Projects – Planning, Analysis, Selection, Implementation and Reviews", Tata McGraw-Hill, 1996.

3   P.Saravanavel, "Entrepreneurial Development", Ess Pee kay Publishing House, Chennai -1997.

4   Donald F Kuratko, T.V Rao. Entrepreneurship: A South Asian perspective. Cengage Learning. 2012

K.S.R. COLLEGE OF ENGINEERING (Autonomous)   **R 2016**
SEMESTER -VII (Elective III)

16IT763	DIGITAL IMAGE PROCESSING	L	T	P	C
		3	0	0	3

Prerequisite: - *No prerequisite needed for enrolling into the course*
Objective(s):
- *To learn digital image fundamentals.*
- *To be exposed to simple image enhancement techniques.*
- *To learn about various image segmentation and restoration concepts.*
- *To be familiar with image compression and segmentation techniques.*
- *To learn representation of image in form of features.*

UNIT - I   DIGITAL IMAGE FUNDAMENTALS   [9]
Introduction – Origin – Steps in Digital Image Processing – Components – Elements of Visual Perception – Image Sensing and Acquisition – Image Sampling and Quantization – Relationships between pixels - color models.

UNIT - II   IMAGE ENHANCEMENT   [9]
Spatial Domain: Gray level transformations – Histogram processing – Basics of Spatial Filtering– Smoothing and Sharpening Spatial Filtering – Frequency Domain: Introduction to Fourier Transform – Smoothing and Sharpening frequency domain filters – Ideal, Butterworth and Gaussian filters.

UNIT - III   IMAGE RESTORATION AND SEGMENTATION   [9]
Noise models – Mean Filters – Order Statistics – Adaptive filters – Band reject Filters – Band pass Filters – Notch Filters – Optimum Notch Filtering – Inverse Filtering – Wiener filtering Segmentation: Detection of Discontinuities–Edge Linking and Boundary detection – Region based segmentation- Morphological processing- erosion and dilation.

UNIT - IV   WAVELETS AND IMAGE COMPRESSION   [9]
Wavelets – Sub band coding – Multi resolution expansions - Compression: Fundamentals – Image Compression models – Error Free Compression – Variable Length Coding – Bit-Plane Coding – Lossless Predictive Coding – Lossy Compression – Lossy Predictive Coding – Compression Standards.

UNIT - V   IMAGE REPRESENTATION AND RECOGNITION   [9]
Boundary representation – Chain Code – Polygonal approximation, signature, boundary segments – Boundary description – Shape number – Fourier Descriptor, moments- Regional Descriptors – Topological feature, Texture - Patterns and Pattern classes - Recognition based on matching.

                                                                            Total : 45 Periods

Course Outcomes: On completion of this course, the student will be able to
- *Discuss digital image fundamentals*
- *Apply image enhancement and restoration techniques*
- *Use image compression and segmentation Techniques*
- *Represent features of images*
- *Discuss image representation concepts*

Text Book :
1   Rafael C. Gonzales, Richard E. Woods, "Digital Image Processing", Third Edition, Pearson Education, 2010.
Reference Books :
1   Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins, "Digital Image Processing Using MATLAB", Third Edition Tata McGraw Hill Pvt. Ltd., 2011.
2   Anil Jain K. "Fundamentals of Digital Image Processing", PHI Learning Pvt. Ltd., 2011.
3   William K Pratt, "Digital Image Processing", John Willey, 2002.

K.S.R. COLLEGE OF ENGINEERING (Autonomous)   **R 2016**
<u>SEMESTER - VII (Elective III)</u>

		L	T	P	C
16IT764	**INFORMATION STORAGE AND RETRIEVAL**	3	0	0	3

Prerequisite: *No prerequisite needed for enrolling into the course*
Objective(s):

- *To understand information retrieval process.*
- *To understand concepts of clustering and how it is related to Information retrieval.*
- *To deal Storage, Organization & Access to Information Items.*
- *To evaluate the performance of IR system.*
- *To understand information sharing on semantic web.*

UNIT - I   INTRODUCTION   [9]

Basic Concepts of IR, Data Retrieval & Information Retrieval, IR system block diagram. Automatic Text Analysis: Luhn's ideas, Conflation Algorithm, Indexing and Index Term Weighing, Probabilistic Indexing, Automatic Classification. Measures of Association, Different Matching Coefficient, Classification Methods, Cluster Hypothesis, Clustering Algorithms, Single Pass Algorithm, Single Link Algorithm, Rocchio's Algorithm.

UNIT - II   STORAGE AND SEARCHING TECHNIQUES   [9]

Storage: Inverted file, Suffix trees & suffix arrays, Signature Files, Scatter storage or hash addressing, Clustered files. IR Models: Basic concepts, Boolean Model, Vector Model Searching strategies: Boolean Search, Serial search, cluster based retrieval, Query languages, Types of queries, Patterns matching, structural queries.

UNIT - III   RETRIEVAL PERFORMANCE EVALUATION AND ONTOLOGY   [9]

Performance evaluation:Precision and recall, alternative measures Ontology: Ontology based information sharing, Ontology languages for semantic web, Ontology creation.

UNIT - IV   DISTRIBUTED AND MULTIMEDIA IR   [9]

Distributed IR: Introduction, Collection Partitioning, Source Selection, Query Processing, web issues. MULTIMEDIA IR: Introduction, Data Modeling, Query languages, Generic multimedia indexing approach, One dimensional time series, two dimensional color images, Automatic feature extraction.

UNIT-V   WEB SEARCHING   [9]

Searching the Web: Challenges, Characterizing the Web, Search Engines, Browsing, Mata-searchers, Web crawlers, Meta-crawler, Web data mining, Finding needle in the Haystack, Searching using Hyperlinks, Page ranking algorithms.

Total : 45 Periods

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

- *Explain information retrieval process.*
- *Discuss concepts of clustering and how it is related to Information retrieval.*
- *Explain deal Storage, Organization & Access to Information Items.*
- *Evaluate the performance of IR system.*
- *Discuss information sharing on semantic web.*

Text Books :

1   Yates & Neto, "Modern Information Retrieval", Pearson Education, ISBN 81-297-0274-6.
2   C.J. Rijsbergen, "Information Retrieval", (www.dcs.gla.ac.uk).

Reference Books :

1   Christopher D. Manning, PrabhakarRaghavan and HinrichSchutze"Introduction to Information Retrieval", Cambridge University Press, ISBN 978-0-521-86571-5
2   Mark leven, "Introduction to search engines and web navigation", John Wiley and sons Inc.,ISBN 9780-170-52684-2.
3   V. S. Subrahamanian, Satish K. Tripathi "Multimedia information System", Kulwer Academic Publisher.
4   ChabaneDjeraba,"Multimedia mining A highway to intelligent multimedia documents", Kulwer Academic Publisher, ISBN 1-4020-7247-3.

K.S.R. COLLEGE OF ENGINEERING (Autonomous)　　　　**R 2016**
SEMESTER - VII (Elective III)

	L	T	P	C
16IT765　　　　**SERVICE ORIENTED ARCHITECTURE**	3	0	0	3

Prerequisite: Computer Networks,Web Technology
Objective(s):

* *To understand the basic principles of service orientation.*
* *To learn advanced concepts such as service composition, orchestration and Choreography.*
* *To be familiar with the web services technology elements for realizing SOA.*
* *To learn the various web service standards.*

UNIT - I　　　　**INTRODUCTION**　　　　　　　　　　　　　　　　　　**[9]**

Characteristics of SOA, Comparing SOA with Client-Server and Distributed architectures – Benefits of SOA — Principles of Service orientation – How components in an SOA interrelate – Principles of service orientation.

UNIT - II　　　　**WEB SERVICES**　　　　　　　　　　　　　　　　　　**[9]**

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

UNIT - III　　　　**SERVICE ORIENTED ANALYSIS**　　　　　　　　　　　　**[9]**

Service oriented analysis – Business-centric SOA – Deriving business services- service modeling - service modeling guidelines.

UNIT - IV　　　　**SERVICE ORIENTED DESIGN**　　　　　　　　　　　　　**[9]**

Service Oriented Design – WSDL basics – SOAP basics – SOA composition guidelines – Entity-centric business service design – Application service design – Task-centric business service design.

UNIT - V　　　　**BUILDING SOA-BASED APPLICATIONS**　　　　　　　　**[9]**

WS-BPEL basics – WS-Coordination overview - WS-Addressing language basics, WS-Reliable Messaging language basics, WS-Policy.

　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　Total : 45 Periods

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

* *Build applications based on XML.*
* *Develop web services using technology elements.*
* *Build SOA-based applications for intra-enterprise and inter-enterprise applications*
* *Discuss distributed system*
* *Discuss web service policy*

Text Book:

1　　　　Thomas Erl, "Service-Oriented Architecture: Concepts, Technology, and Design", Pearson 2nd Education, 2016.

Reference Books :

1　　　　Dan Woods and Thomas Mattern, " Enterprise SOA Designing IT for Business Innovation" O'REILLY, 8th Edition, 2012

2　　　　Sandeep Chatterjee, James Webber, "Developing Enterprise Web Services, An Architect's Guide", Pearson Education, 2005.

3　　　　Newcomer, Lomow, "Understanding SOA with Web Services", Pearson Education, 2005.

4　　　　Thomas Erl, "SOA Principles of Service Design", The Prentice Hall, 2005.

K.S.R. COLLEGE OF ENGINEERING (Autonomous)   **R 2016**
<u>**SEMESTER - VIII (Elective III)**</u>

		L	T	P	C
16IT766	**UNIX INTERNALS**	3	0	0	3

Prerequisite: *No prerequisite needed for enrolling into the course*
Objective(s):
* *To get thorough understanding of the kernel.*
* *To understand the file organization and management.*
* *To know the various system calls.*
* *To have a knowledge of process architecture, process control & scheduling*
* *To get the knowledge of memory management.*

UNIT - I   GENERAL OVERVIEW OF THE SYSTEM   [9]

History – System structure – User perspective – Operating system services –
Assumptions about hardware. Introduction to the Kernel : Architecture of the UNIX operating system – Introduction to
system concepts – Kernel data structures – System administration – Summary and Preview.

UNIT - II   BUFFER CACHE   [9]

Buffer headers – Structure of the buffer pool – Advantages and disadvantages of the buffer cache. Internal representation of
files : Inodes – Structure of a regular file – Directories – Conversion of a path name to an Inode – Super block – Other file
types.

UNIT - III   SYSTEM CALLS FOR FILE SYSTEM   [9]

Open – Read – Write – File and record locking – Adjusting the position of file I/O –LSEEK – Close – File creation – Creation
of special files – Pipes – Dup – Mounting and unmounting file systems

UNIT - IV   THE STRUCTURE OF PROCESSES   [9]

Process states and transitions – Layout of system memory – The context of a process – Saving the context of a process.
Process Control: Process creation – Signals – Process termination – Awaiting process termination – Invoking other
programs – The shell – System boot and the INIT process.

UNIT - V   PROCESS SCHEDULING AND MEMORY MANAGEMENT POLICIES   [9]

Process Scheduling – Memory Management Policies: Swapping – A hybrid system with swapping and demand paging. The
I/O Subsystem: Driver Interfaces– Disk Drivers-Terminal Drivers.

                                                                    Total : 45 Periods

Course Outcomes: On completion of this course, the student will be able to
* *Understand the general overview of the system*
* *Understand the kernel,*
* *Gain knowledge about the I/O & files,*
* *Gain knowledge about process control,*
* *Explore into scheduling and memory management policies in UNIX.*

Text Books :
1   Maurice J. Bach, "The Design of the Unix Operating System", Prentice Hall of India, 2004.
2   Uresh Vahalia, "UNIX Internals: The New Frontiers", Prentice Hall of India, 2000

Reference Books :
1   Vahalia, "Unix Internals: The New Frontiers", Pearson Education Inc, 2003.
2   John Lion, "Lion's Commentary on UNIX", 6th edition, Peer-to-Peer Communications, 2004.
3   Daniel P. Bovet & Marco Cesati, "Understanding the Linux Kernel", O'REILLY,Shroff Publishers & Distributors Pvt.
        Ltd, 2000.
4   M. Beck et al, "Linux Kernel Programming", Pearson Education Asia, 2002.

K.S.R. COLLEGE OF ENGINEERING (Autonomous)   **R 2016**
<u>SEMESTER - VII (Elective III)</u>

16IT767	SOFT COMPUTING	L	T	P	C
		3	0	0	3

Prerequisite: *Artificial Intelligence*
Objective(s):

- *To learn the various soft computing frame works.*
- *To be familiar with design of various neural networks.*
- *To be exposed to fuzzy logic.*
- *To learn genetic programming*
- *To be exposed to hybrid systems*

UNIT - I   INTRODUCTION   [9]
Artificial neural network: Introduction, characteristics- learning methods – taxonomy – Evolution of neural networks- basic models – important technologies – applications. Fuzzy logic: Introduction – crisp sets- fuzzy sets – crisp relations and fuzzy relations: cartesian product of relation – classical relation, fuzzy relations, tolerance and equivalence relations, non-iterative fuzzy sets. Genetic algorithm- Introduction – biological background – traditional optimization and search techniques – Genetic basic concepts.

UNIT - II   NEURAL NETWORKS   [9]
McCulloch-Pitts neuron – linear separability – hebb network – supervised learning network: perceptron networks – adaptive linear neuron, multiple adaptive linear neuron, BPN, RBF, TDNN- associative memory network: auto-associative memory network, hetero-associative memory network, BAM, hopfield networks, iterative auto associative memory network & iterative associative memory network – unsupervised learning networks: Kohonen self-organizing feature maps, LVQ – CP networks, ART network.

UNIT - III   FUZZY LOGIC   [9]
Membership functions: features, fuzzification, methods of membership value   assignments- Defuzzification: lambda cuts – methods – fuzzy arithmetic and fuzzy measures: fuzzy arithmetic – extension principle – fuzzy measures – measures of fuzziness -fuzzy integrals – fuzzy rule base and approximate reasoning : truth values and tables, fuzzy propositions, formation of rules-decomposition of rules, aggregation of fuzzy rules, fuzzy reasoning-fuzzy inference systems-overview of fuzzy expert system-fuzzy decision making

UNIT - IV   GENETIC ALGORITHM   [9]
Genetic algorithm and search space – general genetic algorithm – operators – Generational cycle – stopping condition – constraints – classification genetic programming – multilevel optimization – real life problem- advances in GA

UNIT - V   HYBRID SOFT COMPUTING TECHNIQUES & APPLICATIONS   [9]
Neuro-fuzzy hybrid systems – genetic neuro hybrid systems – genetic fuzzy hybrid and fuzzy genetic hybrid systems – simplified fuzzy ARTMAP – Applications: A fusion approach of multispectral images with SAR, optimization of traveling salesman problem using genetic algorithm approach, soft computing based hybrid fuzzy controllers

Total :   45 Periods

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

- *Apply various soft computing frame works.*
- *Design of various neural networks.*
- *Use fuzzy logic.*
- *Apply genetic programming.*
- *Apply genetic programming.*

Text Books :
1   J.S.R.Jang, C.T. Sun and E.Mizutani, "Neuro-Fuzzy and Soft Computing", PHI / Pearson Education 2004
2   S.N.Sivanandam and S.N.Deepa, "Principles of Soft Computing", Wiley India Pvt Ltd, 2011.

Reference Books :
1   S.Rajasekaran and G.A.Vijayalakshmi Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithm: Synthesis & Applications", Prentice-Hall of India Pvt. Ltd., 2006.
2   David E. Goldberg, "Genetic Algorithm in Search Optimization and Machine Learning" Pearson Education , 2013.
3   Simon Haykin, "Neural Networks Comprehensive Foundation" Second Edition, Pearson Education, 2005
4   Timothy J. Ross, "Fuzzy Logic with Engineering Applications", Third Edition, John Wiley & Sons, 2010.

K.S.R. COLLEGE OF ENGINEERING (Autonomous)   **R 2016**
<u>**SEMESTER - VII (Elective III)**</u>

16IT768	SEMANTIC WEB	L	T	P	C
		3	0	0	3

Prerequisite: No prerequisite needed for enrolling into the course
Objectives:

- To understand the need of semantic web in web services
- To know the methods to discover, classify and build ontology for more reasonable results in searching

UNIT - I   INTRODUCTION   [9]

Introduction to the Syntactic web and Semantic Web – Evolution of the Web – The visual and syntactic web – Levels of Semantics – Metadata for web information - The semantic web architecture and technologies –Contrasting Semantic with Conventional Technologies –Semantic Modeling - Potential of semantic web solutions and challenges of adoption

UNIT - II   ONTOLOGICAL ENGINEERING   [9]

Ontologies – Taxonomies –Topic Maps – Classifying Ontologies – Terminological aspects: concepts, terms, relations between them – Complex Objects –Subclasses and Sub-properties definitions – Upper Ontologies – Quality – Uses - Types of terminological resources for ontology building – Methods and methodologies for building ontologies – Multilingual Ontologies -Ontology Development process and Life cycle – Methods for Ontology Learning – Ontology Evolution – Versioning

UNIT - III   STRUCTURING AND DESCRIBING WEB RESOURCES   [9]

Structured Web Documents - XML – Structuring – Namespaces – Addressing – Querying – Processing - RDF – RDF Data Model – Serialization Formats- RDF Vocabulary –Inferencing - RDFS – basic Idea – Classes – Properties- Utility Properties – RDFS Modeling for Combinations and Patterns- Transitivity

UNIT - IV   WEB ONTOLOGY LANGUAGE   [9]

OWL – Sub-Languages – Basic Notions -Classes- Defining and Using Properties – Domain and Range – Describing Properties - Data Types – Counting and Sets- Negative Property Assertions – Advanced Class Description – Equivalence – Owl Logic.

UNIT - V   SEMANTIC WEB TOOLS AND APPLICATIONS   [9]

Development Tools for Semantic Web – Jena Framework – SPARL –Querying semantic web - Semantic Wikis - Semantic Web Services – Modeling and aggregating social network data - Ontological representation of social relationships, Aggregating and reasoning with social network data.

Total : 45 Periods

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

- *Understand semantic web basics, architecture and technologies*
- *Able to represent data from a chosen problem in XML with appropriate semantic tags obtained from the ontology*
- *Able to understand the semantic relationships among these data elements using Resource Description framework*
- *Able to design and implement a web services application that "discovers" the data and/or other web services*
- *Able to discover the capabilities and limitations of semantic web technology for social networks*
-

Text Books :

1   Liyang Yu, "A Developer's Guide to the Semantic Web", Springer, First Edition, 2011

Reference Books :

1	Robert M. Colomb, "Ontology and the Semantic Web", Volume 156 Frontiers in Artificial Intelligence and Applications (Frontier in Artificial Intelligence and Applications), IOS Press, 2007.
2	Dean Allemang and James Hendler, "Semantic Web for the Working Ontologist: Effective Modeling in RDFS and OWL, Morgan Kaufmann", Second Edition, 2011.
3	Michael C. Daconta, Leo J. Obrst and Kevin T. Smith, "The Semantic Web: A Guide to the Future of XML, Web Services, and Knowledge Management", Wiley, First Edition 2003
4	Karin Breitman, Marco Antonio Casanova and Walt Truszkowski, "Semantic Web: Concepts, Technologies and Applications (NASA Monographs in Systems and Software Engineering)", Springer, Softcover, 2010.

K.S.R. COLLEGE OF ENGINEERING (Autonomous)   **R 2016**
SEMESTER - VII (Professional Elective III)

		L	T	P	C
16IT769	**AGENT BASED INTELLIGENT SYSTEMS**	3	0	0	3

Prerequisite: No prerequisite needed for enrolling into the course
Objectives:

* *To study about the basics of the structure of agents*
* *To discuss the learning in agents*
* *To discuss about the communication and cooperation of agents*
* *To develop an intelligent agent systems*
* *To design agents for various real time applications*

UNIT - I   INTRODUCTION   [9]

Agents as a paradigm for software engineering - Agents as a tool for understanding human societies- Intelligent Agent: Agents and Objects - Agents and Expert Systems - Agents as Intentional Systems - Abstract Architectures for Intelligent Agents - How to Tell an Agent What to Do

UNIT - II   LEARNING IN AGENTS   [9]

Proportional case - Handling variables and qualifiers - Dealing with intractability - Reasoning with horn clauses - Procedural control of reasoning - Rules in production – Reasoning with Higher order Logics.

UNIT - III   COMMUNICATION AND COOPERATION IN AGENTS   [9]

Software tools for ontology - OWL - XML - KIF - Speech acts - Cooperative Distributed Problem Solving - Task Sharing and Result Sharing - Result Sharing - Combining Task and Result Sharing - Handling Inconsistency - Coordination - Multi agent Planning and Synchronization

UNIT - IV   DEVELOPING INTELLIGENT AGENT SYSTEMS   [9]

Situated Agents: Actions and Percepts - Proactive and Reactive Agents: Goals and Events - Challenging Agent Environments: Plans and Beliefs - Social Agents - Agent Execution Cycle - Deciding on the Agent Types - Grouping functionalities - Review Agent Coupling - Acquaintance Diagrams - Develop Agent Descriptors

UNIT - V   APPLICATIONS   [9]

Agent for workflow and business process management- Mobile agents - Agents for distributed systems - agents for information retrieval and management - agents for electronic commerce - agent for human- computer interface - agents for virtual environments - agents for social simulation

Total : 45 Periods

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

* *Implement a computational agent with various searching techniques.*
* *Apply the reasoning mechanisms of proposition and predicate logic to agents.*
* *Use the learning mechanisms for an artificial agent.*
* *Execute different communication and co-operation methodologies in a multi-agent setup.*
* *Explain about cooperative application*
* *Design workflow for agent based application*
*

Text Books :

1   Michael Wooldridge," An Introduction to Multi Agent Systems", Second Edition, John Wiley and Sons, 2009
2   Stuart Russell, Peter Norvig,"Artificial Intelligence: A Modern Approach‖", Third Edition, Pearson Education, 2009.

Reference Books :

1   Lin Padgham, Michael Winikoff," Developing Intelligent Agent Systems: A Practical Guide", Wiley publications, 2005.
2   Ronald Brachman, Hector Levesque ,"Knowledge Representation and Reasoning ‖", The Morgan Kaufmann Series in Artificial Intelligence 2004
3   Arthur B. Markman,"Knowledge Representation", Lawrence Erlbaum Associates,1998
4   Saroj Kaushik, "Artificial Intelligence", Cengage Learning, 2012

16IT771	HUMAN COMPUTER INTERACTION	L	T	P	C
		3	0	0	3

Prerequisite: *Computer Networks*
Objective(s):

- *To learn the foundations of Human Computer Interaction.*
- *To be familiar with the design technologies for individuals and persons with disabilities.*
- *To be aware of mobile HCI.*
- *To learn the guidelines for user interface..*

UNIT - I   FOUNDATIONS OF HCI   [9]
The Human: I/O channels – Memory – Reasoning and problem solving; The computer: Devices – Memory – processing and networks; Interaction: Models – frameworks – Ergonomics – styles – elements – interactivity- Paradigms..

UNIT - II   DESIGN & SOFTWARE PROCESS   [9]
Interactive Design basics – process – scenarios – navigation – screen design – Iteration and prototyping. HCI in software process – software life cycle – usability engineering – Prototyping in practice – design rationale. Design rules – principles, standards, guidelines, rules. Evaluation Techniques – Universal Design.

UNIT - III   MODELS AND THEORIES   [9]
Cognitive models –Socio-Organizational issues and stake holder requirements –Communication and collaboration models-Hypertext, Multimedia and WWW.

UNIT - IV   MOBILE HCI   [9]
Mobile Ecosystem: Platforms, Application frameworks- Types of Mobile Applications: Widgets, Applications, Games- Mobile Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design, Tools.

UNIT - V   WEB INTERFACE DESIGN   [9]
Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow. Case Studies

                                                                      Total : 45 Periods

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

- *Design effective dialog for HCI.*
- *Design effective HCI for individuals and persons with disabilities.*
- *Assess the importance of user feedback.*
- *Explain the HCI implications for designing multimedia/ ecommerce/ e-learning Web sites.*
- *Develop meaningful user interface.*

Text Books :

1 Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, "Human Computer Interaction", 3rd Edition, Pearson Education, 2004.

2 Brian Fling, "Mobile Design and Development", First Edition , O"Reilly Media Inc., 2009.

Reference Books :

1 Bill Scott and Theresa Neil, "Designing Web Interfaces", First Edition, O"Reilly, 2009.(UNIT-V).

2 Jakob Nielsen, "Usability Engineering", Morgan Kaufmann Publishers, 1992.

3 Ben Shneiderman, "Designing the user interface: Strategies for effective human computer interaction", 4th Edition, Reading, 2004

4 Special Issue on Brain Control Interfaces, IEEE Transactions on Neural Systems and Rehabilitation Engineering, Vol 14, June 2006.

K.S.R. COLLEGE OF ENGINEERING (Autonomous)   **R 2016**
<u>**SEMESTER -VIII   (Elective IV & V)**</u>

16IT861	BIO INFORMATICS	L	T	P	C
		3	0	0	3

Prerequisite: *No prerequisite needed for enrolling into the course*
Objective(s):

- *To be exposed to the need for Bioinformatics technologies.*
- *To be aware of DWDM in bioinformatics.*
- *To be familiar with the modeling techniques.*
- *To learn microarray analysis.*
- *To be exposed to Pattern Matching and Visualization.*

UNIT - I   INTRODUCTION   [9]
Need for Bioinformatics technologies – Overview of Bioinformatics technologies Structural bioinformatics – Data format and processing – Secondary resources and applications – Role of Structural bioinformatics - Biological Data Integration System.

UNIT - II   DATAWAREHOUSING AND DATAMINING IN BIOINFORMATICS   [9]
Bioinformatics data – Data warehousing architecture – data quality – Biomedical data analysis – DNA data analysis – Protein data analysis – Machine learning – Neural network architecture and applications in bioinformatics.

UNIT - III   MODELING FOR BIOINFORMATICS   [9]
Hidden markov modeling for biological data analysis – Sequence identification –Sequence classification – multiple alignment generation – Comparative modeling –Protein modeling – genomic modeling – Probabilistic modeling – Bayesian networks – Boolean networks - Molecular modeling – Computer programs for molecular modeling..

UNIT - IV   PATTERN MATCHING AND VISUALIZATION   [9]
Gene regulation – motif recognition – motif detection – strategies for motif detection – Visualization – Fractal analysis – DNA walk models – one dimension – two dimension – higher dimension – Game representation of Biological sequences – DNA, Protein, Amino acid sequences.

UNIT - V   MICROARRAY ANALYSIS   [9]
Microarray technology for genome expression study – image analysis for data extraction – preprocessing – segmentation – gridding – spot extraction – normalization, filtering – cluster analysis – gene network analysis – Compared Evaluation of Scientific Data Management Systems – Cost Matrix – Evaluation model - Benchmark – Tradeoffs.

Total: 45 Periods

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

- *Develop models for biological data.*
- *Apply pattern matching techniques to bioinformatics data – protein data genomic data.*
- *Apply micro array technology for genomic expression study.*
- *Explain about pattern recognition and visualization*
- *Discuss microarray analysis*

Text Book :

1   Yi-Ping Phoebe Chen (Ed), "Bioinformatics Technologies", First Indian Reprint, Springer Verlag, 2007.

Reference Books :

1   Bryan Bergeron, "Bio Informatics Computing", Second Edition, Pearson Education, 2003.
2   Arthur M Lesk, "Introduction to Bioinformatics", Second Edition, Oxford University Press, 2005
3   Ronald Brachman, Hector Levesque ,"Knowledge Representation and Reasoning ll", The Morgan Kaufmann Series in Artificial Intelligence 2004
4   Timothy J. Ross, "Fuzzy Logic with Engineering Applications", Third Edition, John Wiley & Sons, 2010.

K.S.R. COLLEGE OF ENGINEERING (Autonomous)   **R 2016**
SEMESTER – VIII (Elective IV & V)

16IT862	INTELLECTUAL PROPERTY RIGHTS	L	T	P	C
		3	0	0	3

Prerequisite: *No prerequisite needed for enrolling into the course*
Objective(s):

* *To know the importance of intellectual property rights.*
* *To narrate the trade mark and registration processes*
* *To state the laws of copy right and patents*
* *To recognize the status of trade secrets*
* *To summarize the new developments of intellectual property.*

UNIT - I   INTRODUCTION TO INTELLECTUAL PROPERTY   [9]

Introduction – Types of intellectual property – International organizations – Agencies and treaties – Importance of intellectual property rights.

UNIT - II   TRADE MARKS   [9]

Purpose and function of trademarks– Acquisition of trade mark rights – Protectable matter, selecting and evaluating trade mark – Trade mark registration processes.

UNIT - III   LAW OF COPY RIGHTS & PATENTS   [9]

Fundamental of copy right law – Originality of material, rights of reproduction –   Rights to perform the work publicly –Copy right ownership issues – Copy right registration – Notice of copy right – International copy right law. Foundation of patent law – Patent searching process – Ownership rights and transfer.

UNIT - IV   TRADE SECRETS & UNFAIR COMPETITION   [9]

Trade secretes law – Determination of trade secrete status – Liability for misappropriations of trade secrets – Protection for submission – Trade secrete litigation. Misappropriation right of publicity – False advertising.

UNIT - V   NEW DEVELOPMENT OF INTELLECTUAL PROPERTY   [9]

New developments in trade mark law – Copy right law – Patent law – Intellectual property audits. International overview on intellectual property– International - trade mark law – Copy right law – International patent law – International development in trade secrets law.

Total: 45 Periods

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

* *Illustrate various types of intellectual property.*
* *Outline the procedure for selection and evaluation of trade mark.*
* *Summarize the law of patents and also patent searching process.*
* *Explain the concept of trade secrete law.*
* *Describe the international overview on intellectual property.*

Text Books :

1   Deborah, E. Bouchoux,Intellectual Property : The Law of Trademarks, Copyrights, Patents and Trade Secrets, Cengage learning.2013.

2   M Murray and M.J. Mehlman, Encyclopedia of Ethical, Legal and Policy issues in Biotechnology, John Wiley & Sons 2000.

Reference Books :

1   Prabuddha ganguli, "Intellectual property right - Unleashing the knowledge economy", Tata Mc Graw Hill Publishing Company Ltd.

2   P. Narayanan; Law of Copyright and Industrial Designs; Eastern law House, Delhi, 2010.

3   V.K. Unni, Trademarks & The Emerging Concepts of Cyber Property Rights, Eastern Law House, 2005.

4   Dr. Vikes Vashishth, Law & Practice of Intellectual Property in India, Bharath Law House Pvt. Ltd., 2002

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SEMESTER - VIII (Elective IV & V)

		L	T	P	C
16IT863	**GREEN IT : PRINCIPLES AND PRACTICES**	3	0	0	3

Prerequisite: *No prerequisite needed for enrolling into the course*
Objective(s):

- *To understand what Green IT is and How it can help improve environmental Sustainability*
- *To understand the principles and practices of Green IT.*
- *To understand how Green IT is adopted or deployed in enterprises.*
- *To study the metrics and strategies for green IT systems*
- *To provide services and play roles for green IT services.*

UNIT - I   INTRODUCTION   [9]
Environmental Impacts of IT, Holistic Approach to Greening IT, Green IT Standards and Eco-Labelling, Enterprise Green IT Strategy , Green IT: Burden or Opportunity? Hardware: Life Cycle of a Device or Hardware, Reuse, Recycle and Dispose. Software: Introduction, Energy-Saving Software Techniques, Evaluating and Measuring Software Impact to Platform Power.

UNIT - II   SOFTWARE DEVELOPMENT AND DATA CENTERS   [9]
Sustainable Software, Software Sustainability Attributes, Software Sustainability Metrics, Sustainable Software Methodology, Data Centres and Associated Energy Challenges, Data Centre IT Infrastructure, Data Centre Facility Infrastructure: Implications for Energy Efficiency, IT Infrastructure Management, Green Data Centre Metrics.

UNIT - III   DATA STORAGE AND COMMUNICATION   [9]
Storage Media Power Characteristics, Energy Management Techniques for Hard Disks, System-Level Energy Management, Objectives of Green Network Protocols, Green Network Protocols and Standards.

UNIT - IV   INFORMATION SYSTEMS, GREEN IT STRATEGY AND METRICS   [9]
Approaching Green IT Strategies, Business Drivers of Green IT Strategy, Business Dimensions for Green IT Transformation, Multilevel Sustainable Information, Sustainability Hierarchy Models, Product Level Information, Individual Level Information, Functional Level Information, Organizational Level Information, Regional/City Level Information, Measuring the Maturity of Sustainable ICT.

UNIT-V   GREEN IT SERVICES AND ROLES   [9]
Factors Driving the Development of Sustainable IT, Sustainable IT Services (SITS), SITS Strategic Framework, Sustainable IT Roadmap, Organizational and Enterprise Greening, Information Systems in Greening Enterprises, Greening the Enterprise: IT Usage and Hardware, Inter-organizational Enterprise Activities and Green Issues, Enablers and Making the Case for IT and the Green Enterprise.

Total : 45 Periods

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

- *Students will be able to create awareness among stakeholders and promote green agenda and green initiatives in their working environments leading to green movement.*
- *Know about green movement , green products and applications and services.*
- *Understand how Green IT is adopted or deployed in enterprises.*
- *Study the metrics and strategies for green IT systems*
- *Provide services and play roles for green IT services.*

Text Books :
1   San Murugesan, G. R. Gangadharan: Harnessing Green IT,WILEY 1st Edition-2013
2   Bhuvan Unhelkar, "Green IT Strategies and Applications: Using Environmental Intelligence", CRC Press, 2016
Reference Books :
1   Ronald E. Hester, Roy M. Harrison, "Electronic Waste Management" Royal Society of Chemistry, 2009
2   Roger S. Pressman, "Software Engineering – A Practitioner"s Approach", Seventh Edition, Mc Graw-Hill International Edition, 2010.
3   Fabian Löser, "Strategic Information Systems Management for Environmental Sustainability", Universitätsverlag der TU Berlin
4   Bill Tomlinson," Information Technology for Environmental Sustainability" The MIT Press, Cambridge, MA, and London,

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SEMESTER - VIII (Elective IV & V)

16IT864	IT ENABLED SERVICES	L	T	P	C
		3	0	0	3

Prerequisite: *No prerequisite needed for enrolling into the course*
Objective(s):

- *To understand importance of IT enabled services.*
- *To encourage the use of Information Technology to enable students to improve their skills and knowledge.*
- *To enable the students to obtain employment in sunrise industries.*
- *To develop the ability to integrate various resources for optimization in the industry.*
- *To utilize the IT enabled services and functions.*

UNIT - I   BUSINESS STRATEGY: CHALLENGES AND OPPORTUNITIES FOR IT   [9]
Business Strategy: Challenges and Opportunities in the Globalized, Interconnected, Convergent World, Establish Principles before Practice, IT Strategy, Application Strategy, Technology Strategy for IT, IT Management Strategy, Developing IT Strategy for Competitive Advantage, Stages of IT Strategy Development and Implementation, Challenges of IT and Business Strategy Alignment, Inhibitors of Business and IT Strategy Alignment, Three-D Framework for Business and IT Strategy Alignment.

UNIT - II   STRATEGIC IT PLANNING   [9]
Business Implications for IT Strategic and Planning, Strategic IT Planning Motivations, SITP Process: Prevalent Planning Approaches, Difficulties in Developing and Executing SITP, Best Practices for Achieving Good SITP, SITP Approaches-Prevalent Researches.

UNIT - III   ENTERPRISE IT ARCHITECTURE   [9]
Defining EITA, Contents of a Typical Enterprise IT Architecture, Standard for Enterprise IT Architecture, Technology Management strategy Framework, Program Management, Benefits of PMO, Desired Qualities of a Program Office Manager, Maturity of PMO, Implementation of PMO Strategy, Measuring PMO Performance, Success Factors for PMO, Project Scope Management, PMO Dashboard and Reporting.

UNIT - IV   IT SERVICE MANAGEMENT STRATEGY   [9]
Information Technology Infrastructure Library (ITIL), ITIL Overview, ITIL Service Support Processes, Incident Management, Problem Management, Service Delivery, Service Level Management, Financial Management, Capacity Management, IT Service Continuity Management (ITSCM), Availability Management, Imperatives for Outsourcing, IT Management Layers, Variants of Outsourcing, Business Process Outsourcing, In sourcing.

UNIT-V   IT ENABLED WEB SERVICES   [9]
Overview of basic features of PHP: arrays, functions and state management, working with PHP forms, More advanced PHP, OOP's concept in PHP, Portable database supported with different, exception handling, concepts of UDDI, WSDL, SOAP.

Total : 45 Periods

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

- *Explain about importance of IT enabled services.*
- *Discuss strategic plan in IT industry.*
- *Obtain employment in sunrise industries.*
- *Develop the ability to integrate various resources for optimization in the industry.*
- *Utilize the IT enabled services and functions.*

Text Books :
1   Sanjiva Shankar Dubey, " IT strategy and Management", PHI.
2   K.Venkatesh, " Marketing of Information Technology",TMH.
Reference Books :
1   Shiro Uesugi, "IT Enabled Services", Springer; 2013 edition, 2013.
2   Sanjiva Shankar Dubey, "IT Services Business Management: Concepts, Processes and Practices", PHI, 2012
3   Nikhil Treebhoohu, "Promoting IT Enabled Services", Addison-Wesley, 2013.
4   Steve Suehring, Timconverse, Joyoe Park , "PHP 6 and MySQL Bible", Willey.

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<u>**SEMESTER –VIII (Elective IV & V)**</u>

16IT865	CYBER FORENSICS	L	T	P	C
		3	0	0	3

Prerequisite: Network Security
Objective(s):
- *To study the scope of Cyber forensics.*
- *To understand the types of Forensics systems.*
- *To analyze the evidences and validating it.*
- *To learn about the forensics tools and Investigation reports.*
- *To study how to create the report for investigations.*

UNIT - I   FUNDAMENTALS OF CYBERFORENSICS   [9]
Introduction to Computer Forensics – History of Computer Forensics – Understanding Case law – Developing Computer Forensics Resources – Preparing for Computer Investigations – Understanding law Enforcement Agency Investigations – Understanding Corporate Investigations – Maintaining Professional Conduct. Types of Computer Forensics Technology: Types of Military Computer Forensic Technology – Types of law Enforcement – Computer Forensic Technology – Types of Business Computer Forensic Technology

UNIT - II   EVIDENCE COLLECTION AND STORAGE   [9]
Evidence Collection and Data Seizure: Collect Evidence – Collection Options obstacles – Types of Evidence – The Rules of Evidence – Volatile Evidence – General Procedure – Collection and Archiving – Methods of Collection – Artifacts – Processing Crime and Incident Scene – Identifying digital evidence – Collecting evidence in private sector incident scenes – Seizing digital evidence at the scene – Storing digital evidence – Obtaining a digital hash.

UNIT - III   FORENSICS ANALYSIS AND VALIDATION   [9]
Analysis and Validation – Determining what Data to Collect and Analyze – Validating Forensic Data – Addressing Data – Hiding Techniques – Performing Remote Acquisitions. Recovering Graphics Files – Recognizing, locating and Recovering Graphic Files – Understanding data Compression – Copy Rights Issues with Graphics – Identifying Unknown file Formats – Copyright Issues With Graphics. Network Forensics Overview – Performing live Acquisitions – Developing Standard Procedures for Network Forensics, Using Network Tools.

UNIT - IV   FORENSICS TOOLS   [9]
Current Computer Forensic tools: Evaluating Computer Forensic Tool Needs – Computer forensics Software Tools – Computer Forensics Hardware Tools – Validating and Testing Forensics Software – Evaluating Computer Forensics Tool Needs – Computer Forensics Software and Hardware Tools – Validating and Testing Forensics Software.

UNIT - V   INVESTIGATION REPORT GENERATION   [9]
Report Writing For High Tech Investigations – Importance of Reports – Guidelines For Writing – Generating Report Findings With Forensics Software Tools. Expert Testimony in High Tech Investigations – Preparing for Testimony – Testifying in Court – Preparing for a Deposition or Hearing – Preparing Forensic Evidence for Testimony.

Total : 45 Periods

Course Outcomes: On completion of this course, the student will be able to:
- *Able to identify the need of cyber forensics for the society*
- *Understand the methods for evidence collection and storage.*
- *Gain an understanding of Evidence validation and analysis*
- *Identify different types of tools used in the forensics and report generation*
- *Understand and generate the report for investigation*

Text Books :
1.   Eoghan Casey, " Digital Evidence and Computer Crime", 3rd Edition , Academic Press,2011
2.   Marjie ABritz, "Computer Forensics and Cyber Crime: An Introduction",2nd Edition, Prentice Hall, 2008.

References :
1.   John R. Vacca, "Computer Forensics: Computer Crime Scene Investigation", 2nd Edition, Charles River Media, 2005
2.   Elizabeth Bauchner, "Computer Investigation (Forensics, the Science of crime-solving)",Mason Crest Publishers, 2005.
3.   Thomas A. Johnson, " Forensic Computer Crime Investigation (International Forensic Science and Investigation)" CRC Press, 2005
4.   https://www.us-cert.gov/sites/default/files/publications/forensics.pdf.

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<u>**SEMESTER – VIII (Elective IV & V)**</u>

		L	T	P	C
16IT866	**ENTERPRISE RESOURCE PLANNING**	3	0	0	3

Prerequisite: *No prerequisite needed for enrolling into the course*
Objective(s):
- *To study the basics of ERP*
- *To study the life cycle of the ERP*
- *To analyze the modules in the ERP business*
- *To discuss the various tools in the ERP market.*
- *To discuss the use of ERP over the time period.*

UNIT - I   **INTRODUCTION**   **[9]**
Overview of an Enterprise – Benefits of ERP– ERP and Related Technologies – Business Process Reengineering (BPR)– Data Warehousing – Data Mining – OLAP – SCM.

UNIT - II   **ERP IMPLEMENTATION**   **[9]**
Implementation Challenges – Strategies – Life Cycle – Pre-implementation Tasks – Requirements Definition – Methodologies – Package selection – Project Teams – Process Definitions – Vendors and Consultants – Data Migration – Project management – Post Implementation Activities.

UNIT - III   **THE BUSINESS MODULES**   **[9]**
Business modules in an ERP Package – Finance – Manufacturing – Human Resources – Plant Maintenance – Materials Management – Quality Management – Marketing – Sales, Distribution and Service.

UNIT - IV   **ERP MARKET**   **[9]**
Market place – Dynamics – SAP AG – Oracle – PeopleSoft – JD Edwards – QAD Inc – SSA Global – Lawson Software – Epicor – Intuitive – BI - BO .

UNIT-V   **ERP PRESENT AND FUTURE**   **[9]**
Enterprise Application Integration – ERP and E-Business – ERP II – Total quality management – Future Directions – Trends in ERP– Case studies.

           Total: 45 Periods

Course Outcomes: On completion of this course, the student will be able to:
- *Explain the basics of ERP*
- *Discuss the life cycle of the ERP*
- *Analyze the modules in the ERP business*
- *Discuss the various tools in the ERP market.*
- *Discuss the use of ERP over the time period.*

Text Books :
1   Alexis Leon, "ERP Demystified", Tata McGraw Hill, 2nd Edition, 2008.
2   D P Goyal,"Enterprise Resource Planning", Tata McGraw-Hill Education, 2011.

Reference Books :
1   Mary Sumner, "Enterprise Resource Planning", Pearson Education, 2007.
2   Jim Mazzullo,"SAP R/3 for Everyone", Pearson Education, 2007.
3   Vinod Kumar Garg and Venkitakrishnan N K, Enterprise Resource Planning – Concepts and Practice, PHI, New Delhi, 2003.
4   Ellen Monk , Bret Wagner," Concepts in Enterprise Resource Planning", Fourth Edition, Thompson Course Technology ,2012.

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SEMESTER - VIII   (Elective IV & V)

16IT867	**NEXT GENERATION NETWORKS**	L	T	P	C
		3	0	0	3

Prerequisite: *Computer Networks*
Objective(s):
- *To learn the technical, economic and service advantages of next generation networks.*
- *To learn the basic architecture of a next generation network (NGN) with reference*
- *To understand NGN services*
- *To learn the role of IP Multimedia Sub-system (IMS), network attachment and admission control functions.*
- *To learn and compare the various methods of providing connection-oriented services over a NGN with reference to MPLS, MPLS-TE and T-MPLS.*

UNIT - I   INTRODUCTION   [9]
Evolution of public mobile services - motivations for IP based services, Wireless IP network architecture – 3GPP packet data network architecture. Introduction to next generation networks - Changes, Opportunities and Challenges, Technologies, Networks, and Services, Next Generation Society, future Trends.

UNIT - II   IMS AND CONVERGENT MANAGEMENT   [9]
IMS Architecture - IMS services, QoS Control and Authentication, Network and Service management for NGN, IMS advantages, Next Generation OSS Architecture - standards important to oss architecture, Information framework, OSS interaction with IMS, NGN OSS function/ information view reference model, DMTF CIM.

UNIT - III   MPLS AND VPN   [9]
Technology overview –MPLS & QoS, MPLS services and components – layer 2 VPN, layer 2 internetworking, VPN services, signaling, layer 3 VPN –Technology overview, Remote Access and IPsec integration with MPLS VPN.

UNIT - IV   MULTICAST   [9]
MPLS Multicast VPN overview – Applications, examples, IPv6 and MPLS - Technology overview, Future of MPLS – Integrating IP and optical networks, Future layer 3 services, future layer 2 services.

UNIT - V   NGN MANAGEMENT   [9]
Network Management and Provisioning – Configuration, Accounting, performance, security, case study for MPLS, Future enhancements – Adaptive self healing networks.

Total: 45 Periods

Course Outcomes: On completion of this course, the student will be able to:
- *Design routing mechanism meeting the desired QoS in NGN.*
- *Design network management protocols in NGN.*
- *Compare various methods of providing connection-oriented services over a NGN with reference to MPLS, MPLS-TE and T-MPLS.*
- *Compare various NGN virtual network services with reference to VPNs, VLANs,pseudo wires, VPLS and typical applications.*
- *Explain about network management and security*

Text Books :
1. Thomas Plavyk, "Next generation Telecommunication Networks, Services and Management", Wiley & IEEE Press Publications, 2012.

Reference Books :
1. Ina Minie, Julian Lucek, "MPLS enabled Applications – Emerging developments and new technologies", 3rd edition, Wiley. 2011.
2. Monique J. Morrow, "Next Generation Networks", CISCO Press, 2007.
3. Neill Wilkinson, "Next Generation Network Services", John Wiley Publications, 2002.
4. Robert Wood, "MPLS and Next Generation Networks: Foundations for NGN and Enterprise Virtualization", CISCO Press, 2006.

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SEMESTER - VIII (Elective IV & V)

16IT868	C# AND .NET PROGRAMMING	L	T	P	C
		3	0	0	3

Prerequisite: IT Essentials
Objective(s):

- *To cover all segments of programming in C# starting from the language basis, followed by the object oriented programming concepts*
- *To update and enhance skills in writing Windows applications, ADO.NET and ASP .NET*
- *To introduce advanced topics namely data connectivity, WPF, WCF and WPF with C# and .NET 4.5*
- *To implement mobile applications using .Net Compact Framework*
- *To develop the software using .NET technology*

UNIT - I   C# LANGUAGE BASICS   [9]

.Net Architecture - Core C# - Variables - Data Types - Flow control - Objects and Types- Classes and Structs - Inheritance-Generics – Arrays and Tuples - Operators and Casts - Indexers

UNIT - II   C# ADVANCED FEATURES   [9]

Delegates - Lambdas - Lambda Expressions - Events - Event Publisher - Event Listener - Strings and Regular Expressions - Generics - Collections - Memory Management and Pointers - Errors and Exceptions - Reflection

UNIT - III   BASE CLASS LIBRARIES AND DATA MANIPULATION   [9]

Diagnostics -Tasks, Threads and Synchronization - .Net Security - Localization - Manipulating XML- SAX and DOM - Manipulating files and the Registry- Transactions - ADO.NET- Peer-to-Peer Networking - PNRP - Building P2P Applications - Windows Presentation Foundation (WPF)

UNIT - IV   WINDOW BASED APPLICATIONS, WCF AND WWF   [9]

Window based applications - Core ASP.NET- ASP.NET Web forms -Windows Communication Foundation (WCF)-Introduction to Web Services - .Net Remoting - Windows Service - Windows Workflow Foundation (WWF) - Activities - Workflows

UNIT-V   .NET FRAMEWORK AND COMPACT FRAMEWORK   [9]

Assemblies - Shared assemblies - Custom Hosting with CLR Objects - Appdomains - Core XAML - Bubbling and Tunneling Events- Reading and Writing XAML - .Net Compact Framework - Compact Edition Data Stores – Errors, Testing and Debugging – Optimizing performance – Packaging and Deployment – Networking and Mobile Devices

Total: 45 Periods

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

- *Write various applications using C# Language in the .NET Framework*
- *Develop distributed application using .NET Framework*
- *Create Mobile Application using .NET compact Framework*
- *Develop the webpage design using .NET Frame work*
- *Write window based application*

Text Books :

1   Christian Nagel, Bill Evjen, Jay Glynn, Karli Watson, Morgan Skinner . "Professional C# 2012 and .NET 4.5", Wiley, 2012

2   Andrew Troelsen, "Pro C# 5.0 and the .NET 4.5 Framework", Apress publication, 2012.

Reference Books :

1   Ian Gariffiths, Mathew Adams, Jesse Liberty, "Programming C# 4.0", O'Reilly, Fourth Edition, 2010.

2   Andy Wigley, Daniel Moth, Peter Foot, "Mobile Development Handbook", Microsoft Press, 2011.

3   Harsh Bhasin, "Programming in C#", Oxford University Press, 2014.

4   Jung Hyun Han, "3D Graphics for Game Programming" Chapman and Hall/CRC,1st edition, 2011.

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<u>**SEMESTER - VIII (Elective IV & V)**</u>

16IT869	NANO COMPUTING	L	T	P	C
		3	0	0	3

Prerequisite: *No prerequisite needed for enrolling into the course*
Objective(s):

- *To learn nano computing challenges.*
- *To be familiar with the imperfections.*
- *To be exposed to reliability evaluation strategies.*
- *To learn nano scale quantum computing.*
- *To understand Molecular Computing and Optimal Computing*

UNIT - I   **NANOCOMPUTING-PROSPECTS AND CHALLENGES**   **[9]**

Introduction - History of Computing - Nanocomputing - Quantum Computers – Nanocomputing Technologies - Nano Information Processing - Prospects and Challenges - Physics of Nanocomputing : Digital Signals and Gates - Silicon Nanoelectronics - Carbon Nanotube Electronics - Carbon Nanotube Field-effect Transistors – Nanolithography.

UNIT - II   **NANOCOMPUTING WITH IMPERFECTIONS**   **[9]**

Introduction – Nano computing in the Presence of Defects and Faults - Defect Tolerance - Towards Quadrillion Transistor Logic Systems.

UNIT - III   **RELIABILITY OF NANOCOMPUTING**   **[9]**

Markov Random Fields - Reliability Evaluation Strategies - NANOLAB - NANOPRISM - Reliable Manufacturing and Behavior from Law of Large Numbers.

UNIT - IV   **NANOSCALE QUANTUM COMPUTING**   **[9]**

Quantum Computers - Hardware Challenges to Large Quantum Computers - Fabrication, Test, and Architectural Challenges - Quantum-dot Cellular Automata (QCA) - Computing with QCA - QCA Clocking - QCA Design Rules.

UNIT - V   **QCADESIGNER SOFTWARE AND QCA IMPLEMENTATION**   **[9]**

Basic QCA Circuits using QCA Designer - QCA Implementation - Molecular and Optical Computing: Molecular Computing - Optimal Computing - Ultrafast Pulse Shaping and Tb/sec Data Speeds

     Total : 45 Periods

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

- *Discuss nano computing challenges.*
- *Handle the imperfections.*
- *Apply reliability evaluation strategies.*
- *Use nano scale quantum computing.*
- *Utilize Molecular Computing and Optimal Computing.*

Text Books :

1   Sahni V. and Goswami D., "Nano Computing", McGraw Hill Education Asia Ltd. (2008), ISBN (13): 978007024892.

2   Sandeep K. Shukla and R. Iris Bahar., "Nano, Quantum and Molecular Computing", Kluwer Academic Publishers 2004, ISBN: 1402080670.

Reference Books :

1   Sahni V, "Quantum Computing", McGraw Hill Education Asia Ltd. 2007.

2   Jean-Baptiste Waldner, "Nanocomputers and Swarm Intelligence", John Wiley & Sons, Inc. 2008, ISBN (13): 978-1848210097.

3   J P Colinge, "FINFETs and other multi-gate transistors", Springer – Series on integrated circuits and systems, 2008

4   Mark Lundstrom Jing Guo, "Nanoscale Transistors: Device Physics, Modeling and Simulation", Springer, 2006.

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SEMESTER - VIII (Elective IV & V)

	L	T	P	C
16IT870 **SOFTWARE PROJECT MANAGMENT**	3	0	0	3

Prerequisite: *No prerequisite needed for enrolling into the course*
Objective(s):

* *To develop an awareness of the need for project planning and management*

* *To learn about the stages in the software development lifecycle and associated activities.*

* *To know about the procedures needed to schedule , monitor and control the project.*

* *To discuss and where appropriate apply the principles of project risk management.*

* *To understand the key concepts relating to managing projects.*

UNIT - I   FUNDAMENTALS   [9]

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

UNIT - II   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 PROCESS MATURITY MODELS   [9]

Quality management and ISO 9000 - Process improvements - SCI/CMM models - Other process models. Iterative process planning - Organization and Responsibilities - Process automation - Process control and process instrumentation - Tailoring the process.

UNIT - IV   SOFTWARE EFFORT ESTIMATION   [9]

Issues in effort estimation - Effort Estimation techniques - Expert judgment - Estimation by Analogy - Albrecht Function Point Analysis - COCOMO Cost Estimation Model - Project planning - Scheduling - Tracking and Control - Time and Cost overruns.

UNIT - V   SOFTWARE RISK AND PEOPLE MANAGEMENT   [9]

Nature of Risk - Managing Risk - Risk Identification - Risk Analysis - Risk Reduction Techniques - Managing People and Organizing Teams.

Total : 45 Periods

Course Outcomes: On completion of this course, the student will be able to:
* *Know about software Economics.*
* *Discuss about software process models: their advantages and disadvantages*
* *Discuss about software estimation techniques*
* *Know activity planning techniques*
* *Have project planning skills.*

Text Books :

1   Bob Hughes, Mike Cotterell, "Software Project ManagementII", Fifth edition, Tata Mc Graw Hill, 2011.

2   Walker Royce ,"Software Project Management A Unified Framework", Pearson Education, 2004

Reference Books :

1   Rishabh Anand ,"Software Project Management"' S.K. Kataria & Sons; 2013

2   S.A. Kelkar, "Software Project Management: A Concise Study Paperback " , Phi 2013.

3   Ramesh Gopalaswamy, "Managing Global Software Projects", Tata McGraw Hill, 2001.

4   Humphrey Watts, "Managing the software process" Addison Wesley, 1989.

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SEMESTER - VIII (Elective IV & V)

		L	T	P	C
16IT871	**GAME PROGRAMMING AND FRAMEWORKS**	3	0	0	3

Prerequisite: *No prerequisite needed for enrolling into the course*
Objective(s):

* *To understand of game design and development*
* *To understand the processes, mechanics, issues in game design, game engine development*
* *To understand modeling, techniques, handling situations, and logic*
* *To understand gaming platforms and frameworks*
* *To understand game development*

UNIT - I   3D 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]

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

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, DXStudio, 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

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

* *Able to understand and apply 3 D concepts in Game programming.*
* *Gain knowledge about principles and levels of design in various game development*
* *Gain knowledge about gaming engine design for controlling*
* *Explore into various platforms and frameworks available for game development*
* *Able to design and develop interactive games*

Text Books :

1   David H. Eberly, "3D Game Engine Design, Second Edition: A Practical Approach to Real-Time Computer Graphics" Morgan Kaufmann, 2 Edition, 2006.

2   JungHyun Han, "3D Graphics for Game Programming", Chapman and Hall/CRC,1st edition, 2011.

Reference Books :

1   Mike McShaffrfy, "Game Coding Complete", Third Edition, Charles River Media, 2009.

2   Jonathan S. Harbour, "Beginning Game Programming", Course Technology PTR, 3 edition, 2009.

3   Ernest Adams and Andrew Rollings, "Fundamentals of Game Design", Prentice Hall 1st edition, 2006.

4   Roger E. Pedersen, "Game Design Foundations", Edition 2, Jones & Bartlett Learning, 2009.

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SEMESTER -VIII (Elective IV & V)

	L	T	P	C
16IT872 BACKUP RECOVERY SYSTEMS AND ARCHITECTURE	3	0	0	3

Prerequisite: *No prerequisite needed for enrolling into the course*

Objective(s):-

- *To describe backup and recovery terminology and operations*
- *To understand various types of storage systems and backup storage media*
- *To examine the steps involved in planning for backup and recovery*
- *To describe Components of storage node and technologies involved in backup and recovery*
- *To understand backup and recovery planning*

UNIT - I   INTRODUCTION   [9]

Need for backup and recovery – common backup and recovery terminology – components of client/server backup server architecture – flow of data in client/server backup and restore operations

UNIT - II   INFORMATION STORAGE CONCEPTS   [9]

Components of storage system and disk drive – intelligent storage systems – RAID levels and operations – direct attached storage – benefits of SCSI architecture

UNIT - III   CLIENT BASED BACKUP DATA   [9]

Backup data – file system and database backup – Microsoft VSS for backup- NDMP – Different forms of virtualization- VMware backup for clients – challenges impacting client backup environments – factors impacting client backup Performance.

UNIT - IV   STORAGE NODE   [9]

Components of storage node – Protocols during backup process – types of backup storage media – technologies involved in backup and recovery

UNIT - V   BACKUP AND RECOVERY PLANNING   [9]

Backup and recovery planning considerations- backup and recovery testing – disaster recovery considerations – key software and hardware products in the backup and recovery – Proposing a backup and recovery solution.

Total : 45 Periods

Course Outcomes: *On completion of this course, the student will be able to:*

- *Explain about the backup recovery system*
- *Discuss Information storage concepts*
- *Explain about client based backup data*
- *Explore into various backup storage media and technologies involved backup and recovery*
- *Develop backup and recovery planning*

Text Books :

1   Backup Recovery Systems and Architecture Student Guide, EMC Education Services

2   Backup & Recovery: Inexpensive Backup Solutions for Open Systems, By W. Curtis Preston ,O'Reilly Media, Inc.

Reference Books :

Wei-Dong Zhu; Gary Allenbach; Ross Battaglia; Julie Boudreaux; David Harnick-Shapiro; Heajin Kim; Bob Kreuch;

1   Tim Morgan; Sandip Patel; Martin Willingham, "Disaster Recovery and Backup Solutions for IBM FileNet P8 Version 4.5.1 Systems", IBM Redbooks, 2010

2   Techbook: Backup and Recovery in a SAN

3   Pro Data Backup and Recovery, Nelson, Steven, Apress

4   Data Storage Backup and Replication: Effective Data Management to Ensure Optimum Performance and Business Continuity by Nitin Kotwal, Publisher: Nitin Kotwal; 1 edition.

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