Computer Science & Engineering

O P Jindal University, Raigarh (C.G.)

COMPUTER SCIENCE & ENGINEERING

Syllabus of B. Tech III Semester

S.N.	CODE	Board of Study	SUBJECT	Periods per week				Scheme of Examination and Marks				Credits L+(T+P)/2
								PRE**			Total Marks	
				L	T	P	C	Mid Sem	TA	ESE*		
1	MAT2104	HSS	Mathematical Foundation of Computer Science	3	1	0	4	30	20	50	100	4
2	CSE2104	CSE	Electronics & Digital Systems	3	1	0	4	30	20	50	100	4
3	CSE2105	CSE	Internet Technologies	3	1	0	4	30	20	50	100	4
4	CSE2106	CSE	Object Oriented Concepts & Programming using Java	3	1	0	4	30	20	50	100	4
5	CSE2107	CSE	Electronics & Digital Systems Lab	0	0	3	2	0	30	20	50	2
6	CSE2108	CSE	Internet Technologies Lab	0	0	3	2	0	30	20	50	2
7	CSE2109	CSE	Object Oriented Programming System Lab	0	0	3	2	0	30	20	50	2
8	HSS2102	HSS	Humanities & Social Sciences	1	0	0	1	0	15	10	25	1
9	PFD2103	HSS	Professional Development	2	0	0	2	0	30	20	50	2
TOTAL				**15**	**4**	**9**	**25**	**120**	**215**	**290**	**625**	**25**

O P Jindal University, Raigarh (C.G.)

COMPUTER SCIENCE & ENGINEERING

Syllabus of B Tech IV Semester

S.N.	CODE	Board of Study	SUBJECT	Periods per week				Scheme of Examination and Marks				Credits L+(T+P)/2
								PRE**			Total	
				L	T	P	C	Mid Sem	TA	ESE*	Marks	
1	MAT2209	HSS	Probability Statistics and Numerical Analysis	4	1	0	5	30	20	50	100	5
2	CSE2210	CSE	Computer Organization and Architecture	3	1	0	4	30	20	50	100	4
3	CSE2211	CSE	Data Base and Information System	3	1	0	4	30	20	50	100	4
4	CSE2212	CSE	Data Structures and Algorithms	3	1	0	4	30	20	50	100	4
5	CSE2213	CSE	Software Technology - I Lab	0	0	3	2	0	30	20	50	2
6	CSE2214	CSE	DBMS Lab	0	0	3	2	0	30	20	50	2
7	CSE2215	CSE	Data Structure and Algorithms Lab	0	0	3	2	0	30	20	50	2
8	PFD2204	HSS	Professional Development	2	0	0	2	0	30	20	50	2
TOTAL				**15**	**4**	**9**	**25**	**120**	**200**	**280**	**600**	**25**

O P Jindal University, Raigarh (C.G.)

COMPUTER SCIENCE & ENGINEERING

Syllabus of B Tech V Semester

S.N.	CODE	Board of Study	SUBJECT	Periods per week				Scheme of Examination and Marks				Credits L+(T+P)/ 2
								PRE**			Total	
				L	T	P	C	Mid Sem	TA	ESE*	Marks	
1	CSE3116	CSE	Theory of Computation	3	1	0	4	30	20	50	100	4
2	CSE3117	CSE	Microprocessors & Interfacing	3	1	0	4	30	20	50	100	4
3	CSE3118	CSE	Operating System	3	0	0	3	30	20	50	100	3
4	CSE3119 (1-4)	CSE	Professional Elective - I (**CSE Annexure - I**)	3	0	0	3	30	20	50	100	3
5	CSE3120	CSE	Microprocessors & Interfacing Lab	0	0	3	2	0	30	20	50	2
6	CSE3121	CSE	APP development Lab	0	0	3	2	0	30	20	50	2
7	CSE3122 (1-3)	CSE	Elective Lab – I (**CSE Annexure - II**)	0	0	3	2	0	30	20	50	2
8	CSE3123	CSE	Industrial Training and Seminar	0	0	2	1	0	15	10	25	1
9	HSS3103	HSS	Humanities & Social Sciences	1	0	0	1	0	15	10	25	1
10	PFD3105	HSS	Professional Development	0	0	1	1	0	15	10	25	1
TOTAL				**13**	**2**	**12**	**23**	**120**	**215**	**290**	**625**	**23**

O P Jindal University, Raigarh (C.G.)

COMPUTER SCIENCE & ENGINEERING

Syllabus of B Tech VI Semester

S.N.	CODE	Board of Study	SUBJECT	Periods per week				Scheme of Examination and Marks				Credits L+(T+P)/2
								PRE**				
				L	T	P	C	Mid Sem	TA	ESE*	Total Marks	
1	CSE3224	CSE	Computer Network	3	1	0	4	30	20	50	100	4
2	CSE3225	CSE	Software Engineering & Project Management	3	1	0	4	30	20	50	100	4
3	CSE3226 (1-4)	CSE	Professional Elective – II (**CSE Annexure - III**)	3	1	0	4	30	20	50	100	4
4	CSE3227 (1-4)	CSE	Professional Elective – III (**CSE Annexure - IV**)	3	1	0	4	30	20	50	100	4
5	CSE3228	CSE	Software Technology - II Lab	0	0	3	2	0	30	20	50	2
6	CSE3229	CSE	Computer Network Lab	0	0	3	2	0	30	20	50	2
7	CSE3230 (1-3)	CSE	Elective Lab – II (**CSE Annexure - V**)	0	0	3	2	0	30	20	50	2
8	PFD3206	HSS	Professional Development	0	0	1	1	0	15	10	25	1
TOTAL				**12**	**4**	**10**	**23**	**120**	**185**	**270**	**575**	**23**

O P Jindal University, Raigarh (C.G.)

COMPUTER SCIENCE & ENGINEERING

Syllabus of B Tech VII Semester

S.N.	CODE	Board of Study	SUBJECT	Periods per week				Scheme of Examination and Marks				Credits L+(T+P)/2
								PRE**		ESE*	Total Marks	
				L	T	P	C	Mid Sem	TA			
1	CSE4131	CSE	Artificial Intelligence and Soft Computing	3	1	0	4	30	20	50	100	4
2	CSE4132 (1-4)	CSE	Professional Elective - IV (**CSE Annexure - VI**)	3	0	0	3	30	20	50	100	3
3	CSE4133 (1-4)	CSE	Professional Elective - V (**CSE Annexure -VII**)	3	1	0	4	30	20	50	100	4
4	CSE4134 (1-3)	CSE	Elective Lab – III (**CSE Annexure - VIII**)	0	0	3	2	0	30	20	50	2
5	CSE4135	CSE	Minor Project	0	0	8	6	0	50	50	100	6
6	CSE4136	CSE	Industrial Training and Seminar	0	0	2	1	0	15	10	25	1
7	HSS4104	HSS	Humanities & Social Sciences	1	0	0	1	0	15	10	25	1
8	PFD4107	HSS	Professional Development	0	0	1	1	0	15	10	25	1
TOTAL				**10**	**2**	**14**	**22**	**90**	**185**	**250**	**525**	**22**

O P Jindal University, Raigarh (C.G.)

COMPUTER SCIENCE & ENGINEERING

Syllabus of B Tech VIII Semester

S.N.	CODE	Board of Study	SUBJECT	Periods per week				Scheme of Examination and Marks				Credits L+(T+P)/2
								PRE**			Total Marks	
				L	T	P	C	Mid Sem	TA	ESE*		
1	CSE4237 (1-4)	CSE	Professional Elective-VI (**CSE Annexure - IX**)	3	1	0	4	30	20	50	100	4
2	CSE4238 (1-4)	CSE	Professional Elective-VII (**CSE Annexure - X**)	3	1	0	4	30	20	50	100	4
3	OPE42 (01-38)	CSE/HSS	Open Elective (**OE Annexure – I**)	3	0	0	3	30	20	50	100	3
4	CSE4239 (1-3)	CSE	Elective Lab-IV (**CSE Annexure - XI**)	0	0	3	2	0	30	20	50	2
5	CSE4240	CSE	Major Project	0	0	10	7	0	50	50	100	7
6	PFD4208	HSS	Professional Development	0	0	1	1	0	15	10	25	1
TOTAL				**9**	**2**	**14**	**21**	**90**	**155**	**230**	**475**	**21**

O P Jindal University, Raigarh (C.G.)

COMPUTER SCIENCE & ENGINEERING

Professional Elective - I (CSE Annexure - I)

Sr. No	Courses	Name of the Courses
1	CSE3119 (1)	Cloud Computing
2	CSE3119 (2)	Internet Architecture and Communication protocol
3	CSE3119 (3)	Natural Language processing
4	CSE3119 (4)	Computer Graphics

O P Jindal University, Raigarh (C.G.)

COMPUTER SCIENCE & ENGINEERING

Professional Elective - II (CSE Annexure - III)

Sr. No	Courses	Name of the Courses
1	CSE3226 (1)	LAMP Technology
2	CSE3226 (2)	User Interface Development
3	CSE3226 (3)	Compiler Design
4	CSE3226 (4)	Wireless Network

O P Jindal University, Raigarh (C.G.)

COMPUTER SCIENCE & ENGINEERING

Professional Elective - III (CSE Annexure - IV)

Sr. No.	Courses	Name of the Courses
1	CSE3227 (1)	Embedded Systems
2	CSE3227 (2)	Wireless Adhoc Network
3	CSE3227 (3)	Animation and Game Theory
4	CSE3227 (4)	Introduction to Multimedia Systems

O P Jindal University, Raigarh (C.G.)

COMPUTER SCIENCE & ENGINEERING

Professional Elective - IV (CSE Annexure - VI)

Sr. No	Courses	Name of the Courses
1	CSE4132 (1)	Big Data Analytics
2	CSE4132 (2)	Introduction to Robotics
3	CSE4132 (3)	Artificial Neural Network
4	CSE4132 (4)	Advance Web Technology

O P Jindal University, Raigarh (C.G.)

COMPUTER SCIENCE & ENGINEERING

Professional Elective - V (CSE Annexure - VII)

Sr. No	Courses	Name of the Courses
1	CSE4133 (1)	Machine Learning
2	CSE4133 (2)	Advanced Computing Paradigm
3	CSE4133 (3)	Software Testing
4	CSE4133 (4)	Data Mining

O P Jindal University, Raigarh (C.G.)

COMPUTER SCIENCE & ENGINEERING

Professional Elective - VI (CSE Annexure - IX)

Sr. No	Courses	Name of the Courses
1	CSE4237 (1)	Information Retrieval
2	CSE4237 (2)	Human Computer Interaction
3	CSE4237 (3)	Software Interface and Design
4	CSE4237 (4)	Distributed Systems

O P Jindal University, Raigarh (C.G.)

COMPUTER SCIENCE & ENGINEERING

Professional Elective - VII (CSE Annexure - X)

Sr. No	Courses	Name of the Courses
1	CSE4238 (1)	Image Processing
2	CSE4238 (2)	Advanced Computer Architecture
3	CSE4238 (3)	Cryptography and Network Security
4	CSE4238 (4)	Operations Research

O P Jindal University, Raigarh (C.G.)

COMPUTER SCIENCE & ENGINEERING

Open Elective (OE Annexure – I)

Sr. No	Subject code	Board of Studies	Name of the Courses
1	OPE4201	CIE	Disaster Management
2	OPE4202	CIE	Construction Management
3	OPE4203	CIE	Ecology and Sustainable Development
4	OPE4205	CSE	Software Technology
5	OPE4206	CSE	Internet & Web Technology
6	OPE4210	CSE	Evolutionary Computations
7	OPE4211	CSE	E-Commerce and Security Issues
8	OPE4213	CSE	Information Theory & Coding
9	OPE4214	EEE	Distributed Generation
10	OPE4215	EEE	Non-Conventional Energy Sources
11	OPE4216	EEE	Energy Auditing and Management
12	OPE4217	HSS	Innovation, Entrepreneurship and Leadership
13	OPE4218	HSS	Technology Management

14	OPE4219	HSS	Knowledge Entrepreneurship
15	OPE4220	HSS	Finance Management
16	OPE4221	HSS	Project Planning, Management & Evaluation
17	OPE4222	HSS	Intellectual Property Rights
18	OPE4223	HSS	Engineering Economics
19	OPE4224	HSS	Human Relations Management
20	OPE4225	HSS	Entrepreneurship Development
21	OPE4226	HSS	Personnel Management and Industrial Engineering
22	OPE4227	MEE	Safety Engineering
23	OPE4228	MEE	Value Engineering
24	OPE4229	MEE	Energy Conservation & Management
25	OPE4230	MEE	Thermal Treatment of Metal and alloys
26	OPE4231	MEE	Simulation of Physical Processes
27	OPE4232	MEE	TQM and Reliability Engineering
28	OPE4233	MEE	Non Traditional Machining Techniques
29	OPE4234	MME	Nanotechnology
30	OPE4235	MME	Introduction to Nano-Technology applications
31	OPE4236	MME	Material Characterization
32	OPE4237	MME	Materials Management
33	OPE4238	MME	Manufacturing Strategies

O P Jindal University, Raigarh (C.G.)

COMPUTER SCIENCE & ENGINEERING

Elective Lab - I (CSE Annexure - II)

Sr. No	Courses	Name of the Courses
1	CSE3122 (1)	Cloud Computing Lab
2	CSE3122 (2)	Dot NET Lab
3	CSE3122 (3)	Computer Graphics Lab

O P Jindal University, Raigarh (C.G.)

COMPUTER SCIENCE & ENGINEERING

Elective Lab - II (CSE Annexure - V)

Sr. No	Courses	Name of the Courses
1	CSE3230 (1)	LAMP Technology lab
2	CSE3230 (2)	Compiler Lab
3	CSE3230 (3)	Perl and Shell Scripting Lab

O P Jindal University, Raigarh (C.G.)

COMPUTER SCIENCE & ENGINEERING

Elective Lab - III (CSE Annexure - VIII)

Sr. No	Courses	Name of the Courses
1	CSE4134 (1)	Big Data Analysis Lab
2	CSE4134 (2)	Artificial Neural Network (ANN) Lab
3	CSE4134 (3)	Advance Web Technology Lab

O P Jindal University, Raigarh (C.G.)

COMPUTER SCIENCE & ENGINEERING

Elective Lab - IV (CSE Annexure - XI)

Sr. No	Courses	Name of the Courses
1	CSE4239 (1)	Embedded C Lab
2	CSE4239 (2)	Image Processing Lab
3	CSE4239 (3)	Software Testing Lab

Professional Elective-VI (CSE Annexure -IX)

Semester: VIII **Branch: Computer Science & Engineering**

Subject: Information Retrieval **Code: CSE4237 (1)**

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Course Description:

This course will cover the basic methods of information retrieval. In particular, it will cover the entire pipeline of building an information retrieval system, starting from the basic Boolean retrieval model to designing web-scale engines. Emphasis will also be given on the recent trends in the field.

Course Objectives:

Learning objectives include:

- To learn the role of information retrieval in various real-time applications.
- To learn and apply information retrieval models.
- To design web search engine.
- To be exposed to Link Analysis and understand the concept of Hadoop and map reduce.
- To Learn document text mining techniques.

Syllabus:

Unit - I: Introduction

Introduction -History of IR- Components of IR - Issues –Open source Search Engine Frameworks - The impact of the web on IR - The role of artificial intelligence (AI) in IR – IR Versus Web Search - Components of a Search engine- Characterizing the web.

Unit - II: Information Retrieval

Boolean and vector-space retrieval models- Term weighting - TF-IDF weighting- cosine similarity – Preprocessing - Inverted indices - efficient processing with sparse vectors – Language Model based IR - Probabilistic IR –Latent Semantic Indexing - Relevance feedback and query expansion.

Unit - III: Web Search Engine

Web search overview, web structure, the user, paid placement, search engine optimization/ spam. Web size

measurement - search engine optimization/spam – Web Search Architectures - crawling - meta-crawlers- Focused Crawling - web indexes –- Near-duplicate detection - Index Compression - XML retrieval.

Unit - IV: Web search – Link analysis and specialized search

Link Analysis –hubs and authorities – Page Rank and HITS algorithms -Searching and Ranking – Relevance Scoring and ranking for Web – Similarity - Hadoop & Map Reduce - Evaluation -Personalized search - Collaborative filtering and content-based recommendation of documents and products – handling "invisible" Web - Snippet generation, Summarization, Question Answering, Cross- Lingual Retrieval.

Unit - V: Document Text Mining

Information filtering; organization and relevance feedback–Text Mining: Text classification and clustering - Categorization algorithms: naive Bayes; decision trees; and nearest neighbor - Clustering algorithms: agglomerative clustering; k-means; expectation maximization (EM).

Course Outcomes:

After successful completion of the course, students will be able

- Understand search engine framework.
- Use knowledge of data structures and indexing methods in information retrieval Systems.
- Choose clustering and searching techniques for different data base systems.

Text Books:

i. C. Manning, P. Raghavan, and H. Schutze, 'Introduction to Information Retrieval', Cambridge University Press, 2008.

ii. Ricardo Baeza -Yates and Berthier Ribeiro - Neto, 'Modern Information Retrieval: The Concepts and Technology behind Search',2nd Edition, ACM Press Books 2011

Reference Books:

i. Stefan Buettcher, Charles L. A. Clarke, Gordon V. Cormack, 'Information Retrieval: Implementing and Evaluating Search Engines', The MIT Press, 2010.

ii. Ophir Frieder, 'Information Retrieval: Algorithms and Heuristics: The Information Retrieval Series', 2nd Edition, Springer, 2004.

Semester: VIII **Branch: Computer Science & Engineering**

Subject: Human Computer Interaction **Code: CSE4237 (2)**

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Course Description:

The course is intended to introduce the student to the basic concepts of human-computer interaction. It will cover the basic theory and methods that exist in the field. The course will unfold by examining design and evaluation. The students will gain principles and skills for designing and evaluating interactive systems.

Course Objectives:

Learning objectives include:

- The basics of human and computational abilities and limitations.
- The basic theories, tools and techniques in HCI.
- The fundamental aspects of designing and evaluating interfaces.

Syllabus:

Unit - I

Introduction to Human-Computer Interaction, Task-centered system design: task-centered process, development of task examples, evaluation of designs through a task-centered walk-through

Unit - II

User-centered design and prototyping: assumptions, participatory design, methods for involving the user, prototyping, low fidelity prototypes, medium fidelity

Unit - III

Methods for evaluation of interfaces with users: goals of evaluation, approaches, ethics, introspection, extracting the conceptual model, direct observation, constructive interaction, interviews and questionnaires, continuous evaluation via user feedback and field studies, choosing an evaluation method

Unit - IV

Psychology of everyday things: psychopathology of everyday things, examples, concepts for designing everyday things, Beyond screen design: characteristics of good representations, information visualization, Tufte's guidelines, visual variables

Unit - V

Graphical screen design: graphical design concepts, Design principles and usability heuristics: design principles, principles to support usability, HCI design standards: process-oriented standards, product-oriented standards, Past and future of HCI: the past, present and future, perceptual interfaces, context-awareness and perception

Course Outcomes:

At the end of the course students will be able to:

- Explain the capabilities of both humans and computers from the viewpoint of human information processing.
- Describe typical human–computer interaction (HCI) models, styles, and various historic HCI paradigms.
- Apply an interactive design process and universal design principles for designing HCI systems.
- Analyze and identify user models, user support, socio-organizational issues, and stakeholder requirements of HCI systems.

Text Books:

i. Dix A. et al., 'Human-Computer Interaction', Harlow, England, Prentice Hall, 2004, ISBN-10: 0130461091

Reference Books:

i. Yvonne Rogers, Helen Sharp, Jenny Preece,' Interaction Design: Beyond Human Computer Interaction', 3rd Edition, Wiley, 2011, ISBN-10: 0470665769.

Semester: VIII **Branch: Computer Science & Engineering**

Subject: Software Interface and Design **Code: CSE4237 (3)**

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Course Descriptions:

This course introduces the concepts of Software Quality, Role and Objectives of Testing, Debugging, Control Flow Testing, Test design Factors, Quality Control.

Course Objectives:

Learning objectives include:

- To study software testing objectives, process, criteria, strategies, and methods.
- To study various software testing issues and solutions in software unit, integration, regression, and system testing.
- To study planning of a test project, design test cases, conduction of testing operations, generation of a test report.
- To understand automation testing process, its problems and solutions.

Syllabus

Unit-I

Software Quality, Role and Objectives of Testing, Concept of Complete Testing, Central Issue of Testing, Sources of Information for Test Case selection, Test Planning and Design, Monitoring and Measuring Test Execution, Test Tools and Automation, Test Team Organization and Management.

Unit-II

Basic Concepts of Testing Theory, Theory of Goodenough and Gerhart, Theory of Weyuker and Ostrand, Theory of Gourlay, Adequacy of Testing, Limitations of Testing, Static Unit Testing, Defect Prevention, Dynamic Unit Testing, Debugging.

Unit-III

Outline of Control Flow Testing, Control Flow Graph, Paths in Control Flow Graphs, Path Selection Criteria, Data Flow Testing criteria, Comparison of Data Flow and Test Selection Criteria, Domain Error, Testing of Domain Errors.

Unit-IV
System Test design, Test design Factors, Requirement Identification, Test Objective Identification, Structure of a System Test Plan, Assumptions, Test Approach, Test Suite Structure, Types of Acceptance Testing

Unit-V
Five Views of Software Quality, Quality Control, Quality assurance, Cost of quality, Software Quality Assurance, SQA Plan, ISO 9000, Capability Maturity Model, McCall s Quality Factors.

Course Outcomes:
At the end of the course, the student would be able to

- Design and conduct a software test process for a software testing project.
- Identify various software testing problems, and solve these problems by designing and selecting software test models, criteria, strategies, and methods.
- Use software testing methods and modern software testing tools for their testing projects.

Text Books:

i. Kshirasagar Naik, 'Software Testing and Quality Assurance', John Wiley & Sons.
ii. William Perry, 'Effective Methods for Software Testing', John Wiley & Sons.

Reference Books:

i. R. S. Pressman, 'Software Engineering: A Practitioner's Approach', 5th Edn., TMA, New Delhi.
ii. Norman, Donald A.,'The Design of Everyday Things. Basic Books', 2002. ISBN: 9780465067107

Semester: VIII **Branch: Computer Science & Engineering**

Subject: Distributed Systems **Code: CSE4237(4)**

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Course Description:

This course covers a broad range of topics related to parallel and distributed computing, including parallel and distributed architectures and systems, parallel and distributed programming paradigms, parallel algorithms and its applications.

Course Objectives:

Learning objectives include:

- Basic knowledge in parallel and distributed computing.
- Skills to design and analyze parallel and distributed applications
- Ability to describe the design issues in parallel or distributed computing domain.

Syllabus:

Unit-I

Introduction – Various Paradigms in Distributed Applications, Remote Procedure Call, Remote Object Invocation, Message-Oriented Communication, Unicasting, Multicasting and Broadcasting, Group Communication.

Unit-II

Issues in Distributed Operating System – Threads in Distributed Systems, Clock Synchronization, Causal Ordering, Global States, Election Algorithms, Distributed Mutual Exclusion, Distributed Transactions, Distributed Deadlock, Agreement Protocols.

Unit-III

Distributed Shared Memory – Data-Centric Consistency Models, Client-Centric Consistency Models, Ivy, Munin, Distributed Scheduling, Distributed File Systems, Sun NFS.

Unit-IV

Introduction to Fault Tolerance – Distributed Commit Protocols, Byzantine Fault Tolerance, Impossibilities in Fault Tolerance.

Unit-V

Case Studies: Distributed Object-Based System, CORBA, COM+, Distributed Coordination-Based System, JINI.

Course Outcomes:

At the end of the course students will be able to:

- Identify models of distributed computing.
- Analyze algorithms for coordination, communication, security and synchronization in distributed systems.
- Classify distributed shared memory models.

Text Books:

i. George Coulouris, Jean Dollimore and Tim Kindberg, 'Distributed Systems Concepts and Design‖ ', Fifth Edition, Pearson Education, 2012.

ii. Pradeep K Sinha, 'Distributed Operating Systems: Concepts and Design', Prentice Hall of India, 2007

Reference Books:

i. Hagit Attiya and Jennifer Welch, 'Distributed Computing: Fundamentals, Simulations and Advanced Topics', Wiley Edition 2004

ii. Mukesh Singhal,Niranjan Shivaratri, 'Advanced Concepts in Operating Systems', McGraw Hill Series in Computer Science, 1994

iii. A.S.Tanenbaum and M.Van Steen, 'Distributed Systems', Pearson Education, 2004.

iv. Kshemkalyani, Ajay D and Mukesh Singhal. 'Distributed computing: principles, algorithms, and systems', Cambridge University Press, 2011.

Professional Elective-VII (CSE Annexure - X)

Semester: VIII **Branch: Computer Science & Engineering**

Subject: Image Processing **Code: CSE4238 (1)**

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Course Descriptions:

This course is an introduction to image processing, image analysis techniques and concepts. Areas include: Imaging sensors and their principles; Image representation and storage, coding and compression techniques, lossy versus lossless; techniques for noise reduction.

Course Objectives:

Learning objectives include:

- Develop an overview of the field of image processing.
- Understand the fundamental algorithms and how to implement them.
- Prepare to read the current image processing research literature.
- Gain experience in applying image processing algorithms to real world problems.

Syllabus:

Unit - I: Introduction

Motivation and Perspective, Applications, Components of Image Processing System, Element of Visual Perception, A Simple Image Model, Sampling and Quantization, Some Basic Relationships between Pixels, An Introduction to the Color Image Model.

Unit - II: Intensity Transformations and Spatial Filtering

Introduction, Some Basic Intensity Transformation Functions, Histogram Processing, Histogram Equalization, Histogram Specification, Local Enhancement, Enhancement using Arithmetic/Logic Operations – Image Subtraction, Image Averaging, Basics of Spatial Filtering, Smoothing - Mean Filter, Ordered Statistic Filter, Sharpening – The Laplacian.

Unit - III: Filtering in the Frequency Domain:

Fourier Transform and the Frequency Domain, Basis of Filtering in Frequency Domain. Morphological Image

Processing: Introduction, Logical Operations involving Binary Images, Dilation and Erosion, Opening and Closing, The Hit-or-Miss Transformation, Morphological Algorithms – Boundary Extraction, Region Filling, Extraction of Connected Components, Convex Hull, Thinning, Thickening

Unit - IV: Image Segmentation

Point, Line & Edge detection, Thresholding, Region based Segmentation, Region Extraction - Pixel Based Approach & Region Based Approach, Edge and Line Detection - Basic Edge Detection, Cannay Edge Detection, Edge Linking - Hough Transform.

Representation & Description: Representation - Boundary Following, Chain Codes; Boundary Descriptors – Shape Numbers.

Unit – V: Representation & Description

Representation - Boundary Following, Chain Codes; Boundary Descriptors – Shape Numbers. Image Processing Applications: Image Retrieval System, Steganography, Digital Watermarking, Image Compression, Image Forensics.

Course Outcomes:

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

- Analyze, represent and manipulate digital images.
- Apply various intensity transformations and spatial filters for enhancing the image quality.
- Evaluate the methodologies for image segmentation and restoration.
- Apply image processing algorithms in real-life problems.

Text Books:

i. R.C.Gonzalez and R.E.Woods (2011), 'Digital Image Processing', Prentice Hall, 3rd Edition

Reference Books:

i. Bhabatosh Chanda, D. Dutta Majumder (2011), 'Digital Image Processing and Analysis', PHI.
ii. S. Sridhar (2011), 'Digital Image Processing', Oxford University Press.

Semester: VIII **Branch: Computer Science & Engineering**

Subject: Advanced Computer Architecture **Code: CSE4238 (2)**

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Course Descriptions:

This course focuses on how to program a modern embedded microcontroller using real-time development tools. Course contents are tuned to the practical requirements of embedded microcontroller programming.

Course Objectives:

Learning objectives include:

- To provide in-depth coverage of current and emerging trends in computer architectures, focusing on performance and the hardware/software interface.
- To analyzing fundamental issues in architecture design and their impact on application performance

Syllabus:

UNIT I: Pipeline

Linear: pipeline processor, Nonlinear pipeline processor, Instruction pipeline design, Mechanisms, Dynamic instruction scheduling, Arithmetic pipeline design, Super-scalar processors, VLIW architecture.

UNIT II: Memory Hierarchy and I/O Organization

Cache memories, Cache coherence, High bandwidth memories, High bandwidth I/O, Disk I/O, Bus specifications and standards.

UNIT III: Parallel Computer Models & Program Parallelism

Classification of Machines, SISD, SIMD & MIMD, Condition of parallelism, data and resource dependencies, Program partitioning & scheduling, grain size latency, control flow versus data control, data flow architecture.

UNIT IV: Synchronous Parallel Processing

Vector instruction types, vector access memory schemes, vector and symbolic processors, SIMD architecture, SIMD parallel algorithms, SIMD computers and performance enhancements.

UNIT V: System Interconnection

Network properties and routing, static interconnection networks, dynamic interconnection networks, Multiprocessor system interconnection, Multistage & combining networks.

Course Outcomes:

At the end of the course, the student would be able to: -

- Discuss the organization of computer-based systems and how a range of design choices are influenced by applications.
- Differentiate different processor architectures and system-level design processes.
- Understand the components and operation of a memory hierarchy and the range of performance issues influencing its design.
- Understand the organization and operation of current generation parallel computer systems, including multiprocessor and multi core systems.
- Understand the principles of I/O in computer systems, including viable mechanisms for I/O and secondary storage organization.

Text Books:

i. Flynn, 'Computer Architecture: Pipelined and parallel processor design', JB, Boston.
ii. Kai Hwang & Briggs , 'Computer Architecture & Parallel processing' , MGH.

Reference Books:

i. K. Hwang, 'Advanced Computer Architecture with Parallel Programming', MGH.
ii. Michel J. Quinn, 'Parallel Computing, Theory and Practice', MGH.

Semester: VIII **Branch: Computer Science & Engineering**
Subject: Cryptography and Network Security **Code: CSE4238 (3)**

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Course Description:
This course aims to provide students the necessary conceptual background and hands-on experience to understand the most common cryptographic algorithms. Course also comprises the protocols and how to use them to secure distributed applications and computer networks.

Course Objective:
Learning objectives include:

- To understand the principles and practices of cryptography and network security
- To understand the practical applications that have been implemented and are in use to provide network security

Syllabus:

UNIT I: Overview
Security trends, The OSI Security Architecture, Security Attacks, Security Services, Security Mechanisms. Symmetric (Private Key) Ciphers: Classical Encryption Techniques. Block Ciphers and the Data Encryption Standard: The Data Encryption Standard (DES), The Strength of DES, Differential and Linear Cryptanalysis, Block Cipher Design Principles.

UNIT II: Symmetric Ciphers
Basic Concepts in Number Theory and Finite Fields: Groups, Rings, and Fields, Modular Arithmetic, the Euclidian algorithm, Advanced Encryption Standard: The Origins AES, Evaluation criteria for AES, the AES Cipher. Stream cipher: Stream ciphers and RC4. Confidentiality using symmetric encryption: Placement of encryption function, traffic confidentiality, key distribution.

UNIT III: Asymmetric (Public Key) Ciphers
Introduction to Number Theory: Prime Numbers, Fermat's and Euler's Theorems, Testing for Primality, The Chinese Remainder Theorem, Discrete Logarithms. Public-Key Cryptography and RSA: Principles of Public-Key Cryptosystems. Key Management-Other Public-Key Cryptosystems: Key management, Diffie-Hellman Key Exchange, Elliptic Curve Arithmetic, Elliptic Curve Cryptography.

UNIT IV: Asymmetric Ciphers

Message Authentication and Hash functions: Message authentication requirements, authentication functions, Message authentication codes, Hash functions, Security of Hash functions and MAC, SHA, HMAC, CMAC. Digital Signatures and Authentication protocols: Digital signature, Authentication protocols, Digital signature standards

UNIT V: Network Security applications

Authentication applications: Kerberos, X.509 Authentication services, Public key infrastructure. Electronic mail security: PGP, S/MIME. Overview of IP Security. Web Security: Web security considerations, SSL and TLS, Secure electronic transaction. System Security: Intruders, Intrusion detection, password management, viruses and related threats, virus counter measures, Firewall design principles, and trusted systems.

Course Outcomes:

After successful completion of this course, the students will be able to explain

- Conventional encryption algorithms for confidentiality and their design principles
- Public key encryption algorithms and their design principles
- Use of message authentication codes, hash functions, digital signature and public key certificates
- Network security tools and applications
- System-level security issues like threat of and countermeasures for intruders and viruses, and the use of firewalls and trusted systems.

Text Book:

i. William Stallings, 'Cryptography and Network Security, Principles and Practices', Pearson Education, Prentice Hall, Fourth Edition.
ii. Atul Kahate, 'Cryptography and Network Security', McGraw Hill Education (India) Private Limited; Third edition.

Reference books:

i. Schneier & Bruce, 'Applied Cryptography: Protocols & Algorithms', MGH International.
ii. Dr T R Padmanabhan N Harini, 'Cryptography and Security', Wiley India Pvt Ltd, 2011.

Semester: VIII **Branch: Computer Science & Engineering**
Subject: Operations Research **Code: CSE4238 (4)**

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Course Description:

Operations Research (OR) is a discipline that helps to make better decisions in complex scenarios by the application of a set of advanced analytical methods. It couples theories, results and theorems of mathematics, statistics and probability with its own theories and algorithms for problem solving. Applications of OR techniques spread over various fields in engineering, management and public systems

Course Objectives:

Learning objectives include:

- To introduce use quantitative methods and techniques for effective decisions–making; model formulation and applications those are used in solving business decision problems.
- To model decision making problems using major modeling formalisms of artificial intelligence and operations research, including propositional logic, constraints, linear programs and Markov processes,
- To evaluate the computational performance of search, satisfaction, optimization and learning algorithms.
- To apply search, satisfaction, optimization and learning algorithms to real world problems.

Syllabus:

Unit-I: Linear Programming

LP formulations, Graphical method for solving LP with 2 variables, Simplex method, Application of simplex method for maximization and minimization of LP problems, Artificial variable technique for finding the initial basic feasible solution, The Big-M method, Degeneracy in simplex method, Duality theory in LP, Dual simplex method.

Unit-II: Transportation Model

North – West comer rule, least cost method, Vogel's Approximation method, Modi Method, Assignment problem, Dynamic Programming: Basic concepts, Bellman's optimality principle, Dynamic programming approach in decision making, Optimal subdivision problem.

Unit-III: Inventory Model

Introduction to the inventory problem, Deterministic models, The classical EOQ (Economic order quantity) model,

Purchasing model with no shortage, Manufacturing model with no shortage, purchasing model with shortage, Manufacturing model with shortage, Inventory models with probabilistic demand.

Unit-IV: Sequencing and Queuing Theory

Sequencing problem, Johnson's algorithm for processing N-jobs through 2 machine problem, N-jobs through 3 machine problem, 2- job through N machine by graphical method, Characteristics of queuing system- steady state M/M/1, M/M/1K and M/M/C queuing models.

Unit-V CPM and PERT

Arrow network, Time estimates – Earliest expected time, Latest allowable occurrence time and slack, Critical path, Probability of meeting scheduled date of completion of project, Calculation on CPM network, Various floats for activities, Critical Path, Updating project, Operation time cost trade off curve & project time cost trade off curve, selection of schedule based on cost analysis.

Course Outcomes:

Identify and develop operational research models from the verbal description of the real system.

- Understand the mathematical tools that are needed to solve optimization problems.
- Develop a report that describes the model and the solving technique, analyze the results and propose recommendations to the decision-making processes.

Text Books:

i. Kanti Swarup, Gupta P.K, Man Mohan, 'Operations Research', Sultan Chand & Sons.
ii. Panneerselvam, 'Operations Research', Prentice Hall of India.

Reference Books

i. Gillett B.E, 'Introduction to Operations Research- A Computer Oriented algorithmic approach', Mc Graw Hill.
ii. Hamdy a. Taha, 'Operations Research: An Introduction', Prentice Hall of India
iii. Vohra N.D, 'Quantitative Techniques in Management', T.M.H.
iii. Zoints. S., 'Linear & Integer Programming', Prentice Hall.

Open Elective (OE Annexure – I)

Semester: VIII **Branch: Computer Science & Engineering Subject: Software Technology**
Code: OPE4205

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Course Description:

This course will cover various techniques for test case design, as used for testing of software artifacts including requirements, design and code. It will expose students to different views of understanding algorithms and techniques for test case design based on graphs, logic, syntax of programming languages. Special techniques for testing object-oriented features and web applications will also be discussed.

Course Objectives:

Learning objectives include:

- Understanding the theoretical aspects of software testing.
- Demonstrate the knowledge of the existing testing methods.
- Demonstrate the knowledge of static and dynamic analysis methods.
- Demonstrate the knowledge of applying testing and analysis methods in software development and maintenance.

Syllabus:

Unit - I:

Introduction to software testing and analysis, Specification-based testing techniques, Test Tools and Automation.

Unit - II:

Code-based testing techniques, Unit testing, Integration testing, OO-oriented testing, Model-based testing, Black-Box and White-Box Testing.

Unit - III:

Static analysis, Dynamic analysis, Regression testing.

Unit - IV:

Methods of test data generation and validation, Program slicing and its application, Reliability analysis, Formal

methods; verification methods.

Unit –V:

Case studies, generating test cases & report on the modules or projects.

Course Outcomes:

At the end of the course, the student will be able to:

- Realize the importance of software testing
- Apply modern software testing processes in relation to software development
- Create test strategies and plans, design test cases, prioritize and execute them
- Manage incidents and risks within a project

Text Books:

i. Roger S. Pressman, 'Software Engineering: A Practitioner's Approach', McGraw Hill Higher Education, 5th edition,

ii. Pankaj Jalote, 'Software Engineering: A Precise Approach', Wiley India

Reference Books:

i. Rajib Mall, 'Software Engineering', PHI 2014.

ii. Paul Ammann and Jeff Offutt, 'Introduction to Software Testing', Cambridge University Press, 2nd edition, 2016.

iii. Sagar Naik, Piyu Tripathy, 'Software Testing and Quality Assurance: Theory and Practice', Wiley.

Semester: VIII **Branch: Computer Science & Engineering**

Subject: Internet & Web Technology **Code: OPE4206**

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Course Description:

This course introduces Worldwide Web Consortium (W3C) standard client-side Internet programming using industry-established practices. Topics include creating web pages, search engines, FTP, web graphics file types, optimization, RGB color, web typography, elementary special effects, transparency, animation, slicing, basic photo manipulation, JavaScript, markup elements, stylesheets, validation, accessibility, standards, and browsers.

Course Objectives:

- Build web applications using proven developer tools and message formats. We will build web applications using technologies such as Java, JavaScript, AJAX, XML, RSS, XSLT.
- Describe the differences and similarities between two important meta- languages - XML and JSON.
- Develop a conscience of the semantic web of tomorrow.
- Develop an understanding of and an appreciation for the wide variety of XML languages that are being used in many industries

Syllabus:

Unit-I: Introduction to Internet

Introduction, Evolution of Internet, Internet Applications, Internet Protocol -TCP/IP, UDP, HTTP, Secure Http (SHTTP) Internet Addressing – Addressing Scheme – Ipv4 & IPv6, Network Byte Order, Domain Name Server and IP Addresses, Mapping. Internet Service Providers. Web Technologies: Three Tier Web Based Architecture; JSP, Asp, J2ee, .Net Systems

Unit-II: HTML CSS & Scripting

HTML - Introduction, SGML, DTD (Document Type Definition, Basic Html Elements, Tags and usages, HTML Standards. DHTML, Cascading Style Sheets, Java Script Object Model, Variables Constant – Expressions, Conditions-Relational Operators- Data Types – Flow Control – Functions & Objects-events and event handlers – Data type Conversion & Equality – Accessing HTML form elements.

Unit-III: XML

What is XML – Basic Standards, Schema Standards, Linking & Presentation Standards, Standards that build on XML, Generating XML data, writing a simple XML File, creating a Document type definition, Documents & Data, Defining Attributes & Entities in the DTD, Defining Parameter Entities & conditional Sections, resolving a naming conflict, Using Namespaces, designing an XML data structure, Normalizing Data, Normalizing DTDS

Unit-IV: Internet Security & Firewalls

Security Threats from Mobile Codes, Types of Viruses, Client Server Security Threats, Data & Message Security, Various electronic payment systems, Introduction to EDI, Challenges–Response System, Encrypted Documents and Emails, Firewalls: Hardened Firewall Hosts, Ip- Packet Screening, Proxy Application Gateways, AAA (Authentication, Authorization and Accounting).

Unit-V: Website Planning & Hosting

Introduction, Web Page Lay-Outing, Where To Host Site, Maintenance Of Site, Registration Of Site On Search Engines And Indexes, Introduction To File Transfer Protocol, Public Domain Software, Types Of Ftp Servers (Including Anonymous),Ftp Clients Common Command. Telnet Protocol, Server Domain, Telnet Client, Terminal Emulation. Usenet and Internet Relay Chat

Course Outcomes

After successful completion of the course, student will be able to

- Understand, analyze and apply the role of languages like HTML, DHTML, CSS, XML, Javascript, and web applications.
- Analyze a web page and identify its elements and attributes.
- Create XML documents and XML Schema.

Text Books

i. Uttam K. Roy, 'Web Technologies ', Oxford.
ii. Achyut S Godbole & Atul Kahate,' Web Technologies TCP/IP Architecture and Java Programming', 2nd Edition, TMH.

Reference Books

i. Daniel Minoli,'Internet & Intranet Engineering', TMH.
ii. Alexis Leon and Mathews Leon,' Internet for Every One', Tech World.

Semester: VIII **Branch: Computer Science & Engineering**
Subject: Evolutionary Computation **Code: OPE4210**

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Course Description:
This course explores principles from theories of evolution and natural selection, which can be used to construct machines that exhibit nontrivial behavior. In particular, the course covers techniques from genetic algorithms, genetic programming, and artificial life for developing software agents capable of solving problems as individuals and as members of a larger community of agents.

Course objectives:
Learning objectives include:

- To introduce the concept, techniques and applications in the field of evolutionary computation
- To discuss and understand the scenario when evolutionary techniques are useful.

Syllabus:
Unit - I:
Introduction Biological and artificial evolution, Evolutionary computation and AI Different branches of EC, e.g., GAs, EP, ES, GP, etc. simple evolutionary algorithm, Recombination/Crossover for strings, Mutation for strings

Unit - II:
Fitness proportional selection and fitness scaling Ranking, including linear, power, exponential and other ranking methods Tournament selection, Selection pressure and its impact on evolutionary search

Unit - III:
Mixing different search operators, An anomaly of self-adaptive mutations, The importance of representation, e.g., binary vs. Gray coding, Adaptive representations, Evolutionary algorithms for TSP's.

Unit - IV:
Cooperative co-evolution, Competitive co-evolution, Fitness sharing, Crowding and mating restriction, constraint handling.

Unit - V:
Major steps of genetic programming, e.g., functional and terminal sets, initialization, crossover, mutation, fitness evaluation, etc. Search operators on trees Automatically defined functions, Issues in genetic programming, e.g., bloat, scalability, etc.

Course outcomes:
After successful completion of the course, students will be able to:

- Understand the relations between the most important evolutionary algorithms presented in the course.
- Understand the implementation issues of evolutionary algorithms.
- Determine the appropriate parameter settings to make different evolutionary algorithms work well.
- Design new evolutionary operators, representations and fitness functions for specific practical and scientific applications.

Text Books:

i. T. Baeck, D. B. Fogel and Z. Michalewicz (eds.), 'Handbook on Evolutionary Computation', IOP Press, 1997.
ii. X. Yao (ed), 'Evolutionary Computation, Theory and Applications' , World Scientific Publ. Co., Singapore, 1999. (ISBN 3-540-65907-2).

Reference Books:

i. D E Goldberg, 'Genetic Algorithms in Search, Optimization & Machine Learning', Addison-Wesley, 1989.
ii. W Banzhaf, P Nordin, R E Keller & Frank D Francone, 'Genetic Programming: An Introduction', Morgan Kaufmann, 1999.

Semester: VIII **Branch: Computer Science & Engineering**

Subject: E-Commerce and Security Issues **Code: OPE4211**

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Course Description:

This course provides the learner with real-world information allowing them to attain a comprehensive level of understanding of the use of information and communication technologies for conducting and supporting business activities in developing Information oriented society.

Course Objectives:

Learning objectives include:

- To learn about the technologies required to make e-Commerce viable
- To learn e-commerce from an enterprise point of view
- To learn about the working of various electronic payment systems

Syllabus:

UNIT I: –Introduction:

What is E-Commerce, Forces behind E-Commerce, E-Commerce Industry Framework, and Brief History of Ecommerce. Inter Organizational E-Commerce, Intra Organizational E-Commerce, and Consumer to Business Electronic Commerce, Architectural framework

UNIT II: Network Infrastructure:

LAN, Ethernet (IEEE standard 802.3) LAN, WAN, Internet, TCP/IP Reference Model, Domain Name Server, Internet Industry Structure.

UNIT III: Electronic payment systems:

Types of electronic payment systems, digital token-based electronic payment systems, smart cards & electronic payment systems, credit card based electronic payment systems, risk and electronic payment systems, designing electronic payment systems

UNIT IV: Information Distribution and Messaging:
FTP, E-Mail, www server, HTTP, Web service implementation, Information publishing, Web Browsers, HTML, Common Gateway Interface

UNIT V: Network Security applications:
Mobile computing framework, wireless delivery technology and switching methods, mobile information access devices, mobile data internetworking standards, cellular data communication protocols, mobile computing applications, personal communication service.

Course Outcomes:

At the end of the course, the student would be able to:

- Apply the skills necessary for large-scale web based e-commerce project development.
- Work on information distribution and messaging services in e-commerce application.
- Work on business applications of wireless and mobile technologies for e-commerce

Text Books:

i. Kalakota & Whinston ,'Frontiers of E-commerce', Addison Wesley.
ii. Dr. Ravi Kalakota & Marcia Robinson, 'E-business road map for success', Addison Wesley.

Reference Books:

i. Bharat Bhasker, 'Electronic Commerce', TMH

Semester: VIII **Branch: Computer Science & Engineering**
Subject: Information Theory & Coding **Code: OPE4213 CSE**

Course Description:
Information theory is the mathematical theory that deals with the fundamental aspects of communication systems. The purpose of this course is to develop the fundamental ideas of information theory and to indicate where and how the theory can be applied.

Course objectives:
Learning objectives include:
- To study the several source coding techniques.
- To study the channel coding theorem & various codes.
- To study about Block control coding.

Syllabus:
Unit - I: Information Theory
Introduction, Measure of information, Information content of message, Average Information content of symbols in Long Independent sequences, Average Information content of symbols in Long dependent sequences, Markov Statistical Model of Information Sources, Entropy and Information rate of Mark off Sources

Unit – II: Source Coding
Source Coding: Source coding theorem, Prefix Codes, Kraft McMillan Inequality property – KMI. Encoding of the Source Output, Shannon's Encoding Algorithm
Shannon Fano Encoding Algorithm, Huffman codes, Extended Huffman coding, Arithmetic Coding, Lempel – Ziv Algorithm

Unit - III: Information Channels
Information Channels: Communication Channels. Channel Models, Channel Matrix, Joint probability Matrix, Binary Symmetric Channel, System Entropies, Mutual Information, Channel Capacity, Channel Capacity of Binary Symmetric Channel, Binary Erasure Channel, Morgan's Theorem, Continuous Channels.

Unit - IV: Error Control Coding

Introduction, Examples of Error control coding, methods of Controlling Errors, Types of Errors, types of Codes, Linear Block Codes: matrix description of Linear Block Codes, Error Detection and Error Correction Capabilities of Linear Block Codes, Single Error Correcting hamming Codes, Table lookup Decoding using Standard Array. Binary Cyclic Codes: Algebraic Structure of Cyclic Codes, Encoding using an (n-k) Bit Shift register, Syndrome Calculation, Error Detection and Correction

Unit – V: Cyclic Codes

Cyclic Codes: Golay Codes, BCH Codes. Convolution Codes: Convolution Encoder, Time domain approach, Transform domain approach, Code Tree, Trellis and State Diagram, The Viterbi Algorithm.

Course outcomes:

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

- Understands the fundamentals of coding theory
- Understands concept of source coding.
- Understands channel coding theorem.

Text Books: -

i. Simon Haykin, 'Communication Systems', John Willey & Sons, 4th Edition, 2006.
ii. John G.Proakias, 'Digital Communication', McGraw Hill, Singapore, 4th Edition, 2001.
iii. Shu Lin & Daniel J.Costello, 'Error control coding Fundamentals and applications' , Pearson Education 2nd edition.

Reference Books:-

i. S.P.Eugene Xavier, 'Statistical Theory of Communication', New Age International, 1997.
ii. Hwei P Hsu, 'Theory of Analog and Digital Communication', Pearson/Prentice Hall, New Jersey

Elective Lab -IV (CSE Annexure - XI)

Semester: VIII **Branch: Computer Science & Engineering**

Subject: Embedded C Lab **Code: CSE4239 (1)**

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Course Description:

This course focuses on how to program a modern embedded microcontroller using real-time development tools. Course contents are tuned to the practical requirements of embedded microcontroller programming.

Course Objectives:

Learning objectives include:

- Learn the working of ARM processor
- Understand the Building Blocks of Embedded Systems
- Learn the concept of memory map and memory interface
- Know the characteristics of Real Time Systems
- Write programs to interface memory, I/Os with processor

Experiments:

Under this lab various programs in Embedded C programming will be developed by students using ARM, Arduino, Node MCU and Raspberry Pi boards. On different board programs will be based on study of board, Interfacing ADC and DAC, LED and PWM, interfacing real time clock and serial port, interfacing keyboard and LCD, Interfacing EPROM and interrupt, Mailbox, Interrupt performance characteristics of ARM and FPGA, Flashing of LEDS, interfacing stepper motor and temperature sensor, Implementing ZigBee protocol.

Software Requirements:

- Scientific computing tool.

Semester: VIII **Branch: Computer Science & Engineering**

Subject: Image Processing Lab **Code: CSE4239 (2)**

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Course Descriptions:

This course is an introduction to image processing, image analysis techniques and concepts. Areas include: Imaging sensors and their principles; Image representation and storage, coding and compression techniques, lossy versus lossless; techniques for noise reduction

Course Objectives:

Learning objectives include:

- Student will gain experience in applying image processing algorithms to real world problems.
- Student can develop new ideas and can apply through various properties of digital images can be visualized and experimented.

Following concepts will be covered in the lab

- Checking the basic relationships of Pixel i.e. connectivity based on following two methods: a) 4-Adjacency b) 8-Adjacency Mirror Image Generation. Flipped Image Generation.
- Implement Low Pass Filters – Gaussian, Butterworth, Ideal.
- Implement High Pass Filters – Gaussian, Butterworth, Ideal.
- Perform Image Enhancement in Spatial Domain through Gray Level
- Transformation Function. Histogram Equalization.
- Histogram Specification.
- Use of Second Derivate for Image Enhancement: The Laplacian.
- Use of First Derivate for Image Enhancement.
- Implementation of Morphological Operations, image processing, image segmentation and for Edge detection.

Software Requirements:

- Scientific computing tool.

Semester: VIII **Branch: Computer Science & Engineering**

Subject: Software Testing Lab **Code: CSE4239 (3)**

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Course Description:

In this course the students will learn Testing Techniques, Test Administration, Creation of the Test Plan, Test Tools used to Build Test Reports, etc.

Course Objective:

Learning objectives include:

- Understand different types of testing.
- Learn the features of Software development models.
- Learn major concepts of the testing methodologies.
- Understand of the types of testing.
- Plan, create, execute and manage test plan.

Experiments

Brief introduction to software systems and SDLC; Testing Techniques: Structural versus Functional Technique Categories, Verification versus Validation, Static versus Dynamic Testing; Test Administration: Test Planning, Customization of the Test Process, Budgeting, Scheduling; Create the Test Plan: Prerequisites to test planning, Understand the Characteristics of the Software Being Developed, Build the Test Plan, Write the Test Plan; Test reporting: Guidelines for writing test reports; Test Tools used to Build Test Reports; Managing Change: Software Configuration Management, Change Management; Risks – Risk Analysis and Management with examples; User Acceptance testing – in detail explanation with details; Case Study: How to test web, stand alone and database applications – with examples; Software Testing Training Course Week 5; Automation Testing Basics

Semester: VIII **Branch: Common to All Branch**

Subject: Professional Development **Code: PFD4208**

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Course Description:

Today in the present world, society and organization can be developed that follow a process among the people of organization as an instrument in order to get new styles in proceeding, production and services and effective decision making and the comparison of organization with dynamic environment and competitive market which this process is beds for the developed employment skill. Entrepreneur and Knowledge Management Course aims to provide students with scientific and practical knowledge about entrepreneurship and knowledge management as well as the skills to turn such knowledge into practice. The learning outcomes are therefore designed to help the student acquire perspectives, skills and experiences necessary to take on an entrepreneurial role in future positions and activities. Knowledge Management may provide the experiences knowledge and experts. This function will create new abilities; increase the performance and the new innovation.

Course Objectives:

The objectives of this course are:

- to provide an integrative and holistic understanding of the nature of entrepreneurship;
- to make students understand the criticality of entrepreneurship survival, growth and sustainability;
- to make students learn the factors that contribute to entrepreneurship success and failure;
- to make students learn the role of creativity, knowledge and learning processes in entrepreneurship; and
- to make students learn the knowledge management.

Syllabus:

UNIT-I: Entrepreneurship

Definition, Role and expectations – Entrepreneurial styles and types – Characteristics of the Entrepreneur – Functions of an Entrepreneur – Promotion of Entrepreneurship – Role of Socio-Cultural, Economic and Political Environment – Growth of Entrepreneurship in Pre and Post-independence era – Constraints for the Growth of Entrepreneurial Culture.

UNIT-II: Entrepreneurial Motivation Theories

Entrepreneurial Competencies – Developing Competencies – Role of Entrepreneur. Development Programs – Assistance Programme for Small Scale Units – Institutional Framework – Role of SSI Sector in the Economy – SSI Units – Failure, Causes and Preventive Measures – Turnaround Strategies.

UNIT-III: Identification of Business Opportunity

Preparation of Feasibility Report – Financial and Technical Evaluation – Project Formulation – Common Errors in Project Formulation – Specimen Project Report – Ownership Structures – Proprietorship, Partnership, Company, Co-operative, Franchise.

UNIT-IV Corporate Entrepreneurship (Intrapreneurship)

Concepts – Need – Strategies - Corporate Practices – Select Cases – Dynamics of Competition – Plans for Survival and Growth.

UNIT-V Women Entrepreneurship

Need – Growth of women Entrepreneurship – Problems faced by Women Entrepreneurs – Development of women Entrepreneurship – Entrepreneurship in Informal Sector – Rural Entrepreneurship – Entrepreneurship in Sectors like Agriculture, Tourism, health case, Transport and allied services.

Course Outcomes:

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

- Understand the importance of entrepreneurship as a tool for development;
- the basic principles of entrepreneurship;
- the financial sources for startups, the modes of business networking -Design business plans -Develop capabilities and skills necessary to assume entrepreneurial activity -Implement theoretical knowledge acquired by designing a small virtual enterprise;
- demonstrate knowledge and understanding in the field of entrepreneurship, including specialized knowledge in a subfield;

- entrepreneurship, both in theory and methodology;
- demonstrate the ability to critically and systematically integrate knowledge and analyze, assess and deal with complex phenomena, issues and situations, even with limited information.

Text Books:

i. Peter F. Drucker, 'INNOVATION AND ENTREPRENEURSHIP', Heinemann. REFERENCES
ii. Donald L. Sexton & Raymond W. Smilor,'THE ART AND SCIENCE OF ENTREPRENEURSHIP', Ballinger Pub. Co.
iii. Clifford M. Baumback & Joseph R.Mancuso ,'ENTREPRENEURSHIP AND VENTURE MANAGEMENT', Prentice Hall.
iv. Gifford Pinchot,'INTRAPRENEURING' Harper & Row.

Reference Books:

i. Ram K.Vepa ,'HOW TO SUCCEED IN SMALL SCALE INDUSTRY' ,Vikas .
ii. Richard M.Hodgets , 'EFFECTIVE SMALL BUSINESS MANAGEMENT' , Academic Press.
iii. Dan Steinhoff & John F.Burgess ,' SMALL BUSINESS MANAGEMENT – FUNDATMENTALS ', McGraw Hill.