B.TECH – INFORMATION TECHNOLOGY

CURRICULUM AND SYLLABUS

(Regulation 2018)

CURRICULUM AND SYLLABUS

REGULATION 2018

Programme: B.TECH – INFORMATION TECHNOLOGY

Vision of the Department:

To create groomed, technically competent and skilled intellectual IT professionals to meet the current challenges of the modern computing industry.

Mission of the Department:

M1: To ensure the understanding of fundamental aspects of Information Technology

M2: Prepare students to adapt to the challenges of changing market needs by providing an environment

M3: Build necessary skills required for employability through career development training to meet the challenges posed by the competitive world

Programme Educational Objectives (PEOs):

PEO1: Graduates will be able to solve real world problems using learned concepts Pertaining to Information Technology domain.

PEO2: Encompass the ability to examine, plan and build innovative software products and become a successful entrepreneur.

PEO3: Graduates will be able to carry out the profession with ethics, integrity, leadership and social responsibility.

PEO4: Graduates will be able to pursue post-graduation and succeed in academic and research careers.

Mapping of Programme Educational Objectives with Mission of the Department:

PEOs / Department Mission Statements	M1	M2	M3
PEO1	H	H	H
PEO2	M	H	M
PEO3	L	M	H
PEO4	L	M	M

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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Programme Outcomes (Pos):

PO1: 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, resources, and modern engineering and IT tools including prediction and 3odelling 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: Environment 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.

PO 9: Individual and team work: Function effectively as an individual, and as a member or leader in 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

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25 MAR 2019
KARUR - 639 113.

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 broadest context of technological change.

Programme Specific Outcomes (PSOs):

PSO1: Apply knowledge of theoretical computer science to assess the hardware and software aspects of computer systems

PSO2: Design software in a futuristic approach to support current technology and adapt cutting-edge technologies.

PSO3: Comprehend the technological advancements and practice professional ethics and the concerns for societal and environmental well being.

Mapping of Programme Educational Objectives with Programme Outcomes and Programme Specific Outcomes:

PEOs / Pos & PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
PEO1	3	3	3	3	2	2	1	2	2	2	2	3	2	3	2
PEO2	3	3	3	3	2	3	2	2	3	2	3	2	1	3	2
PEO3	1	1	2	2	2	3	3	3	3	3	3	3	2	1	3
PEO4	1	1	1	3	1	1	1	1	1	1	1	1	1	1	2

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

Programme Articulation Matrix

Semester	Course Code	Course Name	POs											PSOs		
			PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
I	18LEH101J	Technical English	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		
I	18MAB101T	Calculus and Linear Algebra	✓	✓	✓	✓	✓				✓			✓	✓		
I	18CYB101J	Chemistry	✓		✓	✓									✓		
I	18MES101J	Engineering Graphics	✓	✓	✓	✓	✓		✓	✓	✓	✓		✓	✓		
I	18EES101J	Basic Electrical and Electronics Engineering	✓	✓	✓	✓	✓		✓	✓	✓	✓		✓	✓		
I	18MBH102L	General Aptitude		✓		✓	✓				✓	✓		✓			
I	18LEM107T	Constitution Of India							✓	✓	✓	✓	✓	✓			
II	18LEH102J	Professional English	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		
II	18MAB102T	Advanced Calculus and Complex Analysis	✓	✓	✓	✓	✓				✓			✓	✓		
II	18PYB101J	Physics	✓	✓	✓	✓									✓		
II	18CSS101J	Programming for Problem Solving	✓	✓							✓	✓		✓	✓		
II	18MES102J	Basic Civil and Mechanical Engineering	✓		✓		✓	✓	✓		✓			✓	✓		
III	18BECS202J	Analog and Digital Electronics	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
III	18MAB203T	Probability Statistics and Queuing Theory	✓	✓	✓	✓									✓	✓	
III	18ITC201J	Data Structures and Algorithms	✓	✓	✓					✓				✓	✓		
III	18ITC202J	Agile Development Methodology	✓		✓		✓				✓		✓	✓		✓	✓
III	18ITC203J	Object Oriented Programming	✓	✓			✓							✓	✓	✓	
III	18ITC204J	Computer Organization and Architecture	✓	✓		✓					✓			✓	✓	✓	✓
III	18ITP201L	Minor Project I	✓	✓	✓	✓					✓	✓			✓	✓	✓
III	18MBM201L	Competencies in Social Skills	✓								✓	✓					
III	18LEM103T	Indian Tradition and Heritage	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
IV	18MAB206T	Discrete Mathematics	✓	✓	✓	✓									✓	✓	✓
IV	18ITS202J	Embedded Systems	✓	✓	✓			✓	✓						✓		✓
IV	18ITC205T	Object Oriented Analysis and Design	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
IV	18ITC206J	Computer Networks	✓	✓	✓		✓		✓	✓				✓	✓	✓	✓
IV	18ITC207J	Database Management Systems	✓	✓	✓	✓	✓				✓			✓	✓	✓	
IV	18ITC208J	Operating Systems	✓	✓		✓					✓			✓	✓	✓	✓
IV	18ITP202L	Minor Project II	✓	✓	✓	✓					✓	✓			✓	✓	✓
IV	18MBM202L	Critical and Creative Thinking Skills	✓									✓			✓		
IV	18CYM201T	Environmental Science		✓		✓		✓	✓	✓							✓
V	18ITC301T	Formal Language and Automata Theory	✓	✓	✓	✓		✓		✓				✓	✓		
V	18ITC302J	Software Testing	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓		
V	18ITC303L	Mobile Application Development Laboratory	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
V	18ITP301L	Minor Project III	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓	✓
V	18ITP301N	MOOC I / Industrial Training I	✓	✓	✓	✓	✓								✓	✓	
V	18MBM301L	Analytical and Logical Thinking Skills	✓								✓	✓				✓	
V	18LEM301L	Indian Art Forms						✓	✓	✓	✓	✓		✓			
VI	18MBH201T	Management Principles for Engineers	✓	✓				✓			✓	✓		✓	✓		
VI	18ITC303J	Web Technology	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓
VI	18ITC304J	Big data Technologies	✓	✓	✓	✓		✓							✓	✓	✓
VI	18ITC306L	Software Design Laboratory	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

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25 MAR 2019

Semester	Course Code	Course Name	POs												PSOs		
			PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
VI	18ITP302L	Minor Project IV	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓	✓
VI	18ITP302N	MOOC II / Industrial Training II	✓	✓	✓	✓	✓								✓	✓	✓
VI	18MBM302L	Employability Skills and Practices	✓								✓	✓				✓	
VI	18LEM302T	Self Development and Entrepreneurship	✓	✓				✓	✓	✓	✓	✓	✓	✓	✓		
VII	18MBH401T	Social Engineering	✓	✓				✓	✓	✓	✓	✓		✓	✓		
VII	18ITC401J	Cryptography and Network Security	✓	✓	✓	✓		✓							✓	✓	✓
VII	18ITC402L	FOSS Laboratory	✓	✓	✓	✓		✓		✓			✓	✓	✓	✓	✓
VIII	18ITP403L	Project Work	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
E	18ITE001J	Python Programming	✓	✓	✓	✓	✓								✓	✓	
E	18ITE002J	C#.NET Framework	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓
E	18ITE003J	Data mining and Data ware housing	✓	✓	✓	✓	✓	✓		✓		✓		✓	✓	✓	✓
E	18ITE004J	Computer Graphics and Multimedia	✓	✓	✓		✓	✓	✓						✓	✓	
E	18ITE005J	3D Game Programming Foundations	✓	✓	✓	✓	✓			✓	✓			✓	✓	✓	✓
E	18ITE006T	Artificial Intelligence	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
E	18ITE007T	Compiler Engineering	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓		
E	18ITE008T	Cryptography and Network Security	✓	✓	✓	✓	✓	✓	✓	✓				✓		✓	
E	18ITE009T	Human Computer Interaction	✓	✓	✓			✓	✓			✓	✓		✓		
E	18ITE010T	Internet of Things	✓	✓	✓	✓	✓	✓	✓		✓					✓	✓
E	18ITE011T	Information Theory and Coding	✓	✓											✓		
E	18ITE012T	Decision Support Systems	✓	✓	✓	✓	✓	✓								✓	✓
E	18ITE013T	Wireless Ad hoc and Sensor Networks	✓	✓	✓	✓	✓							✓	✓	✓	✓
E	18ITE014T	Service Oriented Architecture	✓	✓	✓	✓	✓								✓	✓	✓
E	18ITE015T	Mobile Communication	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
E	18ITE016T	Enterprise Computing	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
E	18ITE017T	Grid Computing	✓	✓	✓		✓				✓				✓		
E	18ITE018T	Semantic Web	✓	✓	✓		✓								✓	✓	✓
E	18ITE019T	Information Retrieval Techniques	✓	✓	✓	✓	✓	✓							✓	✓	✓
E	18ITE020T	Social Network Analysis	✓	✓	✓	✓	✓	✓		✓		✓		✓	✓	✓	✓
E	18ITE021T	User Interface Design	✓	✓	✓	✓	✓								✓	✓	✓
E	18ITE022T	Machine Learning	✓	✓	✓	✓	✓	✓		✓		✓		✓	✓	✓	✓
E	18ITE023T	Parallel Computing	✓	✓	✓										✓		
E	18ITE024T	Robotics	✓	✓	✓		✓		✓						✓	✓	✓
E	18ITE025T	Ethical Hacking	✓	✓	✓	✓	✓							✓	✓	✓	✓
E	18ITE026T	Distributed Systems	✓	✓	✓		✓				✓			✓	✓	✓	
E	18ITE027T	Business Intelligence	✓	✓	✓	✓	✓					✓			✓	✓	
E	18ITE028T	Digital Image Processing	✓	✓	✓	✓	✓	✓	✓				✓	✓	✓	✓	✓
E	18ITE029T	Advanced Java Programming	✓	✓	✓						✓	✓	✓		✓	✓	✓
E	18ITE030T	Software Quality Assurance	✓	✓	✓										✓		
E	18ITE031T	Software Project Management	✓	✓	✓						✓	✓	✓		✓		✓
E	18ITE032T	Cloud Computing	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
E	18ITE033T	Soft Computing	✓	✓	✓	✓	✓		✓					✓	✓	✓	✓
E	18ITE034T	Computer Forensics	✓	✓	✓	✓	✓								✓	✓	✓
E	18ITE035T	Digital Watermarking and Steganography	✓	✓					✓	✓	✓			✓	✓	✓	✓
E	18ITE036T	Intellectual Property Rights	✓							✓	✓		✓	✓			✓

M.KUMARASAMY COLLEGE OF ENGG. (AUTONOMOUS)
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KARUR - 639 113.

Semester	Course Code	Course Name	POs											PSOs		
			PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
E	18ITE037T	IT Security Evaluation & Auditing	✓			✓	✓				✓	✓	✓		✓	✓	✓
E	18ITE038T	Total Quality Management	✓	✓	✓						✓	✓	✓		✓	✓	✓
E	18ITE039T	Foundation Skills in Product Development	✓	✓	✓											✓	✓
E	18ITE040T	Green Computing	✓	✓	✓						✓	✓	✓		✓	✓	✓

M.KUMARASAMY COLLEGE OF ENGG. (AUTO)
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KARUR-639113.

Semester	Course Code	Course Name	POs												PSOs		
			PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
E	18ITE041T	5G Technology	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
E	18ITE042T	Software Defined Radio	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓	
E	18ITE043T	Block Chain	✓	✓	✓	✓	✓	✓							✓	✓	
E	18ITE044T	UNIX Internals	✓	✓			✓			✓		✓	✓		✓	✓	
E	18ITE045T	Computer Vision	✓	✓		✓						✓		✓	✓	✓	
E	18ITE046T	Augmented Reality and Virtual Reality	✓	✓	✓		✓	✓	✓						✓	✓	✓

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Structure of Curriculum

Sl.No.	Category	Credits
1	Humanities and Social Sciences including Management courses (H)	12
2	Basic Science courses (B)	26
3	Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer etc.(S)	21
4	Professional core courses (C)	46
5	Professional Elective courses relevant to chosen specialization/branch (E)	35/ 32
6	Open Electives –Electives from other technical and /or emerging subjects (O)	6/9
7	Project work, Minor project, seminar and internship in industry or elsewhere (P)	14
8	Mandatory Courses (M) [Environmental Sciences, Induction training, Indian Constitution, Essence of Indian Traditional Knowledge]	04
	Total Credits	164

1. Humanities and Social Sciences including Management courses (H)

Course Code	Course Name	Hours / Week			C
		L	T	P	
18LEH101J	Technical English	2	0	2	3
18LEH102J	Professional English	2	0	2	3
18MBH101L	Professional Skills and Practices	0	0	2	1
18MBH102L	General Aptitude	0	0	2	1
18MBH201T	Management Principles for Engineers	2	0	0	2
18MBH202T	Social Engineering	2	0	0	2
				Total Credits	12

L-Lecture T-Tutorial P-Practical

2. Basic Science courses (B)

Course Code	Course Name	Hours / Week			C
		L	T	P	
18PYB102J	Semiconductor Physics	3	1	2	5
18CYB101J	Chemistry	3	1	2	5
18MAB101T	Calculus and Linear Algebra	3	1	0	4
18MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4

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M.KUMARASAMY

Thalavapalayam, Karur, Tamilnadu

BOARD OF INFORMTION TECHNOLOGY

Meeting No: 9 **Date: 19.10.2020** **Venue: MKCE**

Platform: Microsoft Teams App (Online) **Time: 10.00AM**

MINUTES OF THE MEETING

9.1. Confirmation of Previous Board of Studies Meeting Minutes

The minutes of the Eighth Board of Studies Meeting held on 25.03.19 was confirmed.

9.2. Any revision of subject syllabus

No revisions and recommendations by Faculty, Students, Expert Members.

9.3. Confirmation of Syllabus for R2018

General:

- Number of minor projects can be reduced.
- Data Structures and Algorithms can divided as two subjects such as Data Structures (in III Sem) and Algorithms (in IV Sem)
- Operating Systems and Computer Networks should not be in same semester.
- Only 6 Professional Elective's can be given. Few important courses can be pushed from professional elective to professional core.
- The following list of courses can be included in the R2018 Curriculam
    - 5G Technology
    - Robotic Process Automation
    - Software Defined Ratio
    - Block Chain
    - Augmented Reality and Virtual Reality
    - Unix Internals
    - Computer Vision
    - Edge Computing

Vth Sem:

Software Testing: The Syllabus was accepted by board members without any change.

Formal Language Automata Theory: The Syllabus was accepted by board members without any change.

Mobile App Development Laboratory: The Syllabus was accepted by board members without any change.

Structure of Curriculum

Sl.No.	Category	Credits
1	Humanities and Social Sciences including Management courses (H)	12
2	Basic Science courses (B)	26
3	Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer etc.(S)	21
4	Professional core courses (C)	49
5	Professional Elective courses relevant to chosen specialization/branch (E)	32/ 29
6	Open Electives –Electives from other technical and /or emerging subjects (O)	6/9
7	Project work, Minor project, seminar and internship in industry or elsewhere (P)	14
8	Mandatory Courses (M) [Environmental Sciences, Induction training, Indian Constitution, Essence of Indian Traditional Knowledge]	04
	Total Credits	164

1. Humanities and Social Sciences including Management courses (H)

Course Code	Course Name	Hours / Week			C
		L	T	P	
18LEH101J	Technical English	2	0	2	3
18LEH102J	Professional English	2	0	2	3
18MBH101L	Professional Skills and Practices	0	0	2	1
18MBH102L	General Aptitude	0	0	2	1
18MBH201T	Management Principles for Engineers	2	0	0	2
18MBH202T	Social Engineering	2	0	0	2
				Total Credits	12

L-Lecture T-Tutorial P-Practical

2. Basic Science courses (B)

Course Code	Course Name	Hours / Week			C
		L	T	P	
18PYB102J	Semiconductor Physics	3	1	2	5
18CYB101J	Chemistry	3	1	2	5
18MAB101T	Calculus and Linear Algebra	3	1	0	4
18MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4

M.KUMARASAMY COLLEGE OF ENGG. (AUTONOMOUS)
Approved By
Board of Information Technology On
19 OCT 2020

18MAB203T	Probability Statistics and Queuing Theory	3	1	0	4
18MAB206T	Discrete Mathematics	3	1	0	4
				Total Credits	26

L-Lecture T-Tutorial P-Practical

3. Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer etc (S)

Course Code	Course Name	Hours / Week			C
		L	T	P	
18MES101J	Engineering Graphics and Design	1	0	4	3
18EES101J	Basic Electrical and Electronics Engineering	3	0	2	4
18MES102J	Basic Civil and Mechanical Engineering	3	0	2	4
18CSS101J	Programming for Problem Solving	1	0	4	3
18ECS202J	Analog and Digital Electronics	3	0	2	4
18ITS202J	Embedded Systems	2	0	2	3
				Total Credits	21

L-Lecture T-Tutorial P-Practical

4. Professional core courses (C)

Course Code	Course Name	Hours / Week			C
		L	T	P	
18ITC201J	Data Structures and Algorithms	3	0	2	4
18ITC202T	Agile Development Methodology	3	0	0	3
18ITC203J	Object Oriented Programming	3	0	2	4
18ITC204T	Computer Organization and Architecture	3	0	0	3
18ITC205T	Object Oriented Analysis and Design	3	0	0	3
18ITC206J	Computer Networks	3	0	2	4
18ITC207J	Database Management Systems	3	0	2	4
18ITC208T	Operating Systems	3	0	0	3
18ITC301T	Formal Language and Automata Theory	3	1	0	4
18ITC302J	Software Testing	2	0	2	3
18ITC303L	Mobile Application Development Laboratory	0	0	2	1
18ITC304J	Web Technology	3	0	2	4
18ITC305J	Big data Technologies	2	0	2	3
18ITC306L	Software Design Laboratory	0	0	2	1
18ITC401L	Security Laboratory	0	0	2	1
18ITC402L	FOSS Laboratory	0	0	2	1
				Total Credits	46

L-Lecture T-Tutorial P-Practical

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M.KUMARASAMY
COLLEGE OF ENGINEERING
Thalavapalayam, Karur, Tamilnadu

BOARD OF INFORMTION TECHNOLOGY

Meeting No: 9 **Date: 19.10.2020** **Venue: MKCE**

Platform: Microsoft Teams App (Online) **Time: 10.00AM**

MINUTES OF THE MEETING

9.1. Confirmation of Previous Board of Studies Meeting Minutes

The minutes of the Eighth Board of Studies Meeting held on 25.03.19 was confirmed.

9.2. Any revision of subject syllabus

No revisions and recommendations by Faculty, Students, Expert Members.

9.3. Confirmation of Syllabus for R2018

General:

- Number of minor projects can be reduced.
- Data Structures and Algorithms can divided as two subjects such as Data Structures (in III Sem) and Algorithms (in IV Sem)
- Operating Systems and Computer Networks should not be in same semester
- Only 6 Professional Elective's can be given. Few important courses can be pushed from professional elective to professional core.
- The following list of courses can be included in the R2018 Curriculam
    - 5G Technology
    - Robotic Process Automation
    - Software Defined Ratio
    - Block Chain
    - Augmented Reality and Virtual Reality
    - Unix Internals
    - Computer Vision
    - Edge Computing

Vth Sem:

***Software Testing*:** The Syllabus was accepted by board members without any change.

Formal Language Automata Theory: The Syllabus was accepted by board members without any change.

Mobile App Development Laboratory: The Syllabus was accepted by board members without any change.

M.KUMARASAMY
COLLEGE OF ENGINEERING
Thalavapalayam, Karur, Tamilnadu

Members Present:

1.Dr.N.Rameshbabu

2.Dr.R.Punithavathi

3. Dr.N.Arulanand

4. Dr.R.Sasikala

5. Dr.C.Mala

6. Mr.K.S.Siddesh Ram

7. Mr.N.Thiruvenkitachalapathy

8. Mr.A.Shanmugavelayutham

9. Mrs.R.Sujatha

10. Ms.N.Valarmathi

11.Mr.M.Gunasekar

12. Mr.E.Balraj

13. Ms.R. Nethra

14. Mr.E.Ragul

19/10/20

on line

19/10/20

19/10/20.

19/10/20

19.10.2020

19/10/20

19/10/20

on line

19/10/20

18MAB203T	Probability Statistics and Queuing Theory	3	1	0	4
18MAB206T	Discrete Mathematics	3	1	0	4
				Total Credits	26

L-Lecture T-Tutorial P-Practical

3. Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer etc (S)

Course Code	Course Name	Hours / Week			C
		L	T	P	
18MES101J	Engineering Graphics and Design	1	0	4	3
18EES101J	Basic Electrical and Electronics Engineering	3	0	2	4
18MES102J	Basic Civil and Mechanical Engineering	3	0	2	4
18CSS101J	Programming for Problem Solving	1	0	4	3
18ECS202J	Analog and Digital Electronics	3	0	2	4
18ITS202J	Embedded Systems	2	0	2	3
				Total Credits	21

L-Lecture T-Tutorial P-Practical

4. Professional core courses (C)

Course Code	Course Name	Hours / Week			C
		L	T	P	
18ITC201J	Data Structures and Algorithms	3	0	2	4
18ITC202T	Agile Development Methodology	3	0	0	3
18ITC203J	Object Oriented Programming	3	0	2	4
18ITC204T	Computer Organization and Architecture	3	0	0	3
18ITC205T	Object Oriented Analysis and Design	3	0	0	3
18ITC206J	Computer Networks	3	0	2	4
18ITC207J	Database Management Systems	3	0	2	4
18ITC208T	Operating Systems	3	0	0	3
18ITC301T	Formal Language and Automata Theory	3	1	0	4
18ITC302J	Software Testing	2	0	2	3
18ITC303L	Mobile Application Development Laboratory	0	0	2	1
18ITC304J	Web Technology	3	0	2	4
18ITC305J	Big data Technologies	2	0	2	3
18ITC306L	Software Design Laboratory	0	0	2	1
18ITC401J	Cryptography and Network Security	3	0	2	4
18ITC402L	FOSS Laboratory	0	0	2	1
				Total Credits	49

L-Lecture T-Tutorial P-Practical

M.KUMARASAMY COLLEGE OF ENGG. (AUTONOMOUS)
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Board of Information Technology On
19 OCT 2020
639 113.

8.10 Syllabus Revision for 18CSS101J Programming for Problem Solving

- Faculties and Students felt that current syllabus is too heavy. Suggested for reframing the syllabus a accepted for reframing as 2 0 2[Total Credits:3].
- Basics need to be concentrated much through practicals.

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13. Mr.R.Balaji (16BIT3013) - R. Balaji 25/3/19

14. Ms. B. Sinthiya (R&D Coordinator) - B. Sinthiya 27/3/19

18MAB203T	Probability Statistics and Queuing Theory	3	1	0	4
18MAB206T	Discrete Mathematics	3	1	0	4
				Total Credits	26

L-Lecture T-Tutorial P-Practical

3. Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer etc (S)

Course Code	Course Name	Hours / Week			C
		L	T	P	
18MES101J	Engineering Graphics and Design	1	0	4	3
18EES101J	Basic Electrical and Electronics Engineering	3	0	2	4
18MES102J	Basic Civil and Mechanical Engineering	3	0	2	4
18CSS101J/ 18CSS101J(R)	Programming for Problem Solving	1	0	4	3
		2	0	2	
18ECS202J	Analog and Digital Electronics	3	0	2	4
18ITS202J	Embedded Systems	2	0	2	3
				Total Credits	21

L-Lecture T-Tutorial P-Practical

4. Professional core courses (C)

Course Code	Course Name	Hours / Week			C
		L	T	P	
18ITC201J	Data Structures and Algorithms	3	0	2	4
18ITC202T	Agile Development Methodology	3	0	0	3
18ITC203J	Object Oriented Programming	3	0	2	4
18ITC204T	Computer Organization and Architecture	3	0	0	3
18ITC205T	Object Oriented Analysis and Design	3	0	0	3
18ITC206J	Computer Networks	3	0	2	4
18ITC207J	Database Management Systems	3	0	2	4
18ITC208T	Operating Systems	3	0	0	3
18ITC301T	Formal Language and Automata Theory	3	1	0	4
18ITC302J	Software Testing	2	0	2	3
18ITC303L	Mobile Application Development Laboratory	0	0	2	1
18ITC304J	Web Technology	3	0	2	4
18ITC305J	Big data Technologies	2	0	2	3
18ITC306L	Software Design Laboratory	0	0	2	1
18ITC401L	Security Laboratory	0	0	2	1
18ITC402L	FOSS Laboratory	0	0	2	1
				Total Credits	46

L-Lecture T-Tutorial P-Practical

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25 MAR 2019

SEU – unit 1 title may be solar radiation and measurements
PQ – IEEE Standards to be included in unit 2, 3 and 4.

OPen electives.

IoT – No change
FSM – Interchange the unit 3 & unit 4
Robotics – No change.
ESD & FC – No change.
EV – Course name may be changed as fundamentals of electric vehicles
IoT and ESD & FC subjects can be included in professional electives for EEE Students with different name.

BEEE – The subject content in all the 5 units are revised based on the feedback from the stack holders
One credit course – Board is accepted to conduct three one Credit courses from 5th Semester onwards for this 2018 regulation

BTech (CSBS) – Principles of electrical engineering course content also discussed and verified.

PG 2019 Regulation.

Power System Protection Course may be added as elective course in third Semester
electronics
Analog and digital electronics Subject codes are revised

15/10/2020

18MAB203T	Probability Statistics and Queuing Theory	3	1	0	4
18MAB206T	Discrete Mathematics	3	1	0	4
				Total Credits	26

L-Lecture T-Tutorial P-Practical

3. Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer etc (S)

Course Code	Course Name	Hours / Week			C
		L	T	P	
18MES101J	Engineering Graphics and Design	1	0	4	3
18EES101J/ 18EES101J(R)	Basic Electrical and Electronics Engineering	3	0	2	4
18MES102J	Basic Civil and Mechanical Engineering	3	0	2	4
18CSS101J/ 18CSS101J(R)	Programming for Problem Solving	1	0	4	3
		2	0	2	
18ECS202J	Analog and Digital Electronics	3	0	2	4
18ITS202J	Embedded Systems	2	0	2	3
				Total Credits	21

L-Lecture T-Tutorial P-Practical

4. Professional core courses (C)

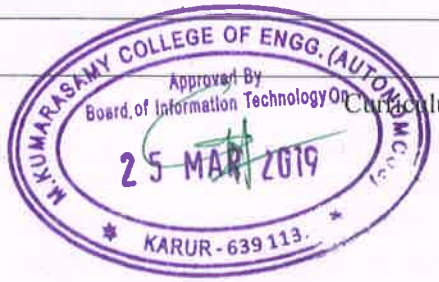
Course Code	Course Name	Hours / Week			C
		L	T	P	
18ITC201J	Data Structures and Algorithms	3	0	2	4
18ITC202T	Agile Development Methodology	3	0	0	3
18ITC203J	Object Oriented Programming	3	0	2	4
18ITC204T	Computer Organization and Architecture	3	0	0	3
18ITC205T	Object Oriented Analysis and Design	3	0	0	3
18ITC206J	Computer Networks	3	0	2	4
18ITC207J	Database Management Systems	3	0	2	4
18ITC208T	Operating Systems	3	0	0	3
18ITC301T	Formal Language and Automata Theory	3	1	0	4
18ITC302J	Software Testing	2	0	2	3
18ITC303L	Mobile Application Development Laboratory	0	0	2	1
18ITC304J	Web Technology	3	0	2	4
18ITC305J	Big data Technologies	2	0	2	3
18ITC306L	Software Design Laboratory	0	0	2	1
18ITC401J	Cryptography and Network Security	3	0	2	4
18ITC402L	FOSS Laboratory	0	0	2	1
				Total Credits	49

L-Lecture T-Tutorial P-Practical

M.KUMARASAMY COLLEGE OF ENGG. (AUTONOMOUS) Approved By Board of Information Technology On 09 OCT 2020 KARUR-639 113.

5.Professional Elective courses relevant to chosen specialization/branch (E)

Course Code	Course Name	Hours / Week			C
		L	T	P	
18ITE001J	Python Programming	3	0	2	4
18ITE002J	C#.NET Framework	3	0	2	4
18ITE003J	Data mining and Data ware housing	3	0	2	4
18ITE004J	Computer Graphics and Multimedia	3	0	2	4
18ITE005J	3D Game Programming Foundations	3	0	2	4
18ITE006T	Artificial Intelligence	3	1	0	4
18ITE007T	Compiler Engineering	3	1	0	4
18ITE008T	Cryptography and Network Security	3	1	0	4
18ITE009T	Human Computer Interaction	3	0	0	3
18ITE010T	Internet of Things	3	0	0	3
18ITE011T	Information Theory and Coding	3	0	0	3
18ITE012T	Decision Support Systems	3	0	0	3
18ITE013T	Wireless Ad hoc and Sensor Networks	3	0	0	3
18ITE014T	Service Oriented Architecture	3	0	0	3
18ITE015T	Mobile Communication	3	0	0	3
18ITE016T	Enterprise Computing	3	0	0	3
18ITE017T	Grid Computing	3	0	0	3
18ITE018T	Semantic Web	3	0	0	3
18ITE019T	Information Retrieval Techniques	3	0	0	3
18ITE020T	Social Network Analysis	3	0	0	3
18ITE021T	User Interface Design	3	0	0	3
18ITE022T	Machine Learning	3	0	0	3
18ITE023T	Parallel Computing	3	0	0	3
18ITE024T	Robotics	3	0	0	3
18ITE025T	Ethical Hacking	3	0	0	3
18ITE026T	Distributed Systems	3	0	0	3
18ITE027T	Business Intelligence	3	0	0	3
18ITE028T	Digital Image Processing	3	0	0	3
18ITE029J	Advanced Java Programming	2	0	2	3
18ITE030T	Software Quality Assurance	3	0	0	3
18ITE031T	Software Project Management	3	0	0	3
18ITE032T	Cloud Computing	3	0	0	3
18ITE033T	Soft Computing	3	0	0	3
18ITE034T	Computer Forensics	3	0	0	3



Course Code	Course Name	Hours / Week			C
		L	T	P	
18ITE035T	Digital Watermarking and Steganography	3	0	0	3
18ITE036T	Intellectual Property Rights	3	0	0	3
18ITE037T	IT Security Evaluation And Auditing	3	0	0	3
18ITE038T	Total Quality Management	3	0	0	3
18ITE039T	Foundation Skills in Product Development	3	0	0	3
18ITE040T	Green Computing	3	0	0	3

L-Lecture T-Tutorial P-Practical

6. Open subjects –Electives from other technical and /or emerging subjects (O)

Course Code	Course Name	Hours / Week			C
		L	T	P	
Open Elective Offered by Civil Engineering					
18CEO001T	Building Services	3	0	0	3
18CEO002T	Disaster Preparedness, Planning and Management	3	0	0	3
18CEO003T	Environmental Impact Assessment	3	0	0	3
18CEO004T	Remote Sensing and GIS	3	0	0	3
18CEO005T	Metro System and Engineering	3	0	0	3
Open Elective Offered by Mechanical Engineering					
18MEO001T	Industrial Safety for Engineers	3	0	0	3
18MEO002T	Energy Engineering	3	0	0	3
18MEO003T	Automobile Technology	3	0	0	3
18MEO004T	Advances in Nanotechnology	3	0	0	3
18MEO005T	Product Design and Development	3	0	0	3
Open Elective Offered by Electrical and Electronics Engineering					
18EEO001T	Basics of Internet of Things	3	0	0	3
18EEO002T	Fundamentals of Smart Grid	3	0	0	3
18EEO003T	Robotics	3	0	0	3
18EEO004T	Energy Storing Devices	3	0	0	3
18EEO005T	Fundamentals of Electric Vehicles	3	0	0	3
Open Elective Offered by Electronics and Instrumentation Engineering					
18EIO001T	Basics of Automation	3	0	0	3
18EIO002T	Automotive Electronics	3	0	0	3
18EIO003T	Programmable Logic Controllers	3	0	0	3
18EIO004T	Introduction to MEMS	3	0	0	3
18EIO005T	Smart Sensor Technology	3	0	0	3

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Course Code	Course Name	Hours / Week			C
		L	T	P	
18ITE035T	Digital Watermarking and Steganography	3	0	0	3
18ITE036T	Intellectual Property Rights	3	0	0	3
18ITE037T	IT Security Evaluation And Auditing	3	0	0	3
18ITE038T	Total Quality Management	3	0	0	3
18ITE039T	Foundation Skills in Product Development	3	0	0	3
18ITE040T	Green Computing	3	0	0	3
18ITE041T	5G Technology	3	0	0	3
18ITE042T	Software Defined Radi0	3	0	0	3
18ITE043T	Block Chain	3	0	0	3
18ITE044T	UNIX Internals	3	0	0	3
18ITE045T	Computer Vision	3	0	0	3
18ITE046T	Augmented Reality and Virtual Reality	3	0	0	3

L-Lecture T-Tutorial P-Practical

M.KUMARASAMY COLLEGE OF ENGG. (AUTONOMOUS)
Approved By
Board of Information Technology On
19 OCT 2020
KARUR-639 113.

Course Code	Course Name	Hours / Week			C
		L	T	P	
Open Elective Offered by Electronics and Communication Engineering					
18ECO001T	Microcontrollers and Embedded systems	3	0	0	3
18ECO002T	Internet of Everything	3	0	0	3
18ECO003T	Wireless Mobile Communication	3	0	0	3
18ECO004T	Medical Engineering	3	0	0	3
18ECO005T	Signal and Image Processing	3	0	0	3
Open Elective Offered by Master of Business Administration					
18MBO001T	Business Ethics and Corporate Social Responsibility	3	0	0	3
18MBO002T	Human Capital Management	3	0	0	3
18MBO003T	Digital and Social Media Marketing	3	0	0	3
18MBO004T	Banking Principles and Practices	3	0	0	3
18MBO005T	Export Management and Documentation	3	0	0	3
Open Elective Offered by Computer Science and Engineering					
18CSO001T	Basics of Data Structures and Algorithms	3	0	0	3
18CSO002J	Fundamentals of Python Programming	2	0	2	3
18CSO003J	Fundamentals of Java Programming	2	0	2	3
18CSO004J	Mobile Application Development	2	0	2	3
18CSO005T	Software Development using Agile	3	0	0	3

L-Lecture T-Tutorial P-Practical

7. Project work, minor project, seminar and internship in industry or elsewhere (P)

Course Code	Course Name	Hours / Week			C
		L	T	P	
18ITP301N	MOOC I / Industrial Training I	0	0	2*	1
18ITP302N	MOOC I / Industrial Training II	0	0	2*	1
18ITP201L	Minor Project I	0	0	2	1
18ITP202L	Minor Project II	0	0	2	1
18ITP301L	Minor Project III	0	0	2	1
18ITP302L	Minor Project IV	0	0	2	1
18ITP403L	Project work	0	0	16	8
				Total Credits	14

L-Lecture T-Tutorial P-Practical *Can be conducted as Non Contact Hours

M.KUMARASAMY COLLEGE OF ENGINEERING (AUTONOMOUS) Approved By Board of Information Technology On 25 MAR 2019 KARUR-639 113.

8. Mandatory Courses (M)

Course Code	Course Name	Hours / Week			C
		L	T	P	
18LEM101T	Constitution of India	1	0	0	Nil
18LEM102T	Value Education	1	0	0	Nil
18GNM101L	Physical & Mental Health using Yoga	0	0	2	Nil
18GNM102L	NCC / NSS / NSO	0	0	2	Nil
18MBM201L	Competencies in Social Skills	0	0	2	1
18MBM202L	Critical and Creative Thinking Skills	0	0	2	1
18CYM201T	Environmental Science	1	0	0	Nil
18LEM103T	Indian Tradition and Heritage	1	0	0	Nil
18MBM301L	Analytical and Logical Thinking Skills	0	0	2	1
18MBM302L	Employability Skills and Practices	0	0	2	1
18LEM301T	Indian Art Forms	1	0	0	Nil
18LEM302T	Self Development and Entrepreneurship	1	0	0	Nil
				Total Credits	4

L-Lecture T-Tutorial P-Practical

9.Open Elective Offered to Other Departments by the Information Technology

Course Code	Course Name	Hours / Week			C
		L	T	P	
18ITO001J	Problem Solving Techniques Using Python	1	0	4	3
18ITO002J	Java Programming	1	0	4	3
18ITO003J	Game Design and Development	1	0	4	3
18ITO004J	Web Design	2	0	2	3
18ITO005J	Data Structures	2	0	2	3

M.KUMARASAMY COLLEGE OF ENGG. (AUTONOMOUS)
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10.One Credit Course

Course Code	Course Name	Hours / Week			C
		L	T	P	
18ITY001L	Web Programming	0	0	2	1

10.One Credit Course(X)

Course Code	Course Name	Hours / Week			C
		L	T	P	
18ITX001L/ 18ITY001L	Web Programming	0	0	2	1
18ITX002L	Application Development Using AR and VR	0	0	2	1
18ITX003L	PHP and MYSQL	0	0	2	1
18ITX004L	DEVOPS Technologies	0	0	2	1
18ITX005L	Data Analytics Using Python	0	0	2	1

Semester I						
Category	Course Code	Course Name	Hours / Week			Credits
			L	T	P	
H	18LEH101J	Technical English	2	0	2	3
B	18MAB101T	Calculus and Linear Algebra	3	1	0	4
B	18PYB101J	Physics(ME,EC,EI)	3	1	2	5
B	18CYB101J	Chemistry (CE,EE,CS,IT)	3	1	2	5
S	18MES101J	Engineering Graphics (CE,EE,CS,IT)	1	0	4	3
S	18CSS101J	Programming for Problem Solving (ME,EC,EI)	1	0	4	3
S	18MES102J	Basic Civil and Mechanical Engineering (ME,EC,EI)	3	0	2	4
S	18EES101J	Basic Electrical and Electronics Engineering (CE,EE,CS,IT)	3	0	2	4
H	18MBH101L	Professional Skills and Practices (ME,EC,EI)	0	0	2	1
H	18MBH102L	General Aptitude(CE,EE,CS,IT)	0	0	2	1
M	18LEM101T	Constitution of India	1	0	0	-
M	18GNM101L	Physical and Mental Health using Yoga (ME,EC,EI)	0	0	2	-
M	18GNM102L	NSS (CE,EE,CS,IT)	0	0	2	-
					Total Credits	20

M.KUMARASAMY COLLEGE OF ENGG.(AUTONOMOUS)
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Board of Science & Humanities
20 APR 2018
KARUR - 639 113

Semester II						
Category	Course Code	Course Name	Hours / Week			Credits
			L	T	P	
H	18LEH102J	Professional English	2	0	2	3
B	18MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
B	18PYB101J	Physics (CE,EE,CS,IT)	3	1	2	5
B	18CYB101J	Chemistry (ME,EC,EI)	3	1	2	5
S	18MES101J	Engineering Graphics (ME,EC,EI)	1	0	4	3
S	18CSS101J	Programming for Problem Solving (CE,EE,CS,IT)	1	0	4	3
S	18MES102J	Basic Civil and Mechanical Engineering. (CE,EE,CS,IT)	3	0	2	4
S	18EES101J	Basic Electrical and Electronics Engineering (ME,EC,EI)	3	0	2	4
H	18MBH101L	Professional Skills and Practices (CE,EE,CS,IT)	0	0	2	1
H	18MBH102L	General Aptitude (ME,EC,EI)	0	0	2	1
M	18LEM102T	Value Education	1	0	0	-
M	18GNM101L	Physical and Mental Health using Yoga (CE,EE,CS,IT)	0	0	2	-
M	18GNM102L	NSS (ME,EC,EI)	0	0	2	-
					Total Credits	20

M.KUMARASAMY COLLEGE OF ENGG.(AUTONOMOUS)
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20 APR 2018
KARUR - 639 113

8.10 Syllabus Revision for 18CSS101J Programming for Problem Solving

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- Basics need to be concentrated much through practicals.

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14. Ms. B. Sinthiya (R&D Coordinator) - B. 25/3/19

Semester I						
Category	Course Code	Course Name	Hours / Week			Credits
			L	T	P	
H	18LEH101J	Technical English	2	0	2	3
B	18MAB101T	Calculus and Linear Algebra	3	1	0	4
B	18PYB101J	Physics(ME,EC,EI)	3	1	2	5
B	18CYB101J	Chemistry (CE,EE,CS,IT)	3	1	2	5
S	18MES101J	Engineering Graphics (CE,EE,CS,IT)	1	0	4	3
S	18CSS101J(R)	Programming for Problem Solving (ME,EC,EI)	2	0	2	3
S	18MES102J	Basic Civil and Mechanical Engineering (ME,EC,EI)	3	0	2	4
S	18EES101J	Basic Electrical and Electronics Engineering (CE,EE,CS,IT)	3	0	2	4
H	18MBH101L	Professional Skills and Practices (ME,EC,EI)	0	0	2	1
H	18MBH102L	General Aptitude(CE,EE,CS,IT)	0	0	2	1
M	18LEM101T	Constitution of India	1	0	0	-
M	18GNM101L	Physical and Mental Health using Yoga (ME,EC,EI)	0	0	2	-
M	18GNM102L	NSS (CE,EE,CS,IT)	0	0	2	-
					Total Credits	20

M.KUMARASAMY COLLEGE OF ENGG.(AUTONOMOUS)
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Board of Science & Humanities
29 MAR 2019
KARUR - 639 113

Semester II						
Category	Course Code	Course Name	Hours / Week			Credits
			L	T	P	
H	18LEH102J	Professional English	2	0	2	3
B	18MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
B	18PYB101J	Physics(CE,EE,CS,IT)	3	1	2	5
B	18CYB101J	Chemistry (ME,EC,EI)	3	1	2	5
S	18MES101J	Engineering Graphics(ME,EC,EI)	1	0	4	3
S	18CSS101J(R)	Programming for Problem Solving (CE,EE,CS,IT)	2	0	2	3
S	18MES102J	Basic Civil and Mechanical Engineering. (CE,EE,CS,IT)	3	0	2	4
S	18EES101J	Basic Electrical and Electronics Engineering (ME,EC,EI)	3	0	2	4
H	18MBH101L	Professional Skills and Practices (CE,EE,CS,IT)	0	0	2	1
H	18MBH102L	General Aptitude (ME,EC,EI)	0	0	2	1
M	18LEM102T	Value Education	1	0	0	-
M	18GNM101L	Physical and Mental Health using Yoga (CE,EE,CS,IT)	0	0	2	-
M	18GNM102L	NSS (ME,EC,EI)	0	0	2	-
					Total Credits	20

M.KUMARASAMY COLLEGE OF ENGG.(AUTONOMOUS)
Approved By
Board of Science & Humanities
29 MAR 2019
KARUR - 639 113

DATE 15 | 10 | 2020

BOS - 9

SEU – unit 1 title may be solar radiation and measurements
PQ – IEEE Standards to be included in unit 2, 3 and 4.

OPen electives.

IoT – No change
FSM – Interchange the unit 3 & unit 4
Robotics – No change.
ESD & FC – No change.
EV – Course name may be changed as fundamentals of electric vehicles
IoT and ESD & FC subjects can be included in professional electives for EEE students with different name.

BEEE – The subject content in all the 5 units are revised based on the feedback from the stack holders
One credit course – Board is accepted to conduct three one Credit courses from 5th Semester onwards for this 2018 regulation

BTech (CSBS) – Principles of electrical engineering course content also discussed and verified.

PG 2019 regulation.

Power system Protection course may be added as elective course in third Semester
electronics
Analog and digital electronics subject codes are revised

15/10/2020

I to VIII Semester Curriculum

Semester I						
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
H	18LEH101J	Technical English	2	0	2	3
B	18MAB101T	Calculus and Linear Algebra	3	1	0	4
B	18PYB101J / 18CYB101J	Physics / Chemistry	3	1	2	5
S	18MES101J / 18CSS101J/ 18CSS101J(R)	Engineering Graphics / Programming for Problem Solving	1	0	4	3
			2	0	2	
S	18MES102J / 18EES101J/ 18EES101J(R)	Basic Civil and Mechanical Engineering / Basic Electrical and Electronics Engineering	3	0	2	4
H	18MBH101L / 18MBH102L	Professional Skills and Practices / General Aptitude	0	0	2	1
M	18LEM101T	Constitution of India	1	0	0	Nil
M	18GNM101L / 18GNM102L	Physical and Mental Health using Yoga / NSS	0	0	2	Nil
					Total Credits	20

Semester II						
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
H	18LEH102J	Professional English	2	0	2	3
B	18MAB102T	Advanced Calculus and Complex Analysis	3	1	0	4
B	18PYB101J / 18CYB101J	Physics / Chemistry	3	1	2	5
S	18MES101J / 18CSS101J/ 18CSS101J(R)	Engineering Graphics / Programming for Problem Solving	1	0	4	3
			2	0	2	
S	18MES102J / 18EES101J/ 18EES101J(R)	Basic Civil and Mechanical Engineering / Basic Electrical and Electronics Engineering	3	0	2	4
H	18MBH101L / 18MBH102L	Professional Skills and Practices / General Aptitude	0	0	2	1
M	18LEM102T	Value Education	1	0	0	Nil
M	18GNM101L / 18GNM102L	Physical and Mental Health using Yoga / NSS	0	0	2	Nil

M.KUMARASAMY COLLEGE OF ENGG. (AUTONOMOUS)
Approved By
Board of Information Technology On
19 OCT 2020

Semester III						
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
B	18MAB203T	Probability Statistics and Queuing Theory	3	1	0	4
S	18ECS202J	Analog and Digital Electronics	3	0	2	4
C	18ITC201J	Data Structures and Algorithms	3	0	2	4
C	18ITC202T	Agile Development Methodology	3	0	0	3
C	18ITC203J	Object Oriented Programming	3	0	2	4
C	18ITC204T	Computer Organization and Architecture	3	0	0	3
P	18ITP201L	Minor Project I	0	0	2	1
M	18MBM201L	Competencies in Social Skills	0	0	2	1
M	18CYM201T/ 18LEM103T	Environmental Science/ Indian Tradition and Heritage	1	0	0	Nil
					Total Credits	24

Semester IV						
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
B	18MAB206T	Discrete Mathematics	3	1	0	4
S	18ITS202J	Embedded Systems	2	0	2	3
C	18ITC205T	Object Oriented Analysis and Design	3	0	0	3
C	18ITC206J	Computer Networks	3	0	2	4
C	18ITC207J	Database Management Systems	3	0	2	4
C	18ITC208T	Operating Systems	3	0	0	3
P	18ITP202L	Minor Project II	0	0	2	1
M	18MBM202L	Critical and Creative Thinking Skills	0	0	2	1
M	18LEM103T/ 18CYM201T	Indian Tradition and Heritage/ Environmental Science	1	0	0	Nil
					Total Credits	23

M.KUMARASAMY COLLEGE OF ENGG.(AUTONOMOUS)
Approved By
Board of Information Technology On
25 MAR 2019

Semester V						
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
C	18ITC301T	Formal Language and Automata Theory	3	1	0	4
C	18ITC302J	Software Testing	2	0	2	3
C	18ITC303L	Mobile Application Developement Laboratory	0	0	2	1
E		Professional Elective I				4
E		Professional Elective II				3
E/O		Professional Elective III / Open Elective I				3
O		Open Elective II				3
P	18ITP301L	Minor Project III	0	0	2	1
P	18ITP301N	MOOC I / Industrial Training I	0	0	2*	1
M	18MBM301L	Analytical and Logical Thinking Skills	0	0	2	1
M	18LEM301T/ 18CYM201T	Indian Art Forms/ Indian Tradition and Heritage	1	0	0	Nil
					Total Credits	24

*-can be conducted as Non Contact Hours

Semester VI						
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
H	18MBH201T	Management Principles for Engineers	2	0	0	2
C	18ITC304J	Web Technology	3	0	2	4
C	18ITC305J	Bigdata Technologies	2	0	2	3
C	18ITC306L	Software Design Laboratory	0	0	2	1
E		Professional Elective IV				4
E		Professional Elective V				3
O		Open Elective III				3
P	18ITP302L	Minor Project IV	0	0	2	1
P	18ITP302N	MOOC II/ Industrial Training II	0	0	2*	1
M	18MBM302L	Employability Skills and Practices	0	0	2	1
M	18LEM302T	Self Development and Entrepreneurship	1	0	0	Nil
					Total Credits	23

* – can be conducted Non Contact Hours

M.KUMARASAMY COLLEGE OF ENGG. (AUTONOMOUS) Approved By Board of Information Technology On 25 MAR 2019 KARUR - 639 113.

Semester VII						
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
H	18MBH202T	Social Engineering	2	0	0	2
C	18ITC401L	Security Laboratory	0	0	2	1
C	18ITC402L	FOSS Laboratory	0	0	2	1
E		Professional Elective VI				3
E		Professional Elective VII				3
E		Professional Elective VIII				3
E		Profesional Elective IX				3
					Total Credits	16

Semester VIII						
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E		Professional Elective X				3
E		Professional Elective XI				3
P	18ITP403L	Project work	0	0	16	8
					Total Credits	14

L-Lecture T-Tutorial P-Practical

BOARD OF INFORMTION TECHNOLOGY

Meeting No: 9 **Date: 19.10.2020** **Venue: MKCE**

Platform: Microsoft Teams App (Online) **Time: 10.00AM**

MINUTES OF THE MEETING

9.1. Confirmation of Previous Board of Studies Meeting Minutes

The minutes of the Eighth Board of Studies Meeting held on 25.03.19 was confirmed.

9.2. Any revision of subject syllabus

No revisions and recommendations by Faculty, Students, Expert Members.

9.3. Confirmation of Syllabus for R2018

General:

- Number of minor projects can be reduced.
- Data Structures and Algorithms can divided as two subjects such as Data Structures (in III Sem) and Algorithms (in IV Sem)
- Operating Systems and Computer Networks should not be in same semester
- Only 6 Professional Elective's can be given. Few important courses can be pushed from professional elective to professional core.
- The following list of courses can be included in the R2018 Curriculam
    - 5G Technology
    - Robotic Process Automation
    - Software Defined Ratio
    - Block Chain
    - Augmented Reality and Virtual Reality
    - Unix Internals
    - Computer Vision
    - Edge Computing

Vth Sem:

***Software Testing*:** The Syllabus was accepted by board members without any change.

Formal Language Automata Theory: The Syllabus was accepted by board members without any change.

Mobile App Development Laboratory: The Syllabus was accepted by board members without any change.

Members Present:

1.Dr.N.Rameshbabu

2.Dr.R.Punithavathi

3. Dr.N.Arulanand

4. Dr.R.Sasikala

5. Dr.C.Mala

6. Mr.K.S.Siddesh Ram

7. Mr.N.Thiruvenkitachalapathy

8. Mr.A.Shanmugavelayutham

9. Mrs.R.Sujatha

10. Ms.N.Valarmathi

11.Mr.M.Gunasekar

12. Mr.E.Balraj

13. Ms.R. Nethra

14. Mr.E.Ragul

19/10/20

online

19/10/20

19/10/20.

19/10/20

19.10.2020

19/10/20

19/10/20

online

19/10/20

Semester VII						
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
H	18MBH202T	Social Engineering	2	0	0	2
C	18ITC401J	Cryptography and Network Security	3	0	2	4
C	18ITC402L	FOSS Laboratory	0	0	2	1
E		Professional Elective VI				3
E		Professional Elective VII				3
E		Professional Elective VIII				3
					Total Credits	16

Semester VIII						
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E		Professional Elective IX				3
E		Professional Elective X				3
P	18ITP403L	Project work	0	0	16	8
					Total Credits	14

L-Lecture T-Tutorial P-Practical

Regulation 2018		Semester I	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
H	18LEH101J	TECHNICAL ENGLISH	2	0	2	3

Prerequisite Course (s)

NIL

Course Objective (s):

The purpose of learning this course is to:

CLR-1	Analyze the importance of communication in personal, professional contexts. Identify proper English pronunciation
CLR-2	Strengthen vocabulary and grammar. Enhance listening and writing comprehension. Review films and documentaries
CLR-3	Writing brief paragraphs using appropriate techniques. Enhance their English fluency in speaking
CLR-4	Write effective essays, stories. Experience workplace communication aspects
CLR-5	Research on a topic and write a comprehensible academic project reports. Make effective presentations

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Identify types, modes, channels and barriers of communication. distinguish different speech sounds, pronounce correctly
CO2	Identify, rectify the errors in the use of grammar and vocabulary. Improve listening and writing skills
CO3	Develop a topic idea into a cohesive paragraph with examples. Improve the fluency of speaking skills
CO4	Develop ideas into logical and coherent essays. Understand better the workplace culture
CO5	Identify the steps involved in writing an academic project report. List and practice skills need for making a presentation

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	3	1	3	3	3	1	3	3	3	-	3	-	-	-
CO2	1	3	1	3	3	3	1	3	3	3	-	3	-	-	-
CO3	1	3	1	3	3	2	1	3	3	3	-	3	-	-	-
CO4	1	3	1	3	3	3	1	3	3	3	-	3	-	-	-
CO5	1	3	1	3	3	3	1	3	3	3	-	3	-	-	-
CO (Avg)	1	3	1	3	3	2.8	1	3	3	3	-	3	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	COMMUNICATION	6

Definition, Process of communication - (Filling in-Class Worksheets) - Verbal and Non-Verbal Communication(Individual and Group Activities - Role play)-Other Types of Communication: General-Technical-Formal, Informal- External, Internal (Write upon a selected type of communication)- Listening, Speaking, Reading, Writing(Group activity (Newspaper) – Discussion and Feedback)- Communication and Language Barriers(Individual Activity- Sharing of Personal Experiences)-Body language(Mime).

UNIT II	VOCABULARY AND GRAMMAR	7

Words with Foreign Roots, Word Formation – Inflectional, Derivational Prefixes, Suffixes(Quiz - Identifying the Borrowed roots and Their Meanings-Worksheet Exercise)-Synonyms and Antonyms and Standard Abbreviations(Context Based Activity / Learner Compiling Standard Abbreviations from Core Subject)-Homonyms and Homophones(Fun Activities – Worksheets- Cross Words)-Articles, Tenses(Exercise through Worksheets- Individual Activity -Peer Correction- Open Discussion)- Noun-Pronoun Agreement and Subject-Verb Agreement(Identifying and Learning through Error Analysis – Worksheets)-Misplaced Modifiers - Prepositions- Prepositional verbs and Phrasal verbs(Learn through Practice – Placing Same Modifier in Different Places in a Sentence)-Prepositions- Prepositional Verbs and Phrasal Verbs(Filling in-Class Worksheets)

UNIT III	DISCOURSE TECHNIQUES	7

Sentence Structure, Phrases and Clauses(Exercise: Worksheet, Identifying Phrases, Clauses, Compound, Complex Sentences)-Developing Ideas into Paragraphs –Cohesion Markers(Identify Topic sentence in a Paragraph; Writing a Paragraph Based on a Topic)- -Inputs on Writing Precisely, Redundancies, Wordiness-Repetition-Clichés(Error Analysis and Editing)-Defining, Describing Technical Terms(Writing Definitions-Product and Process Description)-Inputs on Classifying/Categorising and Sequencing Ideas with Relevant Diagrams(Writing a Passage on the Given hints, Tree Diagram, Classification Table and Flow Chart)-Importance of Punctuation – Miscommunication –(Fun Activities - Worksheets for Appropriate Punctuation – Written)- Errors in Punctuation(Fun Activities - Worksheets for Appropriate Punctuation – Written)

UNIT IV	WORKPLACE COMMUNICATION	6

Reading Comprehension, Guidelines questions (Referential, Critical,Interpretative)(Practice Excercise) - Précis-writing Guidelines(Practice Excercise) - Summarising(Group Activity (Oral/Written) on the Given Passages)-Essay Writing Guidelines: Introduction, Elaboration and Conclusion with Examples(Individual Activity (Written) on the Given Topic)-Organisational Report Writing - Progress Report- Guidelines(Writing a Progress Report)-Interview Skills(Mock Interview).

UNIT V	PROJECT WRITING	5

Topics for Project Writing(Discussion)- Collection of Data – Avoiding Plagiarism-Authenticity and Credibility of Data(Collection of Data for Verification)- Guidelines for Writing: Outline- Objectives-Background- Methodology-Discussion-Documentation(Drafting an Outline & Preparing References)-Discussion Using Sample Project(Writing the First Draft on the Selected Topic)-Checklist for Project Format (PPT)(Self-Verification and Submission of Final Draft).

LIST OF EXPERIMENTS	14

1. Often Mispronounced sounds (Audio Visual Material - Listening to minimal pairs and reproducing)
2. Barriers of communication Language barriers – videos (Identifying the Language Barriers of communication –Written)
3. Short Biographical Account on Famous Personalities –Video(Oral Paraphrasing of the Content Shown)
4. Listening to Long Conversations, Daily Life (Identify Various Communication Contexts and Answering Questions – Collocation)
5. Introduction to Englishes -British and American –Videos (Discussion on Difference between British

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20 APR 2018
KARUR - 639 113

and American Words)

6. Speaking - Practice Activity – Brain Storming – Mind Mapping (Just a Minute)
7. Describing a Scene or Event –Videos (String Narration – Describing an Event or a Scene)
8. Technical Communication – Interpreting Data (Group Activity - Interpretation of Data - Oral Presentation)
9. Sample Case Studies for Work Ethics – Videos (Debate on the Videos Shown)
10. Learning Interview Techniques through Models (Mock Interview)
11. Guidelines for Preparing a PPT; Presentation Techniques (Preparing PPT on the Topic of Learners' Choice)
12. Formal Presentation

Text Book (s)	
1	Abirami K ,Technical English –, R.K.Publishers, Coimbatore.
Reference (s)	
1	Swan, Michael. Practical English Usage. OUP, 1995
2	Kumar Sanjay and PushpaLata. Communication Skills. OUP, 2011
3	CIEFL, Hyderabad. Exercises in Spoken English. Parts I-III. OUP
4	Anbazhagan K, Cauveri B, Devika M.P., English for Engineers. Cengage, 2016
5	www.mmm.english.com
6	www.onlinewriting.com/purdue
7	www.ieee.org/index.html

Regulation 2018		Semester I	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
B	18MAB101T	CALCULUS AND LINEAR ALGEBRA	3	1	0	4

Prerequisite Course (s)

NIL

Course Objective (s):

The purpose of learning this course is to:

1	Apply the Matrices in problems of Science and Engineering
2	Utilize Taylor series, Maxima minima and Jacobian in solving real- time application problems
3	Utilize the concepts of radius of curvature, evolute, envelope in problems of Science and Engineering
4	Apply the concept of Differential Equations in problems of Science and Engineering
5	Applications of Sequences and Series in all problems involving Science and Engineering

Course Outcome (s) (Cos):

At the end of this course, learners will be able to:

CO1	Apply Matrices, Eigenvalues and Eigen Vectors and Reduction of Quadratics form in Science and Engineering problem solving
CO2	Apply Maxima and Minima, Jacobian, and Taylor series to solve problems in Science and Engineering
CO3	Identify Radius, Centre, envelope and Circle of curvature and apply them in the problem solving
CO4	Solve the different types of Differential Equations in Science and Engineering applications
CO5	Apply convergence and divergence of series using different tests and apply sequences and Series in the problem solving

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	3	-	-	-	-	-	3	-	-	3	-	-	-
CO2	3	-	-	3	3	-	-	-	-	-	-	-	-	-	-
CO3	3	3	-	3	-	-	-	-	3	-	-	3	-	-	-
CO4	-	3	-	-	-	-	-	-	3	-	-	3	-	-	-
CO5	-	3	3	-	-	-	-	-	3	-	-	3	-	-	-
CO (Avg)	3	3	3	3	3	-	-	-	3	-	-	3	-	-	-

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M. KUMARASAMY COLLEGE OF ENGG. (AUTONOMOUS)
Approved By
Board of Science & Humanities
20 APR 2018
KARUR - 639 113

UNIT I	EIGEN VALUE PROBLEMS	9 + 3
Characteristic equation- Cayley-Hamilton theorem (excluding proof)- Eigen values and Eigen vectors of a real matrix – Properties- Orthogonal transformation of a symmetric matrix to diagonal form-Quadratic form-Reduction of quadratic form to canonical form by orthogonal transformation.		
UNIT II	**FUNCTIONS OF SEVERAL VARIABLES**	**9 + 3**
Partial derivatives-Euler's theorem for homogenous functions-Total derivatives-Differentiation of implicit functions-Jacobians-Taylor's expansion-Maxima and Minima-Method of Lagrangian multipliers.		
UNIT III	**APPLICATIONS OF DIFFERENTIAL CALCULUS**	**9 + 3**
Curvature and Radius of curvature – Circle of curvature and Centre of curvature-Envelope- Evolute as Envelope of Normals.		
UNIT IV	**DIFFERENTIAL EQUATIONS OF SECOND ORDER**	**9 + 3**
Second order linear differential equations with constant coefficients- Particular Integrals for x^n, e^{ax}, cosax/sinax, e^{ax}cosbx/e^{ax}sinbx - Method of variation of parameters-Cauchy and Legendre's linear equation-Simultaneous first order linear equations with constant coefficients.		
UNIT V	**SEQUENCES AND SERIES**	**9 + 3**
Sequences: Definition and examples-Series : Types and Convergence - Series of positive terms-Test of convergence: Comparison test, D'Alembert's ratio test, Integral test, Rabee's Root test and Log test-Alternating series-Leibnitz's test-Series of positive and negative terms(Alternating series)-Absolute and Conditional convergence.		

Text Book (s)

1	B. H. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006.
2	B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

Reference (s)

1	Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi,2008
2	N.P. Bali and Manish Goyal, A Text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008
3	G.B. Thomas and R.L. Finney, Calculus and Analytic Geometry, 9th Edition, Pearson,Reprint, 2002
4	Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010

M.KUMARASAMY COLLEGE OF ENGG.(AUTONOMOUS) Approved By Board of Science & Humanities 20 APR 2018 KARUR - 639 113

Regulation 2018		SemesterI/Semester II	Total Hours			90
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
B	18PYB101J	PHYSICS	3	1	2	5

Prerequisite Course (s)

NIL

Course Objective (s):
The purpose of learning this course is to:

CLR-1	Identify the applications of electric field on materials
CLR-2	Identify the applications of magnetic field on materials
CLR-3	Identify the significance of quantum theory
CLR-4	Create insights to the concepts of optical effects
CLR-5	Analyze the working principle of lasers and optical fibers

Course Outcome (s) (Cos):
At the end of this course, learners will be able to:

CO1	Identify the effect of charge dynamics
CO2	Analyze electromagnetic induction
CO3	Apply quantum mechanics to basic physical problems
CO4	Apply ray propagation and optical effects
CO5	Identify the applications of lasers and optical fiber

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	-	-	3	-	-	-	-	-	-	-	-	-	-	-
CO4	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO (Avg)	3.00	3.00	3.00	3.00	-	-	-	-	-	-	-	-	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

M. KUMARASAMY COLLEGE OF ENGG. (AUTONOMOUS)
Approved By
Board of Science & Humanities
20 APR 2018
KARUR - 639 113

UNIT I	ELECTROSTATICS AND DIELECTRIC MATERIALS	9+3

Del-divergence-curl and gradient operations in vector calculus-Gauss-divergence and Stoke's theorem-Electric field and electrostatic potential for a charge distribution-Gauss' law and its applications-Laplace's equations for electrostatic potential-Poisson's equations for electrostatic potential-Solving Problems-Concepts of electric current-Continuity equation-Laws of magnetism-Faraday's law-Ampere's law-Maxwell's equations-Solving Problems-Polarizations, permeability and dielectric constant -Polar and non-polar dielectrics -Types of polarization-Frequency and temperature dependence-Internal field in a field-Clausius-Mossotti equation-Solving Problems.

UNIT II	MAGNETIC AND SUPERCONDUCTING MATERIALS	9+3

Magnetization, permeability and susceptibility-Classification of magnetic materials-Ferromagnetism-Concepts of ferromagnetic domains –Hysteresis-Solving Problems -Properties and applications of ferromagnetic materials Hard and soft magnetic materials -Ferrimagnetic materials - Magnetic bubbles – Ferrites- Solving Problems-Superconductivity -Properties of superconductivity -Type I & Type II superconductors-High Tc superconductors – SQUID – CRYOTRON-MAG LEV-Solving Problems.

UNIT III	QUANTUM PHYSICS	9+3

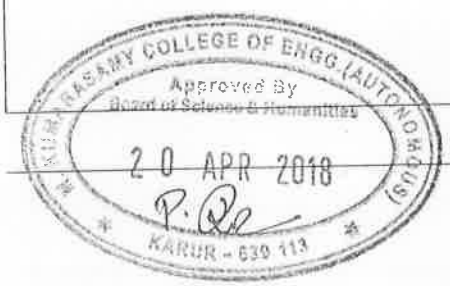
Introduction to Quantum mechanics-Explanation of wave nature of particles-Black body radiation-Compton effect-Solving Problems-Photoelectric effect-de Broglie hypothesis for matter waves - Physical Significance of wave function -Time independent Schrödinger's wave equation -Time dependent Schrödinger's wave equation -Solving Problems-Particle in a 1 D box -Normalization - Born interpretation of wave function -Properties of Matter waves-Verification of matter waves-G.P. Thomson Experiment-Solving Problems.

UNIT IV	WAVE OPTICS	9+3

Introduction to interference-Introduction to diffraction-Fresnel diffraction-Fraunhofer diffraction-Fraunhofer diffraction at single slit-Fraunhofer diffraction at double slit-Solving Problems-Fraunhofer diffraction at multiple slit-Diffraction grating-Characteristics of diffraction grating-Applications of diffraction grating-Polarization by reflection-Polarization by double refraction-Solving Problems -Scattering of light-Circular polarization-Elliptical polarization-Optical activity-Fresnel's relation -Brewster's angle--Solving Problems.

UNIT V	LASER AND FIBER OPTICS	9+3

Absorption and emission processes-two level-Einstein's theory of matter radiation A and B coefficients-Characteristics of laser beams-Amplification of light by population inversion-Threshold population inversion-Essential components of laser system and pumping mechanisms-Solving Problems-Nd: YAG laser-Semiconductor laser-CO_2laser Vibrational modes- CO_2 laser-energy level-Optical fiber-physical structure-Total internal reflection-Solving Problems-Numerical aperture - Acceptance angle-Losses associated with optical fibers-Classification of optical fibers-Optical fiber communications system-Optical sensors-Solving Problems.



LIST OF EXPERIMENTS	30

1. Basics of experimentation
2. Determine dielectric constant of the sample
3. Calibrate Ammeter using Potentiometer
4. Calibrate voltmeter using Potentiometer
5. Determine the energy loss of magnetic materials using B-H curve experiment
6. Determine Planck's Constant
7. Study of I-V characteristics of a light dependent resistor (LDR)
8. Determine wavelength of monochromatic light by Newton's ring
9. Determine particle size using laser
10. Determine wavelength of using diffraction grating
11. Determine wavelength for a given laser source
12. Study of numerical aperture and acceptance angle of optical fiber
13. Mini project

Text books/ References:

1	David Jeffery Griffiths, Introduction to Electrodynamics, Revised edition, Pearson, 2013
2	Ajay Ghatak, Optics, Tata McGraw Hill Education, 5th edition, 2012
3	David Halliday, Fundamentals of Physics, 7th edition, John Wiley & Sons Australia, Ltd, 2004
4	Berg and Resnick, Quantum Physics: Of Atoms, Molecules, Solids, Nuclei and Particles, 2nd Edition, 1985

Regulation 2018		Semester I /Semester II	Total Hours			90
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
B	18CYB101J	CHEMISTRY	3	1	2	5

Prerequisite Course (s)

NIL

Course Objective (s):

The purpose of learning this course is to:

- Apply the basic principles of chemistry at both atomic and molecular levels in understanding the concepts related to the engineering field.
- Integrate the chemical principles in their projects undertaken in their respective fields
- Enhance the quality of a materials used in the product from the technological aspects for societal applications

Course Outcome (s) (Cos):

At the end of this course, learners will be able to:

CO1	Identify the suitable polymeric materials fabrication processes in various application
CO2	Apply the basic principle of inorganic chemistry at the atomic and molecular levels
CO3	Apply the various thermodynamic and kinetics concepts to real system
CO4	Assemble a battery through the understanding of electrochemical principles
CO5	Catagorize the Engineering materials for their applications

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO (Avg)	3.00	3.00	-	-	-	-	-	-	-	-	-	-	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	ENGINEERING ORGANIC MATERIALS	9*+3*

Polymer – Introduction- classification(based on molecular weight, structure and usage)- types of polymerization(Addition, Condensation and Copolymerisation)-crystallinity, melting point and glass transition temperature-mechnism of polymerization(free radical addition polymerization)-elastomer- structure and curing(vulcanization)- Fabrication and molding of polymers(Injection molding and blow molding)- Engineering plastics – PE, PVC, PMMA, Phenol formaldehyde resin , urea formaldehyde resin(Preparation, properties and uses)- Industrial applications of polymers.

UNIT II	COORDINATION AND ORGANOMETALLIC COMPOUNDS	9*+3*

Co-ordination compounds – Introduction- nomenclature- types of ligands (mono, di and poly dendate ligands)- isomerism(structural and stereo isomerism) – theories of bonding(Werner and Sidgwick Pouvell theory(EAN rule)) – applications – EDTA titration – Organometallic compounds - synthesis(organo zinc, organo Lithium and Organo magnesium) – Applications (18 electron rule, Ziegler Natta Catalyst and Hydroformylation)

UNIT III	THERMODYNAMICS AND KINETICS	9*+3*

Introduction- first and second law of thermodynamics – Gibbs –Helmholtz equation – Clausius clapeyron equation – Maxwell relations – Vant hoff isotherm and Isochore (problems also)- Kinetics- Introduction- types of reactions(opposing, consecutive and parallel reactions)- chain reactions (HBr and HCl formation)- Applications of kinetics and thermodynamics.

UNIT IV	ENGINEERING ELECTROCHEMISTRY	9*+3*

Introduction- Conductors and its types - cells (Electrolytic and Electrochemical cells) – Standard electrode potential- Nernst equation of an electrode- types of electrodes (SHE and Calomal electrode)- Batteries –Types (Primary, Secondary, Flow and reserve battery)- Examples (Lead acid battery, Ni-Cd battery, Lithium battery, Lithium sulphur battery and Hydrogen- Oxygen fuel cells)- Graphene.

UNIT V	INDUSTRIAL APPLICATIONS OF CHEMISTRY	9*+3*

Cement (Types, manufacture and properties) – Paints (constitutions and functions)- Lubricants- types- mechanism – properties-abrasives – types –Diamond, Corundum, emery, garnet, quartz, Silicon carbide, carborundum-boron carbide, alundum (preparation, properties and uses) –applications – Basics of biosensor and biochips.

LIST OF EXPERIMENTS	30

1. Determination of total , permanent and temporary hardness of water sample (EDTA method)
2. Determination of alkalinity in water sample- Indicator method
3. Determination of chloride content of water sample by Argentometric method(Mohr's method)
4. Determination of dissolved oxygen content of water sample by winkler's method
5. Conductometric titration of strong acid with strong base
6. Conductometric titration of mixture of acids

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20 APR 2018
KARUR - 639 113

7. Determination of strength and amount of Hydrochloric acid- pH metry 8. Estimation of strength and amount of ferrous ion by potentiometric method 9. Determination of molecular weight of a polymer by viscometry method 10. Estimation of ferrous ion by colorimetry. 11. Cement analysis

Text / Reference (s) books:	
1	B.L.Tembe, Kamaluddin and M.S.Krishnan , "Engineering chemistry"
2	S.S. Dara "A Text book of Engineering Chemistry" S.Chand & Co.Ltd, New Delhi (2009).
3	P.C.Jain and Monica Jain, "Engineering Chemistry" Dhanpat Rai Pub, Co., NewDelhi (2012).
4	Shashi Chawla, Engineering Chemistry: Dhanpat Rai &Co., 3rd Edition, 2015
5	www.nptel.ac.in

Regulation 2018		Semester I / II	Total Hours			75
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
S	18MES101J	ENGINEERING GRAPHICS	1	0	4	3

Course Objective (s):

- Construct ellipse, Parabola, hyperbola, cycloid and involutes.
- Sketch the projection of points, straight lines and plane surfaces.
- Sketch the Projection of simple solids like prisms, pyramids, cylinder and cone
- Sketch the sectional solids and developing the lateral surfaces of simple solids
- Understand the three dimensional drawing of simple solid by isometric projection and perspective projection, and convert isometric projection to orthographic projection.

Course Outcome (s) (COs):

CO1	Apply engineering graphic fundamentals to draw/evaluate engineering curves.
CO2	Draw the graphics of engineering parts with point, line and plane projections
CO3	Draw projection of solid objects like prisms, cylinders, pyramids and cones used in engineering objects
CO4	Develop the lateral surfaces of the sectional solids.
CO5	Create 3D part models using isometric and perspective projection.

CO-PO Mapping

COs	POs												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	2	2	2		2	3	2	2		3	2	2	2
CO2	3	2	3	2	2		1	2	3	2		3	3	1	2
CO3	3	2	3	2	3		1	2	3	2		2	2	1	3
CO4	3	2	3	2	3		1	2	3	2		2	2	1	3
CO5	3	2	2	2	2		1	2	2	2		3	3	1	2
CO (Avg)	3	2	2.6	2	2.4		2.2	2.2	2.6	2		2.6	2.4	2.2	2.4

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	PLANE CURVES	9
Principles of Engineering Graphics - Lettering - dimensioning - Curves used in engineering practices: Conics – Construction of ellipse, Parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes – Drawing of tangents and normal to the above curves.		
UNIT II	PROJECTION OF POINTS, LINES AND PLANE SURFACES	9
Projection of points and straight lines located in the first quadrant – Determination of true lengths and true inclinations. Projection of polygonal surface and circular lamina inclined to both reference planes.		
UNIT III	PROJECTION OF SOLIDS	9
Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by change of position method and auxillary projection		
UNIT IV	SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES	9
Sectioning of above solids in simple vertical position by cutting planes inclined to one reference plane and perpendicular to the other – Obtaining true shape of section. Development of lateral surfaces of simple and truncated solids – Prisms, pyramids, cylinders and cones – Development of lateral surfaces of solids with cylindrical cutouts, perpendicular to the axis.		
UNIT V	ISOMETRIC PERSPECTIVE AND ORTHOGRAPHICS PROJECTIONS	9
Principles of isometric projection – isometric scale – isometric projections of simple solids, truncated prisms, pyramids, cylinders and cones. Perspective projection of planes. Isometric to orthographic projection and orthographics to isomectric projection.		

Text Book (s)

1	K. V. Natrajan, "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai (2010).
2	C.Ramesh, SC Prasanna & M.Karthe " Engineering Graphics", R.K.Publishers, Coimbatore, 3rd edition (2018)

Reference (s)

1	K. Venugopal& V. Prabhu Raja, "Engineering Graphics", New Age International (P) Limited, 15th edition (2018).
2	R. L Jhala "Engineering Graphics", Tata McGraw Hill Publishing Company Limited, New Delhi, 2015.
3	DhananjayA.Jolhe, "Engineering Drawing with an introduction to AutoCAD" Tata McGraw Hill Publishing Company Limited, 2008.
4	Basant Agarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, 2012.
5	M.S. Kumar, "Engineering Graphics", D.D. Publications, 2009.

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List of Laboratory Expertiments

Total: 30hours

1	Spiral and involutes using bspline or cubic spline
2	Plan of residential building
3	Simple steel truss
4	Isometric projection of simple objects
5	Creation of 3D model
6	Orthographic projection of given 3D object
7	Projection of planes with inclination to reference plane
8	Solids with inclination to one reference plane
9	Section view of simple solids
10	Development of solids

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Regulation 2018		Semester I / Semester II	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
S	18CSS101J(R)	PROGRAMMING FOR PROBLEM SOLVING	2	0	2	3

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

CO1	Learn programming using a structured programming language
CO2	Provide exposure on C programming.
C03	Introduce foundational concepts of computer programming to students of different branches of Engineering and Technology.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Apply the problem solving techniques for solving numeric and string problems
CO2	Solve basic numeric problems using control statements in C
CO3	Develop the C program using the concepts of array and string.
CO4	Apply the concept of function prototypes and pointers.
CO5	Compare the performance of structures and union in memory management.

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	-	-	-	2	1	-	3	3	3	-
CO2	3	3	-	-	-	-	-	-	2	1	-	3	3	3	-
CO3	3	3	-	-	-	-	-	-	2	1	-	3	3	3	-
CO4	3	3	-	-	-	-	-	-	2	1	-	3	3	3	-
CO5	3	3	-	-	-	-	-	-	2	1	-	3	3	3	-
CO (Avg)	3	3	-	-	-	-	-	-	2	1	-	3	3	3	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	INTRODUCTION	6
Basic Organization of a Computer –Number System – Binary – Decimal – Conversion – Problems– Need for logical analysis and thinking – Algorithm – Pseudo code – Flow Chart.		
UNIT II	C PROGRAMMING BASICS	6
Structure of a 'C' program – Tokens – Data Types – Operators –Input and Output operations – Decision Making and Branching – Looping statements.		
UNIT III	ARRAYS AND STRINGS	6
Arrays: Declaration – Initialization – One dimensional and Two dimensional arrays – String: String Declaration and Initialization–String Functions.		
UNIT IV	STRUCTURES AND POINTERS	8
Introduction to Structures-Need for Structure Data type – Structure: Definition, Declaration – Structure vs Union. Pointers - Definition – Initialization – Pointers arithmetic – Pointers and arrays –Null Pointer – Pointer to Structures.		
UNIT V	FUNCTIONS	4
Function – Definition of function – Declaration of function – Function Prototype – Pass by value – Pass by reference.		
LIST OF EXPERIMENTS		15

1. Programs on Operators
2. Programs on Control statements
3. Programs on one Dimensional Array
4. Programs on Two Dimensional Array
5. Programs on String Handling
6. Programs on Function using Call by Value
7. Programs on Function using Call by Reference
8. Programs on Pointers
9. Programs on Structures
10. Programs on Union

Text Book (s)

1	Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", Dorling Kindersley (India) Pvt. Ltd., Pearson Education in South Asia, 2011.
2	PradipDey, Manas Ghosh, "Fundamentals of Computing and Programming in C", First Edition, Oxford University Press, 2009

Reference (s)

1	Byron S Gottfried, "Programming with C", Schaum's Outlines, Second Edition, Tata McGraw-Hill, 2006.
2	Dromey R.G., "How to Solve it by Computer", Pearson Education, Fourth Reprint, 2007.
3	Kernighan,B.W and Ritchie,D.M, "The C Programming language", Second Edition, Pearson Education, 2006.
4	Yashavant P. Kanetkar, " Let Us C", BPB Publications, 2011.

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Regulation 2018		Semester I / Semester II	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
S	18CSS101J	PROGRAMMING FOR PROBLEM SOLVING	1	0	4	3

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

CO1	To learn programming using a structured programming language
CO2	To provideexposure on C programming.
CO3	To introduce foundational concepts of computer programming to students of different branches of Engineering and Technology.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Apply the problem solving techniques for solving numeric and string problems
CO2	Solve basic numeric problems using control statements in C
CO3	Develop the C program using the concepts of array and string.
CO4	Applythe concept of function prototypes and pointers.
CO5	Compare the performance of structures and union in memory management.

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	-	-	-	2	1	-	3	3	3	-
CO2	3	3	-	-	-	-	-	-	2	1	-	3	3	3	-
CO3	3	3	-	-	-	-	-	-	2	1	-	3	3	3	-
CO4	3	3	-	-	-	-	-	-	2	1	-	3	3	3	-
CO5	3	3	-	-	-	-	-	-	2	1	-	3	3	3	-
CO (Avg)	3	3	-	-	-	-	-	-	2	1	-	3	3	3	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

5. Programs on String Handling 6. Programs on Function using Call by Value 7. Programs on Function using Call by Reference 8. Programs on Function prototypes 9. Programs on Passing and returning Array to Functions 10. Programs on Recursion Functions 11. Programs on Pointers 12. Programs on Structure 13. Programs on Union 14. Programs on Files

Text Book (s)	
1	Zed A Shaw, Learn C the Hard Way: Practical Exercises on the Computational Subjects You Keep Avoiding (Like C), Addison Wesley, 2015
2	Bharat Kinariwala, TepDobry, Programming in C, eBook
3	W. Kernighan, Dennis M. Ritchie, The C Programming Language, 2nd ed. Prentice Hall, 1996

Regulation 2018		Semester I / II	Total Hours			75
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
S	18MES102J	BASIC CIVIL AND MECHANICAL ENGINEERING	3	0	2	4

Course Objective (s):

- Select building materials and identify the components of a building
- Identify the various transportation systems, bridges, dams and water supply system
- Apply the concept of Harnessing energy from various energy sources
- Know the working of IC engines and identify the sub system requirements
- Apply manufacturing processes; casting, forming. List machining operations; lathe, drilling. Identify process of welding

Course Outcome (s) (COs):

CO1	Identify the building materials and its applications
CO2	Identify different transportation system, water supply system and its applications
CO3	List the basic components and analyze the working of major power plants
CO4	Identify the working of IC engines and understand the need of various auxiliary systems
CO5	Identify manufacturing processes; casting, forming. List machining operations; lathe, drilling. Identify process of welding

CO-PO Mapping

COs	POs												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	-	3	-	-	3	3	-	-	-	-	3	-	-	-
CO2	3	-	3	-	3	3	3	-	3	-	-	3	-	-	-
CO3	3	-	-	-	-	-	3	-	-	-	-	-	-	-	-
CO4	3	-	-	-	-	-	3	-	-	-	-	-	-	-	-
CO5	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO (Avg)	3		3		3	3	3		3			3			

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (high)

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UNIT I	BUILDING MATERIALS	9
Introduction to Civil Engineering, Building Materials, History, Disciplines in Civil Engineering, Early constructions and development over time, Ancient Monuments: Peruvudaiyar or Brihadeeswarar Temple, Kallanai dam Grand Anicut, Taj Mahal, Golconda fort, Angkor Wat, Pyramids of Giza, Colosseum Development of various materials, Methods of Construction, Building Materials - Stone – Classification of Rocks, Quarrying, Dressing, Properties and Uses of Stone Mortar, Plain and Reinforced Cement, Concrete Grade and properties and uses, Necessity of Special Concrete, Self Compacting Concrete, Construction Chemicals (Plasticizers), Recycling: construction, demolition wastes, Buildings, Classification of Buildings, Selection of site for a building, Components of Buildings, Soil, General types of soil, Bearing Capacity, Factors affecting bearing capacity, Foundations: Functions, General types of, foundation, Shallow foundations		
UNIT II	TRANSPORTATION AND WATER SYSTEM	9
Cement concrete flooring, Marble flooring, Granite flooring, Ceramic tile flooring, Roofs: Types of roofs, Madras terrace roof, Reinforced concrete roofs, Trussed roof, Roof Coverings: Types, Weathering course: Types, Mode of Transportation - Highways - Classification of Roads, Cross section details of flexible pavements, Railways – Zone and Headquarters, Permanent way and its requirement, Components of Permanent way, Bridges: Components of Bridge, Types, Dams: Purpose, Classification, Gravity dams - Advantages and Disadvantages, Elements of protected Water Supply system, Objective, Quantity of water, Design period, Per-capita demand, Factor affecting per capita demand, Sources of Water Supply, Standards of Drinking water, Drinking Water Treatment: Objectives, Treatment plant process, Sewage: Method of collection, Sewage treatment and disposal		
UNIT III	POWER PLANTS	9
Coal based thermal Power Plant: layout, components description,working, advantages, disadvantages, Hydro Electric power plant: layout, components description, working, advantages and disadvantages, Nuclear power plant: Nuclear fission and fusion reactions, Nuclear reactor, components description, Layout, working, merits and demerits of boiling water reactor , Layout, working, merits and demerits of pressurized water reactor, Gas turbine power plants:componentsdescription,working and types gas turbines, methods to improve performance, Layout and working of open cycle plant with intercooling, reheating, regeneration, Solar Thermal power plant: layout of Flat plate collector based plant, central receiver type plant, advantages, disadvantages, Wind energy conversion system – wind turbine types, Working, advantages and disadvantages, Ocean Thermal Energy Conversion system: layout of open cycle , Layout of closed cycle, advantages, disadvantages		
UNIT IV	INTERNAL COMBUSTION ENGINES	9
Engine: Classification,operations of 2 stroke & 4 stroke, Comparison of SI & CI engines, Fuel supply system and Battery ignition system, Magneto ignition system of SI engine, Working of a simple carburetor, GDI, MPFI, CRDI, Lubrication system of an engine, Functions and Working of mist and forced feed lubrication system, Cooling system of an engine – Working of air cooled (fins), Water cooled engines (forced circulation), Alternate fuels for IC Engines. Liquid fuels: methanol, ethanol, vegetable oil, Biodiesel, Gaseous fuel: Hydrogen, CNG, LPG, properties, advantages, disadvantages, Emissions from engine – Emission standards – Euro, BS. Emission control measures – Catalytic converter, Exhaust gas recirculation, Introduction to electric vehicles, Hybrid and autonomous vehicles		
UNIT V	CASTING AND FORMING PROCESS	9
Casting introduction and history, Expandable mold casting process , Production steps in a typical sand-casting process, terms including patterns and core, Other expendable mold casting: shell molding, vacuum molding, expanded polystyrene process, Investment casting, Permanent mold casting: hot chamber and cold chamber die casting & Permanent moldcasting:Semi centrifugal and centrifuge casting, Metal forming introduction and its classification, metals and alloys, Bulk deformation: hot, cold forging processes, hot rolling processes,cold rolling processes, Rolling mill classification, hot and cold extrusion processes		

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Date: 1st MAR 2019

processes, Sheet metal working, applications. Cutting operations: shearing, blanking, punching, cutoff, parting, slotting, perforating, notching, trimming, shaving, fine blanking, Bending operations: V-bending, edge bending, flanging, hemming,seaming, curling, spring back effect, Drawing operations, its defects, coining, embossing, ironing, lancing, twisting	
Text Book (s)	
1	Dr.V.Rameshbabu,"Basic Civil and Mechanical Engineering", VRB Publishers pvt ltd, 2017
Reference (s)	
1	SeropeKalpakjian, Steven Schmid," Manufacturing Processes for Engineering Materials", Pearson, 2016
2	Drbal, Larry F. Boston, Patricia G. Westra, Kayla L. Black, Veatch, "Power Plant Engineering", Kluwer Academic Pub., 1995
3	Andy Walker, "Solar Energy", John Wiley & Sons, 2013
4	John B. Heywood, "Internal Combustion Engine Fundamentals", Tata McGraw Hill Education, 2017
5	Kumar. T, Leenusjesu Martin and Murali. G, "Basic Mechanical Engineering", Suma Publications, Chennai, 2007.

LIST OF EXPERIMENTS

Total: 30hours

1.	Study about Brick, Stone & Cement: Types, Uses, Structural steel, Timber properties and uses
2.	Study about Water Supply, Distribution System, Water Treatment Plant, Sewerage System
3.	Study about basics of Casting, processes, Equipment's, To make the mould using stepped flange
4.	Basics of Metal Arc welding operations, Equipment's, Tools, Butt joint of two metal plates using arc welding process
5.	Welding-Lap joint of two metal plates overlapping on one another using arc welding process.
6.	Basics of fitting practice, tools and method of producing models, Tools, Step fitting of two metal plates using fitting tools
7.	Half Round, Vee fitting of two metal plates using fitting tools
8.	Basics of Carpentry operations, Equipment's, Tools, Cross halving joint of two wooden pieces at perpendicular direction
9.	To make duster from wooden piece using carpentry tools.
10.	Basics of Sheet metal operations, Equipment's, Tools and demonstration of producing models, To make geometrical shape like frustum
11.	Sheet metal operations - To make geometrical shape like square tray, rectangulat tray
12.	Sheet metal operations - To make geometrical shape like Cone , Funnel
13.	Study the basics of moulding and processes, Equipment's, To make plastic models using injection moulding of simple part
14.	Basics of Plumbing practices for G.I and P.V.C., Tools and demonstration of producing models
15.	Plumbing of bathroom/ kitchen fittings using G.I. fittings, P.V.C. fittings

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MAR 2019

Regulation 2018		Semester I/ Semester II	Total Hours			90
			Hours / Week			C
Category	Course Code	Course Name	L	T	P	
S	18EES101J	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	3	0	2	4

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

1	Analyze given electric circuits consisting of active and passive components.
2	Identify the parts, functions and working of motors, generators and transformers that function in AC and DC.
3	Utilize the basic electronic devices and circuits.
4	Utilize the working concept of measuring instruments.
5	Build simple logical circuits using Boolean expressions. Identify elements in Integrated circuit.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Discuss basic theory utilized in electrical circuits and its circuits.
CO2	Describing working principle of direct current and alternative current machines such as transformers, motors and generators.
CO3	Operate the basic electronic devices. Identify their uses and construction features.
CO4	Interpret the concept of measuring devices like PMMC, MI ,energy and wattmeter.
CO5	Apply binary logic and Boolean expressions for digital circuit design, Identify elements in a Integrated circuit.

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	1	2	-	2	2	2	2	-	2	-	-	-
CO2	3	2	1	1	2	-	2	2	2	2	-	2	-	-	-
CO3	3	-	1	1	2	-	2	2	2	2	-	2	-	-	-
CO4	3	-	1	1	1	-	2	2	2	2	-	2	-	-	-
CO5	3	2	2	2	2	-	2	2	2	2	-	2	-	-	-
CO (Avg)	3	2	1.2	1.2	1.8	-	2	2	2	2	-	2	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

M.KUMARASAMY COLLEGE OF ENGG.(AUTONOMOUS) Board of Electrical and Electronics Engineering 14 MAR 2018 KARUR - 639 113

UNIT I	ELECTRICAL CIRCUITS	12

Introduction to DC and AC circuits, Active and Passive two terminal elements, Ohms law,Voltage-Current relation, Power, Energy, R,L,C Circuits, Voltage and Current Sources, Kirchoff's current law, Kirchoff's voltage law, Problem Solving Session, Mesh Current Analysis, Nodal Voltage Analysis, Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem, Star- Delta Transformation, Problem Solving Session, Resistive Circuit Analysis, Superposition, Convolution, RL Circuit Transient Analysis, RC & RLC Transient Analysis , Three Phase Systems, Star and delta Connections, Relation between Line and, Phase, Problem Solving Session.

UNIT II	DC MACHINES & AC MACHINES	12

Sinusoids, Generation of AC, Average, RMS values, Form and peak factors, Analysis of single phase AC circuit, Real, Reactive, Apparent power, Power factor, Magnetic materials, B-H Characteristics Simple magnetic circuits, Faraday's laws, induced emf and inductances. 1 - Phase transformers: Construction, types, ideal, practical transformer, EMF equation, Regulation, Efficiency, Problem Solving Session, Construction, working of DC Generators, Types of DC generators, Characteristics of Generators, Applications of DC generator, Working and types of DC motors, Characteristics , Two point starter and Three point starter, Problem Solving Session, AC generators (Alternators), Construction, working, Characteristics of Alternators, Losses, Single Phase motors: Split phase induction motor & Capacitor start induction motor, Working and types of single phase AC motors, Squirrel Cage and Slip ring induction motor, Types of AC starters (Autotransformer, star-delta and Rotor resistance starter), Problem Solving Session.

UNIT III	ELECTRONIC DEVICES	12

Overview of semiconductors, Intrinsic and Extrinsic semiconductors, Operation of PN Junction diode , Characteristics of PN Diode, Operation of Zener diode, Characteristics of Zener Diode, Overview of diode circuits, Operation of Half-wave rectifier, Half wave : Ripple factor Expression, Advantages, Disadvantages, Operation of Full-wave rectifier, Full wave : Ripple factor Expression, Advantages, Disadvantages, Bridge type rectifier operation, Comparison of rectifier circuits, Overview of filters and its uses, BJT construction, operation, BJT characteristics (CB, CE and CC configurations) and uses, JFET construction, operation, JFET characteristics (Drain and Transfer characteristics), Depletion mode and Enhancement mode MOSFET construction operation, MOSFET characteristics (Transfer and output characteristics), Problem Solving Session.

UNIT IV	MEASUREMENTS	12

Methods of measurements – Overview, Types of Measurements: Primary, Secondary, Tertiary, Basic principles and Classification of Instruments- Indicating, Recording and Integrating, Construction and working of PMMC, PMMC-Torque Equation, Advantages, Disadvantages, Construction and working of MI Instruments, MI (Attraction type)-Operation, MI Attraction type-Advantages , Disadvantages, MI (Repulsion type)- Operation, Torque Equation, MI (Repulsion type)- Errors, Advantages, Disadvantages, Overview of Instrument Transformers, Current Transformer, Potential Transformer, CRO, CRT, Operation of Dynamometer type watt meter, Advantages and Disadvantages, Operation of Induction type watt meter, Advantages and Disadvantages, Megger –Construction, Working, Measurement of Earth resistance

UNIT V	DIGITAL AND INTEGRATED DEVICES	12

Number systems, binary codes, Binary arithmetic, Boolean algebra, laws and theorems, Simplification of Boolean expression, Logic Gates and Operations, Simplification of Boolean expression, Problem Solving Session, SOP and POS Expressions, Standard forms of Boolean expression, Simplify using Boolean Expressions, Minterm and Maxterm, K-Map Simple Reduction Technique, Two, Three and Four Variable K-Map, Problem Solving Session, Half adder circuit, Full adder circuit, Flip-flops : RS , JK, T and D Flip-flops, A/D Converter-Successive Approximation , D/A Converter-Binary Weighted, Overview of Op-Amp, Op-Amp : Functional block & Types (Inverting, Non-inverting & differential amplifier).

LIST OF EXPERIMENTS	30

1. Verification of Kirchoff's Law
2. Verification of all Theorems,
3. Time Domain Analysis (RL, RC).

M.KUMARASAMY COLLEGE OF ENGG.(AUTONOMOUS) Dept. of Electrical and Electronics Engineering Approved On 14 MAR 2018 KARUR - 639 113

4. Types of wiring (Flourescent lamp,Staircase ,godown wiring), 5. Demo of DC Machine & Parts 6. Demo of AC Machine & Parts. 7. Characteristics of semiconductors 8. Measurement of Ripple factor (Half-wave and Full-wave), 9. Characteristics of CB and CE configurations 10. Demo of PMMC and MI Meters, 11. Waveform verification using CRO, 12. Measurement of Energy using Single phase Energy meter, 13. Verification of Boolean expression using logic gates, 14. Reduction using Digital Logic Gates, 15. Design and test of Inverting and Non-Inverting Amplifier using IC741	
Text Book (s)	
1	R. Muthusubramanian, S. Salivahanan,"Basic Electrical and Electronics Engineering, Tata McGraw-Hill, 2012
Reference (s)	
1	Dash.S.S, Subramani.C, Vijayakumar.K, Basic Electrical Engineering, 1st ed.,Vijay Nicole, 2013.
2	Jegatheesan.R,Analysis of Electric Circuits, Tata McGraw-Hill; 2014.
3	P. S.Bimbhra ,Electrical Machinery,7th ed,. Khanna Publishers, 2011.
4	Moris M. Mano, Digital Design, 3rd ed.,Pearson, 2011.
5	Sawhney A.K., A Course in Electrical & Electronic measurements and Instrumentation,Dhanpat Rai and Co,2011.

M.KUMARASAMY COLLEGE OF ENGG.(AUTONOMOUS) Board of Electrical and Electronics Engineering Approved On 14 MAR 2018 KARUR - 639 113

DATE 15 | 10 | 2020

BOS - 9

SEU – unit 1 title may be solar gradiation and measurements
PQ – IEEE Standards to be included in unit 2, 3 and 4.

OPen electives.

IOT – No Change
FSM – Interchange the unit 3 & unit 4
Robotics – No change.
ESD & FC – No change.
EV – Course name may be changed as fundamentals of electric vehicles
IOT and ESD & FC subjects can be included in professional electives for EEE Students with different name.

BEEE – The subject content in all the 5 units are revised based on the feedback from the stack holders
One credit course – Board is accepted to conduct three one Credit courses from 5th Semester onwards for this 2018 regulation

BTech (CSBS) – Principles of electrical engineering course conter also discussed and verified.

PG 2019 Regulation.

Power System Protection Course may be added as elective course in third Semester

electronics
Analog and digital electronics Subject codes are revised

15/10/2020

Regulation 2018		Semester - I / Semester - II	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
S	18EES101J(R)	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	3	0	2	4

Prerequisite Course (s)

NIL

Course Objective (s): The purpose of learning this course is to:

1	Gain the knowledge about D.C and A.C circuits.
2	Impart the fundamentals of electrical machines.
3	Study the fundamentals of semiconductor devices
4	Study the working concepts of measuring instruments.
5	Know about digital logic concepts and operational amplifier.

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Apply the concepts of ohm's law and Kirchhoff's law in DC and AC circuits
CO2	Explain the basic concepts of DC motor, DC generator, Transformer and Induction motor.
CO3	Summarize the nature of semiconductor devices.
CO4	Interpret the concept of measuring devices like PMMC, MI, energy meter and wattmeter.
CO5	Infer the concept of electronics devices and conversion techniques

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	1	1	-	-	-	1	1	-	1	3	1	1
CO2	3	-	1	1	1	-	-	-	1	1	-	1	3	1	1
CO3	3	-	1	1	1	-	-	-	1	1	-	1	3	1	1
CO4	3	-	1	1	1	-	-	-	1	1	-	1	3	1	1
CO5	3	-	1	1	1	-	-	-	1	1	-	1	3	1	1
CO (Avg)	3	2	1	1	1	-	-	-	1	1	-	1	3	1	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

M.KUMARASAMY COLLEGE OF ENGG.(AUTONOMOUS)
Board of Electrical and Electronics Engineering
Approved On
15 OCT 2026
KARUR - 639 113

UNIT I	ELECTRICAL CIRCUITS	9

Electrical quantities: Resistors, Inductors, Capacitors - Ohm's Law - Kirchoff's Laws -Series and Parallel circuits - Analysis of DC circuits: Mesh & Nodal analysis, Thevenin's Theorem, Norton's Theorem & Maximum Power Transfer Theorem, Star delta Transformation, RL & RC Transient Analysis. Introduction to AC Circuits: Waveforms and RMS Value – Power and Power factor- Introduction to three phase systems – Types of connections, Relationship between line and phase values.

UNIT II	ELECTRICAL MACHINES	9

Faraday's laws- Construction, Principle of Operation, Basic Equations of DC Generators, DC Motors – Two Point & Three Point Starter – Construction, Working and EMF Equation of Single Phase Transformer – Construction and Working of AC Generator – Three Phase Induction Motor: Construction and Working of Squirrel Cage and Slip Ring Induction Motor – Single Phase Induction Motor (Split Phase, Capacitor Start Induction Motor).

UNIT III	ELECTRONIC DEVICES	9

Intrinsic and Extrinsic Semiconductors – PN junction diode , Zener diode and its Characteristics – Operation of Half Wave, Full Wave and Bridge Type Rectifiers – Bipolar Junction Transistor: Configurations and Characteristics of CB, CE, CC – Construction and Operation of JFET, MOSFET.

UNIT IV	MEASUREMENTS	9

Basic Principles and Classification of Instruments – Construction and Working of PMMC, MI Instruments (Attraction & Repulsion type) – Principle of Operation of Dynamometer Type Wattmeter, Induction Type Energy Meter – Instrument transformer – CRO – Megger.

UNIT V	DIGITAL & INTEGRATED CIRCUITS	9

Number Systems – Boolean Theorems– Logic Gates – Half Adder and Full Adder Circuit – Flip-Flops: RS, JK, T and D – A/D Converter (Successive Approximation Type) – D/A Converter (Binary Weighted Type) – Op-Amp : Functional Block and Types (Inverting , Non-Inverting & Differential Amplifier).

M.KUMARASAMY COLLEGE OF ENGG.(AUTONOMOUS) Electrical and Electronics Engineering Approved On 15 OCT 2020 Board of Studies KARUR - 639 113

LIST OF EXPERIMENTS	15

1. Verification of Ohm's & Kirchoff's Laws
2. Types of Wiring (Fluorescent Lamp & Staircase)
3. Verification of Thevenin's Theorem
4. Verification of Norton's Theorem
5. Characteristics of PN Junction Diode
6. Characteristics of Common Base Configuration.
7. Characteristics of Common Emitter Configuration.
8. Measurement of Ripple Factor: Half Wave & Full Wave Rectifier.
9. Study of AC and DC Machines
10. Verification of Logic Gates
11. Study of PMMC and MI Meters

Text Book (s)

1	R. Muthusubramanian, S. Salivahanan,"Basic Electrical and Electronics Engineering," Tata McGraw-Hill, 2012
2	Sawhney, A.K., "A Course in Electrical & Electronic Measurements & Instrumentation", Dhanpat Rai and Co, 2011.

Reference (s)

1	Dash.S.S, Subramani.C, Vijayakumar.K, "Basic Electrical Engineering", Vijay Nicole, 1st Edition, 2013.
2	Jegatheesan.R, "Analysis of Electric Circuits", Tata McGraw-Hill, 2014.
3	Smarajit Ghosh, "Fundamentals of Electrical and Electronics Engineering", PHI Learning Private Ltd, 2nd Edition, 2010.

Regulation 2018		Semester I/Semester II	Total Hours			30
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
H	18MBH101L	PROFESSIONAL SKILLS AND PRACTICES	0	0	2	1

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

CLR-1	Equip students with different aspects of Presentation
CLR-2	Train students to use appropriate language for publics peaking.
CLR-3	Help students better understand basic leadership qualities and personality traits
CLR-4	Train the students to face interview confidently.
CLR-5	Make students understand how setting goals in life is important.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Make presentation in a formal way.
CO2	Speak with clarity and confidence, thereby enhancing their employability skills.
CO3	Enable students to understand different aspects of leadership and evaluate in their own strengths.
CO4	Clear the job interview successfully.
CO5	Realize that selecting goal is a fundamental component to long- term success of an individual.

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	3	2	3	3	3	2	3	-	-	-
CO2	-	-	-	-	-	3	2	3	3	3	2	3	-	-	-
CO3	-	-	-	-	-	3	2	3	3	3	2	3	-	-	-
CO4	-	-	-	-	-	3	2	3	3	3	2	3	-	-	-
CO5	-	-	-	-	-	3	2	3	3	3	2	3	-	-	-
CO(Avg)	-	-	-	-	-	3	2	3	3	3	2	3	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	PRESENTATIONS	5
Tips and Techniques for an Effective Presentation - Effective presentation structure - Types of Presentation - Verbal aspect of a presentation - Non-verbal aspect of a presentation – body language - Stress management during a presentation		
UNIT II	**PUBLIC SPEAKING**	**5**
Importance of Public Speech - Dealing with fear and Anxiety - Tips and Techniques for Public Speaking - Informative Speech - Delivering a Persuasive Speech - Dealing with audience questions		
UNIT III	**LEADERSHIP SKILLS**	**5**
Communication – Motivation – Delegating – Creativity – Responsibility - Commitment		
UNIT IV	**INTERVIEW SKILLS**	**5**
Preparing for a Job Interview - The Interview Process - Telephone Interviews - Interview Techniques - Mock Interview - Mock Interview		
UNIT V	**GOAL SETTING**	**5**
Types of goals - Reasons for goal setting - Goal Setting Process - S.M.A.R.T. goals - Tips and Techniques for Goal Setting - Trouble in Setting Goals		
LIST OF EXPERIMENTS		**5**
1. Make a presentation on a general topic 2. Give a persuasive speech 3. Exhibit your leadership qualities 4. Mock interview 5. Share your realistic short term and long term goals and the ways to attain them.		

Text Book (s)

	NIL

Reference(s)

1	Aruna Koneru, Professional Communication, Tata McGraw-Hill Publishing Company Limited, New Delhi
2	Professional Skills and Practice, Oxford University Press
3	https://www.skillsyouneed.com
4	https://www.Business English Site.com

Regulation 2018		Semester I/ Semester II	Total Hours			30
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
H	18MBH102L	GENERAL APTITUDE	0	0	2	1

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

CLR1	Recapitulate fundamental mathematical concepts and skills
CLR2	Hone critical thinking skills by analyzing the arguments with explicit and implicit premises
CLR3	Sharpen logical reasoning through skillful conceptualization
CLR4	Identify the relationships between words based on their function, usage and characteristics
CLR5	Nurture passion for enriching vocabulary
CLR6	Acquire the right knowledge, skill and aptitude to face any competitive examination.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Build a strong base in the fundamental mathematical concepts
CO2	Identify the approaches and strategies to solve problems with speed and accuracy
CO3	Gain appropriate skills to succeed in preliminary selection process for recruitment
CO4	Collectively solve problems in teams and groups
CO5	Build vocabulary through methodical approaches
CO6	Enhance lexical skills through systematic application of concepts and careful analysis of style, syntax, semantics and logic

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	3	-	3	2	-	-	-	3	3	1	3	-	-	-
CO2	-	3	-	3	2	-	-	-	3	3	-	3	-	-	-
CO3	-	3	-	3	2	-	-	-	3	3	1	3	-	-	-
CO4	1	3	-	3	2	-	-	-	3	3	-	3	-	-	-
CO5	-	3	-	3	2	-	-	-	3	3	1	3	-	-	-
CO6	-	3	-	3	2	-	-	-	3	3	-	3	-	-	-
CO (Avg)	1	3	-	3	2	-	-	-	3	3	1	3	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

M.KUMARASAMY COLLEGE OF ENGG.(AUTON.) Approved By Board of Science & Humanities 20 APR 2018 KARUR - 639 113

UNIT I		6
Types of numbers, Divisibility tests -Introduction to Significance of Verbal Aptitude in Competitive Examinations - LCM and GCD -Vocabulary enrichment techniques - Unit digit, Number of zeroes, Factorial notation - Vocabulary enrichment Techniques.		
UNIT II		6
Square root, Cube roots, Remainder - Identities - Contextual Vocabulary Exercise - Synonyms Fractions and Decimals, surds -Contextual Vocabulary Exercise -Antonyms		
UNIT III		6
Percentage Introduction - Sentence Completion Basic Level Exercises : Single Blank - Percentage Problems - Sentence Completion Basic Level Exercises : Double Blank - Profit and Loss - Cloze Test		
UNIT IV		6
Discount -Reading Comprehension – Introduction -Simple Interest - Reading Comprehension – Summary & Main Idea - Compound Interest, Installments - Reading Comprehension – Summary & Main Idea		
UNIT V		6
Logarithms Intro - Grammar Rules :A comprehensive Introduction - Logarithms Rules - Sentence Completion – Grammar - Linear Equations - Spotting Errors		

Text Book (s)	
1	Nil
Reference (s)	
1	Charles Harrington Elstor, Verbal Advantage: Ten Easy Steps to a Powerful Vocabulary, Random House Reference, 2002
2	Merriam Webster's Vocabulary Builder, Merriam Webster Mass Market, 2010
3	Norman Lewis, How to Read Better and Faster, Goyal, 4th Edition
4	Franklin GRE Word List, 3861 GRE Words, Franklin Vocab System, 2014
5	Wiley's GMAT Reading Comprehension Grail, Wiley, 2016
6	Manhattan Prep GRE : Reading Comprehension and Essays, 5th Edition
7	Martin Hewings, Advanced Grammar in Use. Cambridge University Press, 2013
8	Nishit K. Sinha, The Pearson Guide to Quantitative Aptitude and Data Interpretation for the CAT
9	Dinesh Khattar-The Pearson Guide to QUANTITATIVE APTITUDE for competitive examinations

Regulation 2018		Semester I	Total Hours			15
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
M	18LEM101T	CONSTITUTION OF INDIA	1	0	0	-

Prerequisite Course (s)

NIL

Course Objective (s):

The purpose of learning this course is to:

CLR-1	Utilize the citizen's rights
CLR-2	Utilize the basic citizen's fundamental rights of freedom of speech, expression, equality, religion and privacy
CLR-3	Identify the Indian constitutional framework with union parliament, government and their functions and citizen's rights
CLR-4	Utilize the States functionality and provisions for the betterment of the individual and society
CLR-5	Identify the emergency provisions, the functions of election and public service commissions, identify the tax system

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Identify the basic provisions in the Indian constitution
CO2	List the fundamental rights, rights to equality, freedom, religion, culture, education and the right against exploitation
CO3	Identify the fundamental duties of the Union of India, President, Vice-President, Union Ministers and Parliament functions
CO4	Identify the power of states, its legislature, Governors role and the state judiciary
CO5	List the special provisions and functionality of election commission, public service commission, individual tax and GST

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	2	3	3	3	-	3	-	-	-
CO2	-	-	-	-	-	-	2	3	3	3	-	3	-	-	-
CO3	-	-	-	-	-	-	2	3	3	3	2	3	-	-	-
CO4	-	-	-	-	-	-	2	3	3	3	2	3	-	-	-
CO5	-	-	-	-	-	-	2	3	3	3	2	3	-	-	-
CO (Avg)	-	-	-	-	-	-	2	3	3	3	2	3	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	INDIAN CONSTITUTION	3
Meaning of the Constitution law and Constitutionalism- Historical perspective of the Constitution of India- Salient features and characteristics of the Constitution of India Citizenship- Scheme of the fundamental rights- Scheme of the Fundamental Duties and its legal status		
UNIT II	**FUNDAMENTAL RIGHTS**	**3**
The Directive Principles of State Policy- Scheme of the Fundamental Right to Equality- Scheme of the Fundamental Right to certain Freedom under Article 19- Scope of the Right to Life and Personal Liberty under Article 21- Union Government, Union Legislature (Parliament)- LokSabha and RajyaSabha (with Powers and Functions), Union Executive		
UNIT III	**POWERS AND FUNCTIONS OF CENTRAL GOVERNMENT**	**3**
President of India (with Powers and Functions)- Prime Minister of India (with Powers and Functions) - Union Judiciary (Supreme Court)- Jurisdiction of the Supreme Court - State Government, Legislature, Legislative Assembly, Legislative Council- Powers and Functions of the State Legislature, State Executive- Governor of the State (with Powers and Functions)		
UNIT IV	**POWERS AND FUNCTIONS OF STATE GOVERNMENT**	**3**
The Chief Minister of the State (with Powers and Functions)- State Judiciary (High Courts) Union Territory, Panchayat, Municipality- Scheduled and Tribal Areas- Co-operative Societies Consumer Rights - Consumer Protection Act		
UNIT V	**POWERS AND FUNCTIONS OF ELECTION AND SERVICE COMMISSION**	**3**
Local Self Government – Constitutional Scheme in India-Emergency Provisions : National, President Rule, Financial Emergency - Election Commission of India (with Powers and Functions) - The Union Public Service Commission (with Powers and Functions) - Amendment of the Constitutional Powers and Procedure -Income Tax, Goods and Services Tax		

Text Book (s)

	NIL

Reference (s)

1	DurgadasBasu, Introduction to the Constitution of India,Lexis- Nexis, 2015
2	Subash C Kashyap, Our Parliament, National Books Trust, 2011
3	Kaushal Kumar Agarwal, India's No 1 book on Tax : Simple Language Advanced Problems: Income Tax, Kindle, 2017
4	Vivek K R Agarwal, GST Guide for students: Making GST – Good and Simple Tax, Neelam Book House, 2017

M.KUMARASAMY COLLEGE OF ENGG.(AUTONOMOUS)
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KARUR - 639 113

Regulation 2018		Semester I&II	Total Hours			30
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
M	18GNM101L	Physical and Mental Health using Yoga	0	0	2	0

Prerequisite Course (s) Nil

Course Objective (s):

The purpose of learning this course is to:

CLR-1	provide deeper insight into the curriculum of Yogic Sciences along with the practical applications of Yoga
CLR-2	intend that students should get familiar with the poses of Yogasanam.
CLR-3	Promote positive health in the Student through Yoga and enabling and imparting skill in them to practice and apply Yogic
CLR-4	practice for Health to general public and teach Yoga for Total personality development and spiritual evolution.

Course Outcome (s) (Cos):

At the end of this course, learners will be able to:

CO1	increase the muscle strength
CO2	improve respiration, energy and vitality.
CO3	maintain a balanced metabolism and weight reduction.
CO4	maintain cardio and circulatory health.
CO5	improve athletic performance and protection from injury.

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	1	-	-	-	-	-	2	-	-	-
CO2	-	-	-	-	-	1	-	-	-	-	-	2	-	-	-
CO3	-	-	-	-	-	1	-	-	-	-	-	2	-	-	-
CO4	-	-	-	-	-	1	-	-	-	-	-	2	-	-	-
CO5	-	-	-	-	-	1	-	-	-	-	-	2	-	-	-
CO (Avg)	-	-	-	-	-	1	-	-	-	-	-	2	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

M. KUMARASAMY COLLEGE OF ENGG. (AUTONO) Approved By Board of Science & Humanities 20 APR 2018 KARUR - 639 113

	Introduction:	6
	▪ Human Body- Meaning and its Importance in Yoga ▪ Definition of Anatomy and Physiology ▪ Cell: Structure & Function	
	General information, Different parts, Structure, Function and Effect of Yogic Practices.	24
	▪ Tissues: Types, Structure & Function. ▪ Musculo-Skeletal System ▪ Digestive system ▪ Excretory system ▪ Respiratory system ▪ Circulatory system ▪ Nervous System ▪ Endocrinal system	

Text / Reference (s) books:

1.	Shirley Telles - A Glimpse of the Human Body The structure anf Functions, Swami Vivekananda Yoga Prakashana, Bangalore.
2.	Makarand Madhukar Gore - Anatomy and Physiology of Yogic Practices, Motilal Banarsidass, New Delhi, 2007
3.	Anne Waugh, Allison Grant - Ross and Wilson Anatomy and Physiology in Health & Illness, Churchill Livingstone; 2010

Regulation 2018		Semester II	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
H	18LEH102J	PROFESSIONAL ENGLISH	2	0	2	3

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

CLR-1	Develop team spirit and stress management skill
CLR-2	Demonstrate the interpersonal skills of the learners
CLR-3	Make learners perform well in interviews
CLR-4	Enable them to listen well and express their ideas, opinions effectively in official contexts
CLR-5	Sharpen their reading comprehension skill
CLR-6	Strengthen their official written communication skill.

Course Outcome (s) (COs):

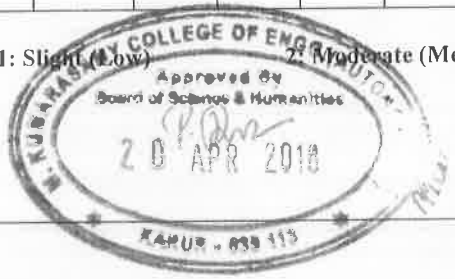
At the end of this course, learners will be able to:

CO1	Work in a team under any situation.
CO2	Practice interpersonal relationships in workplace
CO3	Face interviews confidently and successfully
CO4	Participate and excel in role plays, presentations and formal conversations.
CO5	Read and infer the meanings of technical and aesthetic passages.
CO6	Draft official letters, reports, memos, emails, etc.,

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	3	1	3	3	3	1	3	3	3	-	3	-	-	-
CO2	1	3	1	3	3	3	1	3	3	3	-	3	-	-	-
CO3	1	3	1	3	3	3	1	3	3	3	-	3	-	-	-
CO4	1	3	1	3	3	3	1	3	3	3	-	3	-	-	-
CO5	1	3	1	3	3	3	1	3	3	3	-	3	-	-	-
CO6	1	1	3	3	3	3	1	3	3	3	-	3	-	-	-
CO (Avg)	1	2.66	1.33	3	3	3	1	3	3	3	-	3	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)



UNIT I	SOFT SKILLS	7
Introduction to Soft Skills(MCQ on Soft Skills)-Leadership Skills(Handling a Team) -Optimism & Business Etiquettes(Presentations on How to Handle Situations Effectively)-Team Management (Motivational Videos on Positive Thinking)- Time Management(Discussion on Real Time Hardships) -StressManagement(Handling Criticism)-Organizational Communication - Channels of Communication(Case Study).		
UNIT II	**LISTENING**	**7**
Listening Skills: Active Listening, Passive Listening(Classroom Listening Activities)-Methods for improving Listening Skills, Listening and its process – Barriers to Listening(Innovative Practices and Strategies for Better Listening) – Listening to Pre-Recorded video/audio (Listening to Famous Motivational Speeches)- Listening to Reading in the Class - for Vocabulary - for Complete Understanding – for Better Pronunciation(Read aloud a Story or an Article to Listen and Complete the Task) - Listening for General Content – Listening to fill up Information(Listening –fill in the Form Activity) – Intensive Listening for Specific Purpose-Listening to Monologues(Listening to Announcements) -Extensive Listening(Listening to Business News).		
UNIT III	**SPEAKING**	**5**
Defining Presentation and its Purpose; Audience & Local; Organizing Contents; Preparing Outline(Mini presentation)- Audio-Visual Aids; Nuances of Delivery; Body Language;(PPT Presentation) - Dimensions of Speech: Syllable; Accent; Pitch; Rhythm; Intonation; Paralinguistic features of voice(Voice Modulation Practice)-Interviews &Its Types-Role Play(Mock Interview) -Group Discussion-Oral Presentations -Formal Conversations(Group Discussion Practice) .		
UNIT IV	**READING**	**5**
Reading & Its Types- Techniques for Good Comprehension, Reading Comprehension(Reading Comprehension Exercises) - Cloze Test ,Reading Newspaper- Editorials & Business Articles (Cloze Test Exercises)- Inferring Meaning- Improving Comprehension Skills(Reading for Meaning) - Skimming and Scanning– Structure of the Text – Structure of Paragraphs(Skimming and Scanning Exercises) - Interpreting Visual Communication(Graphs, Charts, Tables)(Interpreting the Graphical images).		
UNIT V	**WRITING**	**5**
Writing Official Letters(Invitation Letter (Accepting & Declining),Quotation, Ordering, Complaining, Seeking Clarification)(Business Letter Writing Exercises), Writing Official Letters(Permission – In-Plant Training)- Writing CV (Job Application)(Job Application Letter Exercise)- Essay Writing-Email Writing - Writing Reports & Proposal(Writing a Business Report)- Writing Circulars, Memos, Agenda & Minutes(Exercises on Writing Circulars, Memos, Agenda & Minutes).		
	LIST OF EXPERIMENTS	**16**
1. Videos on Stress Management (Stress Management Activities) 2. Videos on Team Spirit (Team Activities) 3. Listening to TED Talks(Listening to Business Interviews) 4. Listening to Business Presentation (Listening to Business Interviews) 5. Telephonic Conversation (Organizing a Meeting) 6. Product Launch (Persuasive Speech) 7. Business Conversations 8. Business Role Play Activities 9. Reading for Pleasure(Intensive Reading) 10. Extensive Reading(Briefing Favourite Self Help Books)		

M.KUMARASAMY COLLEGE OF ENGINEERING
Approved by
Board of Studies & Academic Council
20 APR 2018
KARUR - 639 113

11. Reading Newspaper articles(Reading Business Reports) 12. Reading Business Legends Success Formula(Read Between the Lines) 13. Writing an Advertisement (Writing Slogans for Products) 14. Error Correction Exercises (Formal Language expressions) 15. Business Vocabulary (Writing Official E-mails) 16. Writing Business Proposals (Writing Permission Letters)	
Text Book (s)	
1	Abirami K, "Professional English", First Edition, R.K.Publishers, Coimbatore, 2019.
Reference (s)	
1	LinaMuhkopadhyay, et al., "English for Jobseekers" ,Cambridge University Press, New Delhi,2013
2	Brook Hart Guy , Business Benchmark Advanced Personal Study Book for BEC and BULATS, Cambridge
3	Mascull , Bill, Business Vocabulary in Use, Third Edition, Nov 2017
4	Emerson Paul, Business English Handbook ,Advanced, Macmillan
5	www.Business English Site.com
6	www.businessenglishpod.com

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Board of Science & Humanities
20 APR 2018
KARUR - 639 113

Regulation 2018		Semester II	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
B	18MAB102T	ADVANCED CALCULUS AND COMPLEX ANALYSIS	3	1	0	4

Prerequisite Course (s)

Calculus and Linear Algebra

Course Objective (s):

The purpose of learning this course is to:

1	Evaluate Double and triple Integral and apply them in problems in Engineering Industries
2	Evaluate Surface, Volume Integral and applications of Gauss theorem, Stoke's and Green's theorem in Engineering fields
3	To know the properties of Complex functions and apply them in all the Engineering fields
4	Evaluate improper integrals involving complex functions using Residue theorem and apply them in Engineering fields
5	Transform engineering problems into ODE, PDE and Integrals and solve them using Laplace / complex analytic methods

Course Outcome (s) (Cos):

At the end of this course, learners will be able to:

CO1	Evaluate multiple integrals using change of variables
CO2	Apply techniques of vector calculus in problems involving Science and Engineering.
CO3	Apply complex analytic functions and its properties in solving problems
CO4	Evaluate improper integrals using Residue theorem involving problems in Science and Engineering
CO5	Apply techniques of Laplace Transforms and inverse transform for problems in Science and Engineering and Solving Ordinary Differential Equations

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	3	-	-	-	-	-	3	-	-	3	-	-	-
CO2	3	-	-	3	3	-	-	-	-	-	-	-	-	-	-
CO3	3	3	-	3	-	-	-	-	3	-	-	3	-	-	-
CO4	-	3	3	-	-	-	-	-	3	-	-	3	-	-	-
CO5	-	3	-	-	-	-	-	-	3	-	-	3	-	-	-
CO (Avg)	3	3	3	3	3	-	-	-	3	-	-	3	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	MULTIPLE INTEGRALS	9 + 3
Evaluation of double integration in cartesian and polar Coordinates - Evaluation of double integral by changing of order of integration - Area as a double integral (Cartesian and Polar) - Conversion from Cartesian to Polar in double integrals - Triple integration in Cartesian Coordinates - Volume as triple integral in Cartesian, Polar and Spherical Coordinates.		
UNIT II	**VECTOR CALCULUS**	**9 + 3**
Gradient,Divergence,Curl,Solenoidal,Irrotational fields - Directional derivative - Line integrals - Surface integrals - Volume Integrals - Green's theorem (excluding proof) :Applications in evaluating Line and Region - Gauss divergence theorem (excluding proof):Applications to cubes and parallelopipeds - Stoke's theorem (excluding proof):Applications to cubes and parallelopipeds.		
UNIT III	**ANALYTIC FUNCTION**	**9 + 3**
Definition of Analytic function – Cauchy Riemann equations- Properties of Analytic function - Determination of Analytic function using Milne's Thomson method-Conformal mapping (w=c+z, w=cz, w= $\frac{1}{z}$) - Bilinear transformation.		
UNIT IV	**COMPLEX INTEGRATION**	**9 + 3**
Cauchy's integral theorems (without proof) - Cauchy's integral formulae - Taylor's expansions with simple problems - Laurent's expansions with simple problems - Singularities - Poles and their types - Residues - Cauchy's residue theorem (without proof)- Contour integration: unit circle and semicircle.		
UNIT V	**LAPLACE TRANSFORMS**	**9 + 3**
Laplace Transforms of standard functions- Transforms properties- Transform of derivatives and integrals - Initial & Final value theorems (without proof) and Verification for some problems- Inverse laplace transforms using Partial fractions and Shifting theorem- Convolution theorem- Periodic functions- Solution of linear second order ODE equations with constant coefficients.		

Text Book (s)

1	B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2	N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008

Reference (s)

1	B. H. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2	Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008
3	Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010
4	G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson,Reprint, 2002

M.KUMARASAMY COLLEGE OF ENGG.(AUTONOMOUS) Approved By Board of Science & Humanities 20 APR 2018 KARUR - 639 113

Regulation 2018		SemesterI/Semester II	Total Hours			90
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
B	18PYB101J	PHYSICS	3	1	2	5

Prerequisite Course (s)

NIL

Course Objective (s):
The purpose of learning this course is to:

CLR-1	Identify the applications of electric field on materials
CLR-2	Identify the applications of magnetic field on materials
CLR-3	Identify the significance of quantum theory
CLR-4	Create insights to the concepts of optical effects
CLR-5	Analyze the working principle of lasers and optical fibers

Course Outcome (s) (Cos):
At the end of this course, learners will be able to:

CO1	Identify the effect of charge dynamics
CO2	Analyze electromagnetic induction
CO3	Apply quantum mechanics to basic physical problems
CO4	Apply ray propagation and optical effects
CO5	Identify the applications of lasers and optical fiber

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	-	-	3	-	-	-	-	-	-	-	-	-	-	-
CO4	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO (Avg)	**3.00**	**3.00**	**3.00**	**3.00**	-	-	-	-	-	-	-	-	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	ELECTROSTATICS AND DIELECTRIC MATERIALS	9+3

Del-divergence-curl and gradient operations in vector calculus-Gauss-divergence and Stoke's theorem-Electric field and electrostatic potential for a charge distribution-Gauss' law and its applications-Laplace's equations for electrostatic potential-Poisson's equations for electrostatic potential-Solving Problems-Concepts of electric current-Continuity equation-Laws of magnetism-Faraday's law-Ampere's law-Maxwell's equations-Solving Problems-Polarizations, permeability and dielectric constant -Polar and non-polar dielectrics -Types of polarization-Frequency and temperature dependence-Internal field in a field-Clausius-Mossotti equation-Solving Problems.

UNIT II	MAGNETIC AND SUPERCONDUCTING MATERIALS	9+3

Magnetization, permeability and susceptibility-Classification of magnetic materials-Ferromagnetism-Concepts of ferromagnetic domains –Hysteresis-Solving Problems -Properties and applications of ferromagnetic materials -Hard and soft magnetic materials -Ferrimagnetic materials - Magnetic bubbles – Ferrites- Solving Problems-Superconductivity -Properties of superconductivity -Type I & Type II superconductors-High Tc superconductors – SQUID – CRYOTRON-MAG LEV-Solving Problems.

UNIT III	QUANTUM PHYSICS	9+3

Introduction to Quantum mechanics-Explanation of wave nature of particles-Black body radiation-Compton effect-Solving Problems-Photoelectric effect-de Broglie hypothesis for matter waves - Physical Significance of wave function -Time independent Schrödinger's wave equation -Time dependent Schrödinger's wave equation -Solving Problems-Particle in a 1 D box -Normalization - Born interpretation of wave function -Properties of Matter waves-Verification of matter waves-G.P. Thomson Experiment-Solving Problems.

UNIT IV	WAVE OPTICS	9+3

Introduction to interference-Introduction to diffraction-Fresnel diffraction-Fraunhofer diffraction-Fraunhofer diffraction at single slit-Fraunhofer diffraction at double slit-Solving Problems-Fraunhofer diffraction at multiple slit-Diffraction grating-Characteristics of diffraction grating-Applications of diffraction grating-Polarization by reflection-Polarization by double refraction-Solving Problems -Scattering of light-Circular polarization-Elliptical polarization-Optical activity-Fresnel's relation -Brewster's angle--Solving Problems.

UNIT V	LASER AND FIBER OPTICS	9+3

Absorption and emission processes-two level-Einstein's theory of matter radiation A and B coefficients-Characteristics of laser beams-Amplification of light by population inversion-Threshold population inversion-Essential components of laser system and pumping mechanisms-Solving Problems-Nd: YAG laser-Semiconductor laser-CO_2laser Vibrational modes- CO_2 laser-energy level-Optical fiber-physical structure-Total internal reflection-Solving Problems-Numerical aperture - Acceptance angle-Losses associated with optical fibers-Classification of optical fibers-Optical fiber communications system-Optical sensors-Solving Problems.

M.KUMARASAMY COLLEGE OF ENGINEERING
Approved by
Board of Science & Humanities
20 APR 2018
KARUR - 639 113

LIST OF EXPERIMENTS	30

1. Basics of experimentation
2. Determine dielectric constant of the sample
3. Calibrate Ammeter using Potentiometer
4. Calibrate voltmeter using Potentiometer
5. Determine the energy loss of magnetic materials using B-H curve experiment
6. Determine Planck's Constant
7. Study of I-V characteristics of a light dependent resistor (LDR)
8. Determine wavelength of monochromatic light by Newton's ring
9. Determine particle size using laser
10. Determine wavelength of using diffraction grating
11. Determine wavelength for a given laser source
12. Study of numerical aperture and acceptance angle of optical fiber
13. Mini project

Text books/ References:

1	David Jeffery Griffiths, Introduction to Electrodynamics, Revised edition, Pearson, 2013
2	Ajay Ghatak, Optics, Tata McGraw Hill Education, 5th edition, 2012
3	David Halliday, Fundamentals of Physics, 7th edition, John Wiley & Sons Australia, Ltd, 2004
4	Berg and Resnick, Quantum Physics: Of Atoms, Molecules, Solids, Nuclei and Particles, 2nd Edition, 1985

Regulation 2018		Semester I /Semester II	Total Hours			90
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
B	18CYB101J	CHEMISTRY	3	1	2	5

Prerequisite Course (s)

NIL

Course Objective (s):

The purpose of learning this course is to:

- Apply the basic principles of chemistry at both atomic and molecular levels in understanding the concepts related to the engineering field.
- Integrate the chemical principles in their projects undertaken in their respective fields
- Enhance the quality of a materials used in the product from the technological aspects for societal applications

Course Outcome (s) (Cos):

At the end of this course, learners will be able to:

CO1	Identify the suitable polymeric materials fabrication processes in various application
CO2	Apply the basic principle of inorganic chemistry at the atomic and molecular levels
CO3	Apply the various thermodynamic and kinetics concepts to real system
CO4	Assemble a battery through the understanding of electrochemical principles
CO5	Catagorize the Engineering materials for their applications

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO (Avg)	3.00	3.00	-	-	-	-	-	-	-	-	-	-	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

M.KUMARASAMY COLLEGE OF ENGG.(AUTONOMOUS) Approved By Board of Science & Humanities 20 APR 2018 KARUR - 639 113

UNIT I	ENGINEERING ORGANIC MATERIALS	9*+3*

Polymer – Introduction- classification(based on molecular weight, structure and usage)- types of polymerization(Addition, Condensation and Copolymerisation)-crystallinity, melting point and glass transition temperature-mechnism of polymerization(free radical addition polymerization)-elastomer- structure and curing(vulcanization)- Fabrication and molding of polymers(Injection molding and blow molding)- Engineering plastics – PE, PVC, PMMA, Phenol formaldehyde resin , urea formaldehyde resin(Preparation, properties and uses)- Industrial applications of polymers.

UNIT II	COORDINATION AND ORGANOMETALLIC COMPOUNDS	9*+3*

Co-ordination compounds – Introduction- nomenclature- types of ligands (mono, di and poly dendate ligands)- isomerism(structural and stereo isomerism) – theories of bonding(Werner and Sidgwick Pouvell theory(EAN rule)) – applications – EDTA titration – Organometallic compounds - synthesis(organo zinc, organo Lithium and Organo magnesium) – Applications (18 electron rule, Ziegler Natta Catalyst and Hydroformylation)

UNIT III	THERMODYNAMICS AND KINETICS	9*+3*

Introduction- first and second law of thermodynamics – Gibbs –Helmholtz equation – Clausius clapeyron equation – Maxwell relations – Vant hoff isotherm and Isochore (problems also)- Kinetics- Introduction- types of reactions(opposing, consecutive and parallel reactions)- chain reactions (HBr and HCl formation)- Applications of kinetics and thermodynamics.

UNIT IV	ENGINEERING ELECTROCHEMISTRY	9*+3*

Introduction- Conductors and its types - cells (Electrolytic and Electrochemical cells) – Standard electrode potential- Nernst equation of an electrode- types of electrodes (SHE and Calomal electrode)- Batteries –Types (Primary, Secondary, Flow and reserve battery)- Examples (Lead acid battery, Ni-Cd battery, Lithium battery, Lithium sulphur battery and Hydrogen- Oxygen fuel cells)- Graphene.

UNIT V	INDUSTRIAL APPLICATIONS OF CHEMISTRY	9*+3*

Cement (Types, manufacture and properties) – Paints (constitutions and functions)- Lubricants- types- mechanism – properties-abrasives – types –Diamond, Corundum, emery, garnet, quartz, Silicon carbide, carborundum-boron carbide, alundum (preparation, properties and uses) –applications – Basics of biosensor and biochips.

LIST OF EXPERIMENTS	30

1. Determination of total , permanent and temporary hardness of water sample (EDTA method)
2. Determination of alkalinity in water sample- Indicator method
3. Determination of chloride content of water sample by Argentometric method(Mohr's method)
4. Determination of dissolved oxygen content of water sample by winkler's method
5. Conductometric titration of strong acid with strong base
6. Conductometric titration of mixture of acids

M. KUMARASAMY COLLEGE OF ENGINEERING (AUTONOMOUS)
Approved By
Board of Science & Humanities
20 APR 2018
KARUR - 639 113

7. Determination of strength and amount of Hydrochloric acid- pH metry 8. Estimation of strength and amount of ferrous ion by potentiometric method 9. Determination of molecular weight of a polymer by viscometry method 10. Estimation of ferrous ion by colorimetry. 11. Cement analysis

Text / Reference (s) books:	
1	B.L.Tembe, Kamaluddin and M.S.Krishnan , "Engineering chemistry"
2	S.S. Dara "A Text book of Engineering Chemistry" S.Chand & Co.Ltd, New Delhi (2009).
3	P.C.Jain and Monica Jain, "Engineering Chemistry" Dhanpat Rai Pub, Co., NewDelhi (2012).
4	Shashi Chawla, Engineering Chemistry: Dhanpat Rai &Co., 3rd Edition, 2015
5	www.nptel.ac.in

Regulation 2018		Semester I / II	Total Hours			75
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
S	18MES101J	ENGINEERING GRAPHICS	1	0	4	3

Course Objective (s):

- Construct ellipse, Parabola, hyperbola, cycloid and involutes.
- Sketch the projection of points, straight lines and plane surfaces.
- Sketch the Projection of simple solids like prisms, pyramids, cylinder and cone
- Sketch the sectional solids and developing the lateral surfaces of simple solids
- Understand the three dimensional drawing of simple solid by isometric projection and perspective projection, and convert isometric projection to orthographic projection.

Course Outcome (s) (COs):

CO1	Apply engineering graphic fundamentals to draw/evaluate engineering curves.
CO2	Draw the graphics of engineering parts with point, line and plane projections
CO3	Draw projection of solid objects like prisms, cylinders, pyramids and cones used in engineering objects
CO4	Develop the lateral surfaces of the sectional solids.
CO5	Create 3D part models using isometric and perspective projection.

CO-PO Mapping

COs	POs												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	2	2	2		2	3	2	2		3	2	2	2
CO2	3	2	3	2	2		1	2	3	2		3	3	1	2
CO3	3	2	3	2	3		1	2	3	2		2	2	1	3
CO4	3	2	3	2	3		1	2	3	2		2	2	1	3
CO5	3	2	2	2	2		1	2	2	2		3	3	1	2
CO (Avg)	3	2	2.6	2	2.4		2.2	2.2	2.6	2		2.6	2.4	2.2	2.4

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

M. KUMARASAMY COLLEGE OF ENGG. (AUTONOMOUS)
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KARUR - 639 113

UNIT I	PLANE CURVES	9
Principles of Engineering Graphics - Lettering - dimensioning - Curves used in engineering practices: Conics – Construction of ellipse, Parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes – Drawing of tangents and normal to the above curves.		
UNIT II	PROJECTION OF POINTS, LINES AND PLANE SURFACES	9
Projection of points and straight lines located in the first quadrant – Determination of true lengths and true inclinations. Projection of polygonal surface and circular lamina inclined to both reference planes.		
UNIT III	PROJECTION OF SOLIDS	9
Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by change of position method and auxillary projection		
UNIT IV	SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES	9
Sectioning of above solids in simple vertical position by cutting planes inclined to one reference plane and perpendicular to the other – Obtaining true shape of section. Development of lateral surfaces of simple and truncated solids – Prisms, pyramids, cylinders and cones – Development of lateral surfaces of solids with cylindrical cutouts, perpendicular to the axis.		
UNIT V	ISOMETRIC PERSPECTIVE AND ORTHOGRAPHICS PROJECTIONS	9
Principles of isometric projection -- isometric scale – isometric projections of simple solids, truncated prisms, pyramids, cylinders and cones. Perspective projection of planes. Isometric to orthographic projection and orthographics to isomectric projection.		

Text Book (s)

1	K. V. Natrajan, "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai (2010).
2	C.Ramesh, SC Prasanna & M.Karthe " Engineering Graphics", R.K.Publishers, Coimbatore, 3rd edition (2018)

Reference (s)

1	K. Venugopal& V. Prabhu Raja, "Engineering Graphics", New Age International (P) Limited, 15th edition (2018).
2	R. L Jhala "Engineering Graphics", Tata McGraw Hill Publishing Company Limited, New Delhi, 2015.
3	DhananjayA.Jolhe, "Engineering Drawing with an introduction to AutoCAD" Tata McGraw Hill Publishing Company Limited, 2008.
4	Basant Agarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill Publishing Company Limited. New Delhi, 2012.
5	M.S. Kumar, "Engineering Graphics", D.D. Publications, 2009.

M. KUMARASAMY COLLEGE OF ENGG. (AUTONOMOUS)
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KARUR - 639 113

List of Laboratory Expertiments **Total: 30hours**

1	Spiral and involutes using bspline or cubic spline
2	Plan of residential building
3	Simple steel truss
4	Isometric projection of simple objects
5	Creation of 3D model
6	Orthographic projection of given 3D object
7	Projection of planes with inclination to reference plane
8	Solids with inclination to one reference plane
9	Section view of simple solids
10	Development of solids

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8.10 Syllabus Revision for 18CSS101J Programming for Problem Solving

- Faculties and Students felt that current syllabus is too heavy. Suggested for reframing the syllabus a accepted for reframing as 2 0 2[Total Credits:3].
- Basics need to be concentrated much through practicals.

MEMBERS PRESENT

1. Dr.A.Kannan
2. Dr.G.Mohana Prabha
3. Dr.R.Suganya
4. Dr.T.Abirami
5. Ms.Nivetha Ravichandran
6. Mr.S.N.Gowtham
7. Dr.V.Durgadevi
8. Mr.A.Shanmugavelaytham
9. Mrs.R.Sujatha
10. Mr.M.Gunasekar
11. Mr.E.Balraj
12. Mr.S.Vinoth (15BIT2058)
13. Mr.R.Balaji (16BIT3013)
14. Ms. B. Sinthiya (R&D Coordinator)

Regulation 2018		Semester I / Semester II	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
S	18CSS101J(R)	PROGRAMMING FOR PROBLEM SOLVING	2	0	2	3

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

CO1	Learn programming using a structured programming language
CO2	Provide exposure on C programming.
CO3	Introduce foundational concepts of computer programming to students of different branches of Engineering and Technology.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Apply the problem solving techniques for solving numeric and string problems
CO2	Solve basic numeric problems using control statements in C
CO3	Develop the C program using the concepts of array and string.
CO4	Apply the concept of function prototypes and pointers.
CO5	Compare the performance of structures and union in memory management.

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	-	-	-	2	1	-	3	3	3	-
CO2	3	3	-	-	-	-	-	-	2	1	-	3	3	3	-
CO3	3	3	-	-	-	-	-	-	2	1	-	3	3	3	-
CO4	3	3	-	-	-	-	-	-	2	1	-	3	3	3	-
CO5	3	3	-	-	-	-	-	-	2	1	-	3	3	3	-
CO (Avg)	3	3	-	-	-	-	-	-	2	1	-	3	3	3	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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25 MAR 2019

Regulation 2018		Semester I / Semester II	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
S	18CSS101J	PROGRAMMING FOR PROBLEM SOLVING	1	0	4	3

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

CO1	To learn programming using a structured programming language
CO2	To provideexposure on C programming.
C03	To introduce foundational concepts of computer programming to students of different branches of Engineering and Technology.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Apply the problem solving techniques for solving numeric and string problems
CO2	Solve basic numeric problems using control statements in C
CO3	Develop the C program using the concepts of array and string.
CO4	Applythe concept of function prototypes and pointers.
CO5	Compare the performance of structures and union in memory management.

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	-	-	-	2	1	-	3	3	3	
CO2	3	3	-	-	-	-	-	-	2	1	-	3	3	3	-
CO3	3	3	-	-	-	-	-	-	2	1	-	3	3	3	-
CO4	3	3	-	-	-	-	-	-	2	1	-	3	3	3	-
CO5	3	3	-	-	-	-	-	-	2	1	-	3	3	3	-
CO (Avg)	3	3	-	-	-	-	-	-	2	1	-	3	3	3	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	INTRODUCTION TO C	9

Evolution of Programming & Languages - Problem solving through programming - Creating algorithms - Drawing flowcharts - Writing pseudocode - Evolution of C language, its usage history - Input and output functions: Printf and scanf - Variables and identifiers - Expressions, Constants - Keyword ,Single line and multiline comments- Values, Names, Scope - Binding, Storage Classes - Input and Output Statement - Numeric Data types - Non-Numeric Data types: char string - Non-Numeric Data types: string - Increment operator - decrement operator - Comma, Arrow and Assignment operator - Sizeof operator - Bitwise operators - Relational Operators - logical Operators - Conditional Operators - Operator Precedence

UNIT II	CONTROL STATEMENT AND ARRAY	9

If statement in expression - L value and R value in expression - Control Statements – if and else – else if – nested if - switch case - Iterations – While loop - do..While loop - For loop - Goto, break, continue - Array Basic and Types - Array Initialization and Declaration - Initialization: one Dimensional Array, Accessing - Indexing one Dimensional Array Operations - Initializing and Accessing 2D Array - Initializing Multidimensional Array - Array Advantages and Limitations

UNIT III	STRINGS AND FUNCTIONS	9

String Basics - String Declaration and Initialization - String Functions: gets(), puts(), getchar() - putchar(), printf()atoi(), strlen()streat(), stremp()sprint(), sscanf()strepy(), strstr()Strrev(), strtok()Functions basics - Functions declaration and definition - Types: Call by Value - Call by Reference - Function with Arguments and no Return Values - Function without Arguments and no Return Values - Function with Arguments and Return Values - Function without Arguments and Return Values - Passing Array to Functions - Returning array from functions - Formal and Actual Parameters - Recursion Functions - Advantages of using Functions

UNIT IV	POINTERS	9

Pointers Basics - Address operator - Pointer Declaration dereferencing pointers - Size of Pointer Variable and Pointer Operator - Void Pointers and size of Void Pointers - Arithmetic Operations - Incrementing Pointers - Constant Pointers - Null Pointers - Pointers to array elements - Pointers to strings - Function Pointers

UNIT V	STRUCTURES AND UNIONS	9

Structure basics & declaration - Initializing Structure, Accessing members - Nested structure - Array of structure - Accessing elements in a structure array - Passing Array of structure to function - Union Basic and declaration - Accessing Union Members - file: opening, defining - File closing, File Modes, File Types - Writing contents into a file - Reading file contents - Appending an existing file - File permissions and rights - Changing permissions and rights

LIST OF EXPERIMENTS	15

1. Programs on Operators
2. Programs on Control statements
3. Programs on one Dimensional Array
4. Programs on Two Dimensional Array

5. Programs on String Handling
6. Programs on Function using Call by Value
7. Programs on Function using Call by Reference
8. Programs on Function prototypes
9. Programs on Passing and returning Array to Functions
10. Programs on Recursion Functions
11. Programs on Pointers
12. Programs on Structure
13. Programs on Union
14. Programs on Files

Text Book (s)

1	Zed A Shaw, Learn C the Hard Way: Practical Exercises on the Computational Subjects You Keep Avoiding (Like C), Addison Wesley, 2015
2	Bharat Kinariwala, TepDobry, Programming in C, eBook
3	W. Kernighan, Dennis M. Ritchie, The C Programming Language, 2nd ed. Prentice Hall, 1996

20 FEB 2019

Regulation 2018		Semester I / II	Total Hours			75
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
S	18MES102J	BASIC CIVIL AND MECHANICAL ENGINEERING	3	0	2	4

Course Objective (s):

- Select building materials and identify the components of a building
- Identify the various transportation systems, bridges, dams and water supply system
- Apply the concept of Harnessing energy from various energy sources
- Know the working of IC engines and identify the sub system requirements
- Apply manufacturing processes; casting, forming. List machining operations; lathe, drilling. Identify process of welding

Course Outcome (s) (COs):

CO1	Identify the building materials and its applications
CO2	Identify different transportation system, water supply system and its applications
CO3	List the basic components and analyze the working of major power plants
CO4	Identify the working of IC engines and understand the need of various auxiliary systems
CO5	Identify manufacturing processes; casting, forming. List machining operations; lathe, drilling. Identify process of welding

CO-PO Mapping

COs	POs												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	-	3	-	-	3	3	-	-	-	-	3	-	-	-
CO2	3	-	3	-	3	3	3	-	3	-	-	3	-	-	-
CO3	3	-	-	-	-	-	3	-	-	-	-	-	-	-	-
CO4	3	-	-	-	-	-	3	-	-	-	-	-	-	-	-
CO5	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO (Avg)	3		3		3	3	3		3			3			

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (high)

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15 MAR 2019

UNIT I	BUILDING MATERIALS	9
Introduction to Civil Engineering, Building Materials, History, Disciplines in Civil Engineering, Early constructions and development over time, Ancient Monuments: Peruvudaiyar or Brihadeeswarar Temple, Kallanai dam Grand Anicut, Taj Mahal, Golconda fort, Angkor Wat, Pyramids of Giza, Colosseum Development of various materials, Methods of Construction, Building Materials - Stone – Classification of Rocks, Quarrying, Dressing, Properties and Uses of Stone Mortar, Plain and Reinforced Cement, Concrete Grade and properties and uses, Necessity of Special Concrete, Self Compacting Concrete, Construction Chemicals (Plasticizers), Recycling: construction, demolition wastes, Buildings, Classification of Buildings, Selection of site for a building, Components of Buildings, Soil, General types of soil, Bearing Capacity, Factors affecting bearing capacity, Foundations: Functions, General types of, foundation, Shallow foundations		
UNIT II	TRANSPORTATION AND WATER SYSTEM	9
Cement concrete flooring, Marble flooring, Granite flooring, Ceramic tile flooring, Roofs: Types of roofs, Madras terrace roof, Reinforced concrete roofs, Trussed roof, Roof Coverings: Types, Weathering course: Types, Mode of Transportation - Highways - Classification of Roads, Cross section details of flexible pavements, Railways – Zone and Headquarters, Permanent way and its requirement, Components of Permanent way, Bridges: Components of Bridge, Types, Dams: Purpose, Classification, Gravity dams - Advantages and Disadvantages, Elements of protected Water Supply system, Objective, Quantity of water, Design period, Per-capita demand, Factor affecting per capita demand, Sources of Water Supply, Standards of Drinking water, Drinking Water Treatment: Objectives, Treatment plant process, Sewage: Method of collection, Sewage treatment and disposal		
UNIT III	POWER PLANTS	9
Coal based thermal Power Plant: layout, components description,working, advantages, disadvantages, Hydro Electric power plant: layout, components description, working, advantages and disadvantages, Nuclear power plant: Nuclear fission and fusion reactions, Nuclear reactor, components description, Layout, working, merits and demerits of boiling water reactor , Layout, working, merits and demerits of pressurized water reactor, Gas turbine power plants:componentsdescription,working and types gas turbines, methods to improve performance, Layout and working of open cycle plant with intercooling, reheating, regeneration, Solar Thermal power plant: layout of Flat plate collector based plant, central receiver type plant, advantages, disadvantages, Wind energy conversion system – wind turbine types, Working, advantages and disadvantages, Ocean Thermal Energy Conversion system: layout of open cycle , Layout of closed cycle, advantages, disadvantages		
UNIT IV	INTERNAL COMBUSTION ENGINES	9
Engine: Classification,operations of 2 stroke & 4 stroke, Comparison of SI & CI engines, Fuel supply system and Battery ignition system, Magneto ignition system of SI engine, Working of a simple carburetor, GDI, MPFI, CRDI, Lubrication system of an engine, Functions and Working of mist and forced feed lubrication system, Cooling system of an engine – Working of air cooled (fins), Water cooled engines (forced circulation), Alternate fuels for IC Engines. Liquid fuels: methanol, ethanol, vegetable oil, Biodiesel, Gaseous fuel: Hydrogen, CNG, LPG, properties, advantages, disadvantages, Emissions from engine – Emission standards – Euro, BS. Emission control measures – Catalytic converter, Exhaust gas recirculation, Introduction to electric vehicles, Hybrid and autonomous vehicles		
UNIT V	CASTING AND FORMING PROCESS	9
Casting introduction and history, Expandable mold casting process , Production steps in a typical sand-casting process, terms including patterns and core, Other expendable mold casting: shell molding, vacuum molding, expanded polystyrene process, Investment casting, Permanent mold casting: hot chamber and cold chamber die casting & Permanent moldcasting:Semi centrifugal and centrifuge casting, Metal forming introduction and its classification, metals and alloys, Bulk deformation: hot, cold forging processes, hot rolling processes,cold rolling processes, Rolling mill classification, hot and cold extrusion processes		

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Approved By
Board of Mechanical Engg.Dn
Date: 1st MAR 2019

processes, Sheet metal working, applications. Cutting operations: shearing, blanking, punching, cutoff, parting, slotting, perforating, notching, trimming, shaving, fine blanking, Bending operations: V-bending, edge bending, flanging, hemming,seaming, curling, spring back effect, Drawing operations, its defects, coining, embossing, ironing, lancing, twisting	
Text Book (s)	
1	Dr.V.Rameshbabu,"Basic Civil and Mechanical Engineering", VRB Publishers pvt ltd, 2017
Reference (s)	
1	SeropeKalpakjian, Steven Schmid," Manufacturing Processes for Engineering Materials", Pearson, 2016
2	Drbal, Larry F. Boston, Patricia G. Westra, Kayla L. Black, Veatch, "Power Plant Engineering", Kluwer Academic Pub., 1995
3	Andy Walker, "Solar Energy", John Wiley & Sons, 2013
4	John B. Heywood, "Internal Combustion Engine Fundamentals", Tata McGraw Hill Education, 2017
5	Kumar. T, Leenusjesu Martin and Murali. G, "Basic Mechanical Engineering", Suma Publications, Chennai, 2007.

LIST OF EXPERIMENTS

Total: 30hours

1.	Study about Brick, Stone & Cement: Types, Uses, Structural steel, Timber properties and uses
2.	Study about Water Supply, Distribution System, Water Treatment Plant, Sewerage System
3.	Study about basics of Casting, processes, Equipment's, To make the mould using stepped flange
4.	Basics of Metal Arc welding operations, Equipment's, Tools, Butt joint of two metal plates using arc welding process
5.	Welding-Lap joint of two metal plates overlapping on one another using arc welding process.
6.	Basics of fitting practice, tools and method of producing models, Tools, Step fitting of two metal plates using fitting tools
7.	Half Round, Vee fitting of two metal plates using fitting tools
8.	Basics of Carpentry operations, Equipment's, Tools, Cross halving joint of two wooden pieces at perpendicular direction
9.	To make duster from wooden piece using carpentry tools.
10.	Basics of Sheet metal operations, Equipment's, Tools and demonstration of producing models, To make geometrical shape like frustum
11.	Sheet metal operations - To make geometrical shape like square tray, rectangulat tray
12.	Sheet metal operations - To make geometrical shape like Cone , Funnel
13.	Study the basics of moulding and processes, Equipment's, To make plastic models using injection moulding of simple part
14.	Basics of Plumbing practices for G.I and P.V.C., Tools and demonstration of producing models
15.	Plumbing of bathroom/ kitchen fittings using G.I. fittings, P.V.C. fittings

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Board of Mechanical Engg.On
MAR 2019

Regulation 2018		Semester I/ Semester II	Total Hours			90
			Hours / Week			C
Category	Course Code	Course Name	L	T	P	
S	18EES101J	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	3	0	2	4

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

1	Analyze given electric circuits consisting of active and passive components.
2	Identify the parts, functions and working of motors, generators and transformers that function in AC and DC.
3	Utilize the basic electronic devices and circuits.
4	Utilize the working concept of measuring instruments.
5	Build simple logical circuits using Boolean expressions. Identify elements in Integrated circuit.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Discuss basic theory utilized in electrical circuits and its circuits.
CO2	Describing working principle of direct current and alternative current machines such as transformers, motors and generators.
CO3	Operate the basic electronic devices. Identify their uses and construction features.
CO4	Interpret the concept of measuring devices like PMMC, MI ,energy and wattmeter.
CO5	Apply binary logic and Boolean expressions for digital circuit design, Identify elements in a Integrated circuit.

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	1	2	-	2	2	2	2	-	2	-	-	-
CO2	3	2	1	1	2	-	2	2	2	2	-	2	-	-	-
CO3	3	-	1	1	2	-	2	2	2	2	-	2	-	-	-
CO4	3	-	1	1	1	-	2	2	2	2	-	2	-	-	-
CO5	3	2	2	2	2	-	2	2	2	2	-	2	-	-	-
CO (Avg)	3	2	1.2	1.2	1.8	-	2	2	2	2	-	2	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	ELECTRICAL CIRCUITS	12

Introduction to DC and AC circuits, Active and Passive two terminal elements, Ohms law,Voltage-Current relation, Power, Energy, R,L,C Circuits, Voltage and Current Sources, Kirchoff's current law, Kirchoff's voltage law, Problem Solving Session, Mesh Current Analysis, Nodal Voltage Analysis, Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem, Star- Delta Transformation, Problem Solving Session, Resistive Circuit Analysis, Superposition, Convolution, RL Circuit Transient Analysis, RC & RLC Transient Analysis , Three Phase Systems, Star and delta Connections, Relation between Line and, Phase, Problem Solving Session.

UNIT II	DC MACHINES & AC MACHINES	12

Sinusoids, Generation of AC, Average, RMS values, Form and peak factors, Analysis of single phase AC circuit, Real, Reactive, Apparent power, Power factor, Magnetic materials, B-H Characteristics Simple magnetic circuits, Faraday's laws, induced emf and inductances. 1 - Phase transformers: Construction, types, ideal, practical transformer, EMF equation, Regulation, Efficiency, Problem Solving Session, Construction, working of DC Generators, Types of DC generators, Characteristics of Generators, Applications of DC generator, Working and types of DC motors, Characteristics , Two point starter and Three point starter, Problem Solving Session, AC generators (Alternators), Construction, working, Characteristics of Alternators, Losses, Single Phase motors: Split phase induction motor & Capacitor start induction motor, Working and types of single phase AC motors, Squirrel Cage and Slip ring induction motor, Types of AC starters (Autotransformer, star-delta and Rotor resistance starter), Problem Solving Session.

UNIT III	ELECTRONIC DEVICES	12

Overview of semiconductors, Intrinsic and Extrinsic semiconductors, Operation of PN Junction diode , Characteristics of PN Diode, Operation of Zener diode, Characteristics of Zener Diode, Overview of diode circuits, Operation of Half-wave rectifier, Half wave : Ripple factor Expression, Advantages, Disadvantages, Operation of Full-wave rectifier, Full wave : Ripple factor Expression, Advantages, Disadvantages, Bridge type rectifier operation, Comparison of rectifier circuits, Overview of filters and its uses, BJT construction, operation, BJT characteristics (CB, CE and CC configurations) and uses, JFET construction, operation, JFET characteristics (Drain and Transfer characteristics), Depletion mode and Enhancement mode MOSFET construction operation, MOSFET characteristics (Transfer and output characteristics), Problem Solving Session.

UNIT IV	MEASUREMENTS	12

Methods of measurements – Overview, Types of Measurements: Primary, Secondary, Tertiary, Basic principles and Classification of Instruments- Indicating, Recording and Integrating, Construction and working of PMMC, PMMC-Torque Equation, Advantages, Disadvantages, Construction and working of MI Instruments, MI (Attraction type)-Operation, MI Attraction type-Advantages , Disadvantages, MI (Repulsion type)- Operation, Torque Equation, MI (Repulsion type)- Errors, Advantages, Disadvantages, Overview of Instrument Transformers, Current Transformer, Potential Transformer, CRO, CRT, Operation of Dynamometer type watt meter, Advantages and Disadvantages, Operation of Induction type watt meter, Advantages and Disadvantages, Megger –Construction, Working, Measurement of Earth resistance

UNIT V	DIGITAL AND INTEGRATED DEVICES	12

Number systems, binary codes, Binary arithmetic, Boolean algebra, laws and theorems, Simplification of Boolean expression, Logic Gates and Operations, Simplification of Boolean expression, Problem Solving Session, SOP and POS Expressions, Standard forms of Boolean expression, Simplify using Boolean Expressions, Minterm and Maxterm, K-Map Simple Reduction Technique, Two, Three and Four Variable K-Map, Problem Solving Session, Half adder circuit, Full adder circuit, Flip-flops : RS , JK, T and D Flip-flops, A/D Converter-Successive Approximation , D/A Converter-Binary Weighted, Overview of Op-Amp, Op-Amp : Functional block & Types (Inverting, Non-inverting & differential amplifier).

LIST OF EXPERIMENTS	30

1. Verification of Kirchoff's Law
2. Verification of all Theorems,
3. Time Domain Analysis (RL, RC).

M.KUMARASAMY COLLEGE OF ENGG.(AUTONOMOUS)
Electrical and Electronics Engineering
Approved On
14 MAR 2018
Board of Studies
KARUR - 639 113

4. Types of wiring (Flourescent lamp,Staircase ,godown wiring), 5. Demo of DC Machine & Parts 6. Demo of AC Machine & Parts. 7. Characteristics of semiconductors 8. Measurement of Ripple factor (Half-wave and Full-wave), 9. Characteristics of CB and CE configurations 10. Demo of PMMC and MI Meters, 11. Waveform verification using CRO, 12. Measurement of Energy using Single phase Energy meter, 13. Verification of Boolean expression using logic gates, 14. Reduction using Digital Logic Gates, 15. Design and test of Inverting and Non-Inverting Amplifier using IC741	
Text Book (s)	
1	R. Muthusubramanian, S. Salivahanan,"Basic Electrical and Electronics Engineering, Tata McGraw-Hill, 2012
Reference (s)	
1	Dash.S.S, Subramani.C, Vijayakumar.K, Basic Electrical Engineering, 1st ed.,Vijay Nicole, 2013.
2	Jegatheesan.R,Analysis of Electric Circuits, Tata McGraw-Hill, 2014.
3	P. S.Bimbhra ,Electrical Machinery,7th ed,. Khanna Publishers, 2011.
4	Moris M. Mano, Digital Design, 3rd ed.,Pearson, 2011.
5	Sawhney A.K., A Course in Electrical & Electronic measurements and Instrumentation,Dhanpat Rai and Co,2011.

M.KUMARASAMY COLLEGE OF ENGG.(AUTONOMOUS)
Board of Electrical and Electronics Engineering
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14 MAR 2018
KARUR - 639 113

Regulation 2018		Semester I/Semester II	Total Hours			30
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
H	18MBH101L	PROFESSIONAL SKILLS AND PRACTICES	0	0	2	1

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

CLR-1	Equip students with different aspects of Presentation
CLR-2	Train students to use appropriate language for publics peaking.
CLR-3	Help students better understand basic leadership qualities and personality traits
CLR-4	Train the students to face interview confidently.
CLR-5	Make students understand how setting goals in life is important.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Make presentation in a formal way.
CO2	Speak with clarity and confidence, thereby enhancing their employability skills.
CO3	Enable students to understand different aspects of leadership and evaluate in their own strengths.
CO4	Clear the job interview successfully.
CO5	Realize that selecting goal is a fundamental component to long- term success of an individual.

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	3	2	3	3	3	2	3	-	-	-
CO2	-	-	-	-	-	3	2	3	3	3	2	3	-	-	-
CO3	-	-	-	-	-	3	2	3	3	3	2	3	-	-	-
CO4	-	-	-	-	-	3	2	3	3	3	2	3	-	-	-
CO5	-	-	-	-	-	3	2	3	3	3	2	3	-	-	-
CO(Avg)	-	-	-	-	-	3	2	3	3	3	2	3	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	PRESENTATIONS	5
Tips and Techniques for an Effective Presentation - Effective presentation structure - Types of Presentation - Verbal aspect of a presentation - Non-verbal aspect of a presentation – body language - Stress management during a presentation		
UNIT II	**PUBLIC SPEAKING**	**5**
Importance of Public Speech - Dealing with fear and Anxiety - Tips and Techniques for Public Speaking - Informative Speech - Delivering a Persuasive Speech - Dealing with audience questions		
UNIT III	**LEADERSHIP SKILLS**	**5**
Communication – Motivation – Delegating – Creativity – Responsibility - Commitment		
UNIT IV	**INTERVIEW SKILLS**	**5**
Preparing for a Job Interview - The Interview Process - Telephone Interviews - Interview Techniques - Mock Interview - Mock Interview		
UNIT V	**GOAL SETTING**	**5**
Types of goals - Reasons for goal setting - Goal Setting Process - S.M.A.R.T. goals - Tips and Techniques for Goal Setting - Trouble in Setting Goals		
LIST OF EXPERIMENTS		**5**
1. Make a presentation on a general topic 2. Give a persuasive speech 3. Exhibit your leadership qualities 4. Mock interview 5. Share your realistic short term and long term goals and the ways to attain them.		

Text Book (s)

	NIL

Reference(s)

1	Aruna Koneru, Professional Communication, Tata McGraw-Hill Publishing Company Limited, New Delhi
2	Professional Skills and Practice, Oxford University Press
3	https://www.skillsyouneed.com
4	https://www.Business English Site.com

Regulation 2018		Semester I/ Semester II	Total Hours			30
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
H	18MBH102L	GENERAL APTITUDE	0	0	2	1

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

CLR1	Recapitulate fundamental mathematical concepts and skills
CLR2	Hone critical thinking skills by analyzing the arguments with explicit and implicit premises
CLR3	Sharpen logical reasoning through skillful conceptualization
CLR4	Identify the relationships between words based on their function, usage and characteristics
CLR5	Nurture passion for enriching vocabulary
CLR6	Acquire the right knowledge, skill and aptitude to face any competitive examination.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Build a strong base in the fundamental mathematical concepts
CO2	Identify the approaches and strategies to solve problems with speed and accuracy
CO3	Gain appropriate skills to succeed in preliminary selection process for recruitment
CO4	Collectively solve problems in teams and groups
CO5	Build vocabulary through methodical approaches
CO6	Enhance lexical skills through systematic application of concepts and careful analysis of style, syntax, semantics and logic

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	3	-	3	2	-	-	-	3	3	1	3	-	-	-
CO2	-	3	-	3	2	-	-	-	3	3	-	3	-	-	-
CO3	-	3	-	3	2	-	-	-	3	3	1	3	-	-	-
CO4	1	3	-	3	2	-	-	-	3	3	-	3	-	-	-
CO5	-	3	-	3	2	-	-	-	3	3	1	3	-	-	-
CO6	-	3	-	3	2	-	-	-	3	3	-	3	-	-	-
CO (Avg)	1	3	-	3	2	-	-	-	3	3	1	3	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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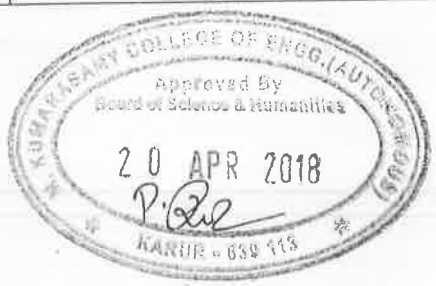
UNIT I		6
Types of numbers, Divisibility tests -Introduction to Significance of Verbal Aptitude in Competitive Examinations - LCM and GCD -Vocabulary enrichment techniques - Unit digit, Number of zeroes, Factorial notation - Vocabulary enrichment Techniques.		
UNIT II		6
Square root, Cube roots, Remainder - Identities - Contextual Vocabulary Exercise - Synonyms Fractions and Decimals, surds -Contextual Vocabulary Exercise -Antonyms		
UNIT III		6
Percentage Introduction - Sentence Completion Basic Level Exercises : Single Blank - Percentage Problems - Sentence Completion Basic Level Exercises : Double Blank - Profit and Loss - Cloze Test		
UNIT IV		6
Discount -Reading Comprehension – Introduction -Simple Interest - Reading Comprehension – Summary & Main Idea - Compound Interest, Installments - Reading Comprehension – Summary & Main Idea		
UNIT V		6
Logarithms Intro - Grammar Rules :A comprehensive Introduction - Logarithms Rules - Sentence Completion – Grammar - Linear Equations - Spotting Errors		

Text Book (s)	
1	Nil
Reference (s)	
1	Charles Harrington Elstor, Verbal Advantage: Ten Easy Steps to a Powerful Vocabulary, Random House Reference, 2002
2	Merriam Webster's Vocabulary Builder, Merriam Webster Mass Market, 2010
3	Norman Lewis, How to Read Better and Faster, Goyal, 4th Edition
4	Franklin GRE Word List, 3861 GRE Words, Franklin Vocab System, 2014
5	Wiley's GMAT Reading Comprehension Grail, Wiley, 2016
6	Manhattan Prep GRE : Reading Comprehension and Essays, 5th Edition
7	Martin Hewings, Advanced Grammar in Use. Cambridge University Press, 2013
8	Nishit K. Sinha, The Pearson Guide to Quantitative Aptitude and Data Interpretation for the CAT
9	Dinesh Khattar-The Pearson Guide to QUANTITATIVE APTITUDE for competitive examinations



Regulation 2018		Semester II	Total Hours			30
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
M	18LEM102T	VALUE EDUCATION	1	0	0	-

Prerequisite Course (s)

NIL

Course Objective (s):

The purpose of learning this course is to:

CLR-1	Connect the learners to their potential, identify their potential to create a new positive world
CLR-2	Analyze the merits and demerits of different educational systems. Identify the different systems of education
CLR-3	Draw attention towards the weaknesses they are susceptible to and inspire them through positive models
CLR-4	Instill a sense of professional ethics which help them develop a safe comfortable and prosperous society
CLR-5	Cultivate a spirit of willing accommodation in an increasingly diverse world

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Equipped with an awareness of their positive energy and power
CO2	Identify the meaning of 'education'; have a clearer and better understanding in taking education to the masses
CO3	Assess their weaknesses; understand risks involved and rectify them through learning from positive and negative instances
CO4	Realize their professional responsibilities
CO5	Acquire the required values in an expanding pluralistic world not be swept off their feet due to the rapid changes

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	-	-	2	3	-	3	3	3	-	3	-	-	-
CO2	2	3	2	-	3	3	2	2	3	3	-	3	-	-	-
CO3	2	-	-	-	2	3	2	2	3	3	-	3	-	-	-
CO4	3	2	-	-	3	3	3	3	3	3	-	3	-	-	-
CO5	2	-	-	-	3	3	3	3	3	3	-	3	-	-	-
CO (Avg)	2	2.33	2	-	2.6	3	2.5	2.6	3	3	-	3	-	-	-

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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UNIT I	VISIONS FOR YOUTH	6
Introduction (Quiz) - Two speeches by great personalities (Oral presentations) - Quotes, proverbs relating to the power and potential of youth, Excerpts: Wings of Fire (Collecting proverbs highlighting the potential of youth) - Two news articles highlighting the initiatives for social causes by youth (Role play in a similar context) - One song exhibiting the positive energy of youth (Discussion on the song)		
UNIT II	**YOUTH AND EDUCATION**	**6**
Meaning and the significance of education (Brainstorming) - Overview of different (traditional, modern) educational systems (Debate) - Role of youth in education, Urban and Rural set up, dissemination (Student presentations) - Designing and framing educational curriculum and materials (Students' Presentation based on write ups) -The pressing challenges in current educational system (Collage Design)		
UNIT III	**YOUTH AND SOCIETY**	**6**
Need for social values in the present context (Poem – "Where the mind is without fear" , Write up on various instances from real life) - Individual and group behaviour, respect for others (Case study on recent happenings) - Civic sense, bullying-substance abuse, uses of expletives (Case study on recent happenings) - Hero worship, gender insensitivity moral policing (Case study on recent happenings) - Positive contribution by youth in promoting social welfare (Short videos followed by discussions)		
UNIT IV	**YOUTH AS PROFESSIONALS**	**6**
Introduction to professional values (Brainstorming through visual cues) - Engineering societies in India (Quiz) - Challenges to be addressed by Engineers in India (Case Study) - Challenges in different sectors: agriculture (Case Study) - Challenges in different sectors: urban development, environment (Group activity (oral and written)) - Challenges in different sectors: sustainable development, cyber security (Case Study – from Newspapers)		
UNIT V	**YOUTH IN PLURALISTIC SOCIETY**	**6**
Introduction to pluralistic society, forces of globalization (Group Discussion) - Science and technology intercultural proximity (Narration of stories from various religions to illustrate the oneness of humanity) - Positive, Negative impact: religion, politics, gender, economic status, aesthetics (Discussion on "To Kill a Mocking Bird") - Values required to live in a global society (Poster presentation on festivals of various religions) - Learning the etiquettes of various societies (Poster presentation on festivals of various religions) - Success of pluralistic society, enliven the society, religious harmony through literary (Writing the aspects of pluralistic society based on the text).		

Text Book (s)	
	Nil
Reference (s)	
1	Kalam, APJ Abdul. Wings of Fire: AN Autobiography of APJ Abdul Kalam. Ed. Sangam Books Ltd., 1999
2	"Banaras Hindu University Speech" and "To Students". The Voice of Truth. General Editor Shriman Narayan. Navajivan Publishing House. pp. 3-13 and pp. 425-30. www.mkgandhi.org
3	Piroda, Sam. "Challenges in Science and Technology". www.nfdindia.org/loc19.htm

20 APR 2018
KARUR - 639 113

4	Thomas A Address to VTU Students by Narayana Murthy. https://www.karnataka.com/personalities/narayana-murthy/vtu-address-2006/
5	World Economic forum. "India's top 7 challenges from skills to water scarcity"

Regulation 2018		Semester I&II	Total Hours			30
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
M	18GNM101L	Physical and Mental Health using Yoga	0	0	2	0

Prerequisite Course (s) Nil

Course Objective (s):

The purpose of learning this course is to:

CLR-1	provide deeper insight into the curriculum of Yogic Sciences along with the practical applications of Yoga
CLR-2	intend that students should get familiar with the poses of Yogasanam.
CLR-3	Promote positive health in the Student through Yoga and enabling and imparting skill in them to practice and apply Yogic
CLR-4	practice for Health to general public and teach Yoga for Total personality development and spiritual evolution.

Course Outcome (s) (Cos):

At the end of this course, learners will be able to:

CO1	increase the muscle strength
CO2	improve respiration, energy and vitality.
CO3	maintain a balanced metabolism and weight reduction.
CO4	maintain cardio and circulatory health.
CO5	improve athletic performance and protection from injury.

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	1	-	-	-	-	-	2	-	-	-
CO2	-	-	-	-	-	1	-	-	-	-	-	2	-	-	-
CO3	-	-	-	-	-	1	-	-	-	-	-	2	-	-	-
CO4	-	-	-	-	-	1	-	-	-	-	-	2	-	-	-
CO5	-	-	-	-	-	1	-	-	-	-	-	2	-	-	-
CO (Avg)	-	-	-	-	-	1	-	-	-	-	-	2	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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	Introduction:	6
	▪ Human Body- Meaning and its Importance in Yoga ▪ Definition of Anatomy and Physiology ▪ Cell: Structure & Function	
	General information, Different parts, Structure, Function and Effect of Yogic Practices.	24
	▪ Tissues: Types, Structure & Function. ▪ Musculo-Skeletal System ▪ Digestive system ▪ Excretory system ▪ Respiratory system ▪ Circulatory system ▪ Nervous System ▪ Endocrinal system	

Text / Reference (s) books:

1.	Shirley Telles - A Glimpse of the Human Body The structure anf Functions, Swami Vivekananda Yoga Prakashana, Bangalore.
2.	Makarand Madhukar Gore - Anatomy and Physiology of Yogic Practices, Motilal Banarsidass, New Delhi, 2007
3.	Anne Waugh, Allison Grant - Ross and Wilson Anatomy and Physiology in Health & Illness, Churchill Livingstone; 2010

Regulation 2018		Semester V/ VI	Total Hours			15
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
M	18LEM301T	INDIAN ART FORMS (Common to all UG Programmes)	1	0	0	-

Prerequisite Course (s)

NIL

Course Objective (s):
The purpose of learning this course is to:

CLR-1	Introduce the learners to various art forms and whet their aesthetics sense.
CLR-2	Improve learners' knowledge on history of theatre and drama and draw connections between theatrical practices and social contexts in both modern and pre modern periods..
CLR-3	Enable the learners to identify and understanding various types of dance and music concepts
CLR-4	Make learners explore the diversity of Architecture, Sculpture, Painting and its intersection with community, culture and society.
CLR-5	Make students to get familiarized with the formal, historical, and theoretical aspects of literary arts.

Course Outcome (s) (COs):
At the end of this course, learners will be able to:

CO1	Identify aesthetics traits found throughout Indian art.
CO2	Demonstrate understanding of the social and artistic movements that have shaped theatre and dance.
CO3	Recognize different concepts involved in music and dance.
CO4	Identify and appreciate the salient features and various styles of Indian Architecture, Sculpture and Painting at different times.
CO5	Demonstrate a broad understanding of Indian literary arts and appreciate the role that historical context plays in the creation and interpretation of literary works

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO 11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	1	1	2	2	2	-	2	-	-	-
CO2	-	-	-	-	-	1	1	2	2	1	-	2	-	-	-
CO3	-	-	-	-	-	1	1	2	2	1	-	2	-	-	-
CO4	-	-	-	-	-	1	1	2	2	2	-	2	-	-	-
CO5	-	-	-	-	-	1	1	2	2	2	-	2	-	-	-
CO (Avg)	-	-	-	-	-	1	1	2	2	1.6	-	2	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	INDIAN ARTS	3
Introduction to art (aesthetics, taste)- fine arts - applied arts –Terminology - Subject matter -Art as propaganda - Purposes/uses of art.		
UNIT II	**THEATRE & DRAMA**	**3**
History of Theatre and Drama- Traditional Theatre forms- Modern Theatre and its characteristics-Puppetry –different forms and elements of drama.		
UNIT III	**MUSIC AND DANCES**	**3**
Origin of Music and Dance- Classical music and Carnatic Music- Regional Music -Musical Instruments-Regional Classical Dances.		
UNIT IV	**ARCHITECTURE, SCULPTURE, PAINTING**	**3**
History of architecture, sculpture, painting -Indo-Islamic Architecture- Temple Architecture– different types of Sculptures and its characteristics-Painting and its different styles.		
UNIT V	**LITERARY ARTS**	**3**
Ancient Indian Literature- Early Dravidian Literature- Medieval Literature- Modern Indian Literature-Contemporary Literature.		

Text Book (s)

	NIL

Reference (s)

1	Dhar, Parul Pandya, ed., 2011, Indian Art History Changing Perspectives, New Delhi: D.K. Print world and National Muscum Institutc (Introduction).
2	Guha-Thakurta, Tapati, The making of a new modern Indian art: Aesthetics and nationalism in Bengal, 1850-1920, Cambridge University Press, 1992
3	Huntington, Susan, The Art of Ancient India: Hindu, Buddhist, Jain, Weatherhill, 1985
4	Mitter, Partha, Indian Art, Oxford History of Art series, Oxford University Press, 2001

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Regulation 2018		Semester III	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
B	18MAB203T	PROBABILITY STATISTICS AND QUEUEING THEORY (B.E CSE & B.TECH IT)	3	1	0	4

Prerequisite Course (s)

NIL

Course Objective (s):

The purpose of learning this course is to:

1	Have a well – founded knowledge of standard distributions which can describe real life phenomena.
2	Acquire skills in handling situations involving more than one random variable and functions of random variables.
3	Understand test of hypothesis and how they relate to engineering applications.
4	Understand and characterize phenomena which evolve with respect to time in a probabilistic manner.
5	Be exposed to basic characteristic features of a queuing system and acquire skills in analyzing queuing models.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Apply basic probability techniques and models to analyze the performance of computer systems .
CO2	Illustrate and apply the concept of pairs of random variables from the knowledge of sampling distributions.
CO3	Understand the problems of Students T test for single mean and difference of means.
CO4	Use discrete time Markov chains to model computer systems.
CO5	Understand basic characteristic features of a queuing system and acquire skills in analyzing queuing model.

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	1	-	-	-	-	-	-	-	-	-	2	2	-
CO2	2	2	1	-	-	-	-	-	-	-	-	-	1	1	-
CO3	2	3	2	1	-	-	-	-	-	-	-	-	1	2	-
CO4	3	2	1	-	-	-	-	-	-	-	-	-	2	1	-
CO5	3	2	2	1	-	-	-	-	-	-	-	-	2	2	-
CO (Avg)	2.4	2.4	1.4	1	-	-	-	-	-	-	-	-	1.6	1.6	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

M.KUMARASAMY COLLEGE OF ENGINEERING (AUTONOMOUS)
29 MAR 2019

UNIT I	RANDOM VARIABLE AND STANDARD DISTRIBUTIONS	9*+3*
Random variable - Probability mass function - Probability density functions- Properties - Moments - Moment generating functions and their properties. Binomial, Poisson, Geometric, Uniform, Exponential, and Normal distributions and their properties .		
UNIT II	**TWO DIMENSIONAL RANDOM VARIABLES**	**9*+3***
Joint distributions - Marginal and conditional distributions – Covariance – Correlation and regression - Transformation of random variables - Central limit theorem.		
UNIT III	**TESTING OF HYPOTHESIS**	**9*+3***
Sampling distributions - Tests for single mean, Proportion, Difference of means (large and small samples) – Tests for single variance and equality of variances – chi-square test for goodness of fit – Independence of attributes.		
UNIT IV	**MARKOV PROCESSES AND MARKOV CHAINS**	**9*+3***
Classification-First order, Second order, strictly stationary order, wide-sense stationary - Markov process - Markov chains – Transition probabilities - Poisson process.		
UNIT V	**QUEUEING THEORY**	**9*+3***
Markovian models – Birth and Death queuing models - Steady state results: Single and multiple server queuing models with finite and infinite service ((M/M/1:∞/FCFS), (M/M/1:N/FCFS), (M/M/C:∞/FCFS), (M/M/C:N/FCFS)) - Pollaczek- Khintchine formula.		

Text Book (s)

1	Oliver Ibe, "Fundamentals of Applied Probability and Random Processes" 2nd Edition, Elsevier, 2014
2	D. Gross and C.M. Harris, "Fundamentals of Queueing Theory", Wiley Student edition, 2002
3	R.E. Walpole, R.H. Myers, S.L. Myers, and K Ye, "Probability and Statistics for Engineers and Scientists", Pearson Education, Asia , 8th edition, 2007.

Reference (s)

1	R.A Johnson, Miller & Freund's Probability and Statistics for Engineers, Seventh Edition, Pearson Education, Delhi, 2009.
2	Allen. A. O, Probability, Statistics and Queuing Theory: with computer Science Applications, Academic press, 2014.
3	Trivedi. K.S, Probability and Statistics with Reliability, Queuing and Computer Applications, John Wiley and sons, Second edition, 2012.
4	Taha.H.A, Operations Research: An Introduction, Eighth Edition, Prentice Hall of India Ltd, New Delhi, 2008.

Regulation 2018		Semester III	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
S	18ECS202J	Analog and Digital Electronics	3	0	2	4

Prerequisite Course (s)

Basic Electrical and Electronics Engineering

Course Objective (s):

1	To understand the methods of biasing the Transistors & to know construction and characteristics of special diodes
2	To simplify Boolean expressions using basic postulates of Boolean algebra.
3	To synthesize the basic combinational circuits
4	To synthesize the basic Sequential circuits
5	To synthesize combinational and sequential logic using programmable logic devices.

Course Outcome (s) (COs):

CO1	Review various biasing techniques used in BJT and its characteristics.
CO2	Illustrate the Boolean functions and Boolean Expressions.
CO3	Design and Analyze the combinational circuits.
CO4	Design and Analyze the sequential circuits.
CO5	Analyze the characteristics and structure of different memory systems and programmable logic Devices

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	2	1	-	-	3	2	-	2	3	-	2
CO2	3	3	2	2	2	1	-	-	3	2	-	2	3	-	2
CO3	3	3	2	2	2	1	-	-	3	2	-	2	3	-	2
CO4	3	2	2	2	2	1	-	-	3	2	-	2	3	-	2
CO5	3	3	2	2	2	1	-	-	3	2	-	2	3	-	2
CO (Avg)	3	2.8	2	2	2	1	-	-	3	2	-	2	3	-	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	TRANSISTORS AND SPECIAL DIODES	9

Bipolar Junction Transistor – CB, CE, CC Configurations and Characteristics - The Metal-oxide-semiconductor FET (MOSFET) – The Low–frequency Common Source and Common Drain Amplifiers – Biasing the FET - Construction & Characteristics of UJT- SCR –TRIAC - DIAC.

UNIT II	BOOLEAN ALGEBRA AND LOGIC GATES	9

Boolean postulates and laws –De-Morgan's Theorem- Principle of Duality- Boolean expression – Minimization of Boolean expressions– Sum of Products (SOP), Product of Sums (POS) and its Conversion– Minimization of Boolean Expression upto 4 variables using Karnaugh map, Tabulation Method-Don't care conditions. Introduction to Logic Gates - Implementation of Basic Gates using Universal gates.

UNIT III	COMBINATIONAL CIRCUITS	9

Design procedure of Combinational circuits: Adders - Subtractors – Parallel adder/ Subtractor- Carry look ahead adder- BCD adder- 2- bit Magnitude Comparator- Multiplexer / Demultiplexer - Encoder / Decoder – Parity Generator/Checker – Code converters: Binary to Gray – Gray to Binary - BCD to Excess 3 – Excess 3 to BCD.

UNIT IV	SEQUENTIAL CIRCUITS	9

Flip flops SR, JK, T, D and Master slave – Characteristic and excitation tables and equations –Level and Edge Triggering –Realization of one flip flop using other flip flops – counters - Ring counters and Sequence detector - Design of Synchronous counters - Registers – shift registers- Universal shift register.

UNIT V	MEMORY AND PROGRAMMABLE LOGIC DEVICES	9

Classification of memories – ROM Organization: PROM, EPROM, EEPROM – RAM Organization: Static RAM, Dynamic RAM - (PLA) - Programmable Array Logic (PAL) – Field Programmable Gate Arrays (FPGA) - Implementation of combinational logic circuits using PROM, PLA, PAL.

LIST OF EXPERIMENTS	15

1. Design and construct Fixed Bias amplifier circuit using BJT
2. Design and construct BJT Common Emitter Amplifier using voltage divider bias (self-bias).
3. Design and implementation of Adder / subtractor using basic gates and MSI devices.
4. Design and implementation of 2-bit and 8-bit magnitude comparator using basic gates and MSI devices.
5. Design and implementation of multiplexers and demultiplexers.
6. Design and testing of flip-flops using gates.
7. Implementation of SISO, SIPO, PISO and PIPO shift registers using flip-flops.

Text Book (s)

1	S. Salivahanan, N. Suresh Kumar and A. Vallavaraj, Electronic Devices and Circuits, 4th Edition, Tata McGraw-Hill Education Pvt. Ltd, 2017.
2	Morris Mano, M, - Digital Design, Third Edition, Prentice Hall of India, New Delhi, 2003.

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Reference (s)	
1	Millman J and Halkias.C. Integrated Electronics, TMH, 2007.
2	David A. Bell, Electronic Devices & Circuits, 4th Edition, PHI, 2007
3	Roth, Charles H., - Fundamentals of Logic Design, Thomson Publication Company, New Delhi,2003.
4	Leach, Donald P. and Malvino, Albert Paul., - Digital Principles and Applications, Fifth Edition, Tata McGraw-Hill, New Delhi, 2003.
5	Givone, Donald D.,- Digital Principles and Design, Tata McGraw-Hill, New Delhi, 2003.

Regulation 2018		Semester III	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
C	18ITC201J	Data Structures and Algorithms	3	0	2	4

Prerequisite Course (s)

Programming for problem solving

Course Objective (s):

The purpose of learning this course is to:

1	Implement Linear and Non-Linear Data Structures using Array and Linked List
2	Outline the parameters to measure the running time of an algorithm
3	Understand the problem type and select respective problem solving methodology

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Implement Linear Data Structures such as List, Stack and Queue
CO2	Apply Non-Linear Data Structures such as Trees and Heaps in problem solving
CO3	Illustrate the working of shortest path algorithms
CO4	Understand the problem solving nature of brute force and divide and conquer techniques
CO5	Solve problems using Dynamic Programming, Backtracking and Branch & Bound techniques

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2									2	2		
CO2	3	2										2	2		
CO3	3	2	2										2		
CO4	3	2	2										2		
CO5	3	2	2					2					2		
CO (Avg)	3	2	1.6					2					2		

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	Measuring Algorithm efficiency and Linear Data Structure	9
Notion of an Algorithm - Fundamentals of the Analysis of Algorithm Efficiency - Asymptotic Notations and its properties - ADT - List ADT [Array and Linked List Implementation] - Stack ADT [Implementation] – Applications of Stack [Evaluating arithmetic expressions and Recursion] - Queue ADT [Implementation and Types]		
UNIT II	**Non-Linear Data Structure: Trees**	**9**
Tree basic terminologies – Binary Tree – BST [Implementation] – Tree Traversal – AVL Tree – Red Black Tree – B-Tree – Binary Heap – Hashing		
UNIT III	**Non-Linear Data Structure: Graphs & Greedy Technique**	**9**
Graph basic Terminologies – Topological sort – Depth First Search and Breadth First Search - Unweighted Shortest Paths – Greedy Algorithm: Prim's algorithm - Kruskal's Algorithm - Dijkstra's Algorithm - Huffman Trees		
UNIT IV	**Brute force and Divide and Conquer**	**9**
Brute Force - Exhaustive Search - Traveling Salesman Problem - Knapsack Problem - Assignment problem – Divide and Conquer – Merge, Quick sort - Strassens Matrix Multiplication		
UNIT V	**Dynamic Programming, Backtracking and Branch & Bound**	**9**
Computing a Binomial Coefficient – Warshall's and Floyd's algorithm – Optimal Binary Search Trees - Knapsack Problem - Backtracking – n-Queens problem – Hamiltonian Circuit Problem - Branch and Bound – Assignment problem – Knapsack Problem (0/1)		
LIST OF EXPERIMENTS		**15**

1. Array Implementation of List ADT
2. Linked List Implementation of List ADT
3. Implementation of Stack ADT
4. Implementation of Queue ADT
5. Binary Search implementation
6. Implement Quick Sort
7. Implementation of Dijikstra's algorithm.
8. Implementation of Prims algorithm
9. Implementation of Kruskal's algorithm
10. Implementation of n-queens algorithm

Text Book (s)

1. M. A. Weiss, "Data Structures and Algorithm Analysis in C", Second Edition, Pearson Education, 2011.

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2	AnanyLevitin, "Introduction to the Design and Analysis of Algorithms", Third Edition, Pearson Education, 2017.
Reference (s)	
1	Y.Langsam, M.J.Augeustein and A.M.Tenenbaum, "Data Structures Using C", Pearson Education Asia, 2004.
2	Richard Gilberg, Behrouz A. Forouzan, "Data Structures: A Pseudo code Approach with C", Second edition, India Edition 2005.
3	Aho, J.E. Hopcroft and J.D. Ullman, "Data Structures and Algorithms", Pearson Education, 1983.
4	Ellis Horowitz, SartajSahni, Sanguthevar Rajasekaran, "Fundamentals of Computer Algorithms",Galgotia Publications,2010.
5	Thomas H. Cormen, Charles E.Leiserson, Ronald L.Rivest, Clifford Stein "Introduction to Algorithms", 3rd Edition, The MIT Press 2009.

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25 MAR 2019
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Regulation 2018		Semester III	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
C	18ITC202T	AGILE DEVELOPMENT METHODOLOGY	3	0	0	3

Prerequisite Course (s)

NIL

Course Objective (s):

The purpose of learning this course is to:

Understand the basic concepts of Agile Software Process and develop Agile Software Process by using the principles of Agile Testing.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Understand the models, process and testing in Software Engineering.
CO2	Outline the fundamentals of agile software process
CO3	Explain about the project phases involved in agile software development
CO4	Summarize the various agile testing methods
CO5	Explain about the design and development of agile software

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	2	-	1	1	-	-	2	-	1	1	3	-	-
CO2	3	2	-	-	-	-	-	-	-	1	-	-	3	-	-
CO3	3	2	1	-	-	-	-	-	-	1	-	-	3	-	-
CO4	3	3	2	-	-	-	-	-	1	-	-	1	3	-	-
CO5	3	3	3	3	-	-	-	-	1	1	-	1	3	-	-
CO (Avg)	3	2.2	1.6	0.6	1	1	-	-	1.33	1	1	1	3	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

M.KUMARASAMY COLLEGE OF ENGG.(AUTONOMOUS)
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25 MAR 2019
KARUR-639113.

UNIT I	INTRODUCTION TO SOFTWARE ENGINEERING	9
Nature of software-Software Process – Generic Process Models– Prescriptive Process Models – Personal and Team Process Model – Unit testing – Integration testing – System testing – Validation testing – Black and White box Testing.		
UNIT II	**FUNDAMENTALS OF AGILE**	**9**
The Genesis of Agile - Introduction and background - Agile Manifesto and Principles - Overview of Scrum - Extreme Programming - Feature Driven development - Lean Software Development - Agile project management - Design and development practices in Agile projects - Test Driven Development - Continuous Integration – Refactoring - Pair Programming - Simple Design - User Stories		
UNIT III	**AGILE SCRUM FRAMEWORK**	**9**
Introduction to Scrum - Project phases - Agile Estimation - Planning game - Product backlog - Sprint backlog - Iteration planning - User story definition - Characteristics and content of user stories - Acceptance tests and Verifying stories - Project velocity - Burn down chart - Sprint planning and retrospective - Daily scrum - Scrum roles - Product Owner - Scrum Master - Scrum Team - Scrum case study - Tools for Agile project management		
UNIT IV	**AGILE TESTING**	**9**
The Agile lifecycle and its impact on testing - Test-Driven Development (TDD) - xUnit framework and tools for TDD - Testing user stories - acceptance tests and scenarios - Planning and managing testing cycle - Exploratory testing - Risk based testing - Regression tests - Test Automation - Tools to support the Agile tester		
UNIT V	**AGILE SOFTWARE DESIGN AND DEVELOPMENT**	**9**
Agile design practices - Role of design Principles including Single Responsibility Principle - Open Closed Principle - Liskov Substitution Principle - Interface Segregation Principles - Dependency Inversion Principle in Agile Design - Need and significance of Refactoring - Refactoring Techniques - Continuous Integration - Automated build tools - Version control		

Text Book (s)

1	Roger S. Pressman, —Software Engineering – A Practitioner"s Approach‖, Seventh Edition, Mc Graw-Hill International Edition, 2010.
2	Ken Schawber, Mike Beedle," Agile Software Development with Scrum", Pearson Edition 1, 2008.
3	Lisa Crispin, Janet Gregory," Agile Testing: A Practical Guide for Testers and Agile Teams", Addison Wesley, 2008.

Reference (s)

1	Robert C. Martin," Agile Software Development, Principles, Patterns and Practices", Pearson Edition 1, 2013.
2	Alistair Cockburn, "Agile Software Development", Second Edition, Pearson Education Asia, 2006.

Regulation 2018		Semester III	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
C	18ITC203J	Object Oriented Programming	3	0	2	4

Prerequisite Course (s)

Programming for problem solving

Course Objective (s):

The purpose of learning this course is to:

1	Understand Object Oriented Programming concepts and basic characteristics of Java
2	Understand the principles of packages, inheritance and interfaces
3	Define exceptions and use I/O streams
4	Develop a java application with threads and generics classes
5	Design and build simple Graphical User Interfaces

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Develop Programs using OOP principles
CO2	Develop Programs with the concepts inheritance and interfaces
CO3	Build Applications using exceptions and I/O streams
CO4	Develop Applications with threads and generics classes
CO5	Develop interactive Java programs

COPO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2			3								2	2	
CO2	2	2			2								2	2	
CO3	2	2			2							2	2	2	
CO4	2	2										2	2	2	
CO5	3	3										3	2	2	
CO (Avg)	2.4	2.2			2.33							2.33	2	2	

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	INTRODUCTION TO OOP AND JAVA FUNDAMENTALS	10
Object Oriented Programming and Evolution of Java-Program Structures in Java-Datatypes, Variables and Opearators-Control Statements – Classes and Objects – Methods - Arrays.		
UNIT II	**INHERITANCE AND INTERFACES**	**9**
Inheritance – Interfaces – Packages and Java Library – String Handling .		
UNIT III	**EXCEPTION HANDLING AND I/O**	**8**
Exceptions Handling - Input / Output Basics –Streams –Byte streams and Character streams – Reading and Writing Console –Reading and Writing Files		
UNIT IV	**MULTITHREADING AND GENERIC PROGRAMMING**	**9**
Multithread Programming (Differences Between Multithreading and Multitasking, Thread Life Cycle, Creating Threads, Synchronizing Threads, Interthread communication, Daemon threads, Thread groups). Generic Programming –Generic Classes –Generic Methods –Bounded Types – Restrictions and Limitations		
UNIT V	**COLLECTIONS AND EVENT DRIVEN PROGRAMMING**	**9**
Collection (Array List,Tree,Set,Map,Stack,Queue) – Event Handling – Applet – Creating GUI in AWT Windows(Basic Components and Layout Manager).		

Text Book (s)	
1	Herbert Schildt, "Java The complete reference", 8th Edition, McGraw Hill Education, 2011
2	Cay S. Horstmann, Gary cornell, "Core Java Volume –I Fundamentals", 9th Edition, Prentice Hall, 2013.
Reference (s)	
1	Paul Deitel, Harvey Deitel, "Java SE 8 for programmers", 3rdEdition, Pearson, 2015.
2	Steven Holzner, "Java 2 Black book", Dreamtech press, 2011.
3	Timothy Budd, "Understanding Objectoriented programming with Java", Updated Edition, Pearson Education, 2000.

LIST OF EXPERIMENTS	**15**

1. Develop application to generate Electricity bill. Create a class with the following members: Consumer no., consumer name, previous month reading, current month reading,type of EB connection(i.e domestic or commercial). Compute the bill amount using the following tariff.

If the type of the EB connection is domestic, calculate the amount to be paid as follows:

- First 100 units Rs. 1 per unit
- 101200 units Rs. 2.50 per unit
- 201 500 units Rs. 4 per unit
- >501 units Rs. 6 per unit

If the type of the EB connection is commercial, calculate the amount to be paid as follows:

- First 100 units Rs. 2 per unit
- 101200 units Rs. 4.50 per unit
- 201 500 units Rs. 6 per unit
- > 501 units Rs. 7 per unit

2. Develop application to implement currency converter (Dollar to INR, EURO to INR, Yen to INR and vice versa), distance converter (meter to KM, miles to KM and vice versa) , time converter (hours to minutes, seconds and vice versa) using packages.

3. Develop application with Employee class with Emp_name, Emp_id, Address, Mail_id, Mobile_no as members. Inherit the classes, Programmer, Assistant Professor, Associate Professor and Professor from employee class. Add Basic Pay (BP) as the member of all the inherited classes with 97% of BP as DA, 10 % of BP as HRA, 12% of BP as PF, 0.1% of BP for

staff club fund. Generate pay slips for the employees with their gross and net salary.

4. Design interface for ADT Stack. Implement this interface using array. Provide

necessary exception handling in both the implementations.

5. Write a program to perform string operations using Array List. Write functions for the following

a) Append add at end
b) Insert – add at particular index
c) Search
d) List all string starts with given letter

6. Write a Program to create an abstract class named Shape that contains two integers and an empty method named print Area(). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.

7. Write a program to implement user defined exception handling.

8. Write a program that reads a file name from the user, displays information about whether the file exists, whether the file is readable, or writable, the type of file and the length of the file in bytes.

9. Write a program that implements a multithreaded application that has three threads. First thread generates a random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.

10. Write a program to find the maximum value from the given type of elements using a generic function.

11. Design calculator using eventdriven programming paradigm with the following options.

a) Decimal manipulations
b) Scientific manipulations

12. Develop a mini project for any application using OOPS concepts.

Regulation 2018		Semester III	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
C	18ITC204T	Computer Organization and Architecture	3	0	0	3

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

1	Provide introduction to basic structure of computers
2	Understand the working of the arithmetic unit
3	Infer the basic knowledge on the fundamentals of Basic Processing unit
4	Acquire knowledge on the need and importance of Instruction Level Parallelism
5	Familiarize the various memory technologies and I/O systems

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Illustrate the basic concepts and structure of computers
CO2	Summarize the working of the arithmetic units and its operations
CO3	Infer the fundamental concepts of Basic Processing Unit
CO4	Illustrate the need and importance of Instruction level parallelism
CO5	Classify the various memory technologies and the I/O systems

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	-	-	-	-	-	-	1	-	-	2	3	1	1
CO2	3	2	-	2	-	-	-	-	1	-	-	2	3	1	1
CO3	3	2	-	2	-	-	-	-	1	-	-	2	3	1	1
CO4	3	2	-	2	-	-	-	-	1	-	-	2	3	1	1
CO5	3	1	-	-	-	-	-	-	1	-	-	2	3	1	1
CO (Avg)	3	1.6	-	2.00	-	-	-	-	1	-	-	2.00	3	1	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

M.K. COLLEGE OF ENGG. (AUTONOMOUS)
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Board of Information Technology On
25 MAR 2019
KARUR-639 113.

UNIT I	BASIC STRUCTURE OF COMPUTERS	9
Functional units – Basic operational concepts - Bus structures – Software performance – Performance- Metrics-Amdahl's Law-Memory locations and addresses – Memory operations – Instruction and instruction sequencing – Addressing modes Instruction Set Architecture		
UNIT II	**ARITHMETIC UNIT**	**9**
Addition and subtraction of signed numbers – Design of fast adders –Multiplication of positive numbers – Signed operand multiplication and fast multiplication – Integer division – Floating point numbers and operations.		
UNIT III	**BASIC PROCESSING UNIT**	**9**
Fundamental concepts – Execution of a complete instruction – Multiple bus organization – Hardwired control –Micro programmed control – Pipelining –Basic concepts – Data hazards – Instruction hazards –Control Hazards-Exceptions		
UNIT IV	**PARALLELISM**	**9**
Instruction Level Parallelism – Parallel processing challenges – Flynn's classification – Hardware multithreading – Multicore processors.		
UNIT V	**MEMORY AND I/O SYSTEMS**	**9**
Memory hierarchy – Memory technologies – Cache basics – Measuring and improving cache performance – Virtual memory, TLBs – Input/output system, programmed I/O, DMA and interrupts, I/O processors.		

Text Book (s)

1	Carl Hamacher, Zvonko Vranesic, Safwat Zaky, "Computer Organization", McGraw-Hill, Fifth Edition, Reprint 2012.
2	David A. Patterson and John L. Hennessy, "Computer Architecture-A Quantitative Approach", Elsevier, a division of reed India Private Limited, Fifth edition, 2012.

Reference (s)

1	William Stallings "Computer Organization and Architecture", Seventh Edition , Pearson Education, 2006.
2	Ghosh T. K., "Computer Organization and Architecture", Tata McGraw-Hill, Third Edition, 2011.
3	John P. Hayes, "Computer Architecture and Organization", Tata McGraw Hill, Third Edition, 1998.
4	V.P. Heuring, H.F. Jordan, "Computer Systems Design and Architecture", Second Edition, Pearson Education, 2004.
5	Vincent P. Heuring, Harry F. Jordan, "Computer System Architecture", Second Edition, Pearson Education, 2005.

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Regulation 2018		Semester III	Total Hours			30
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
M	18MBM201L	COMPETENCIES IN SOCIAL SKILLS	0	0	2	1

Course Objective (s):

The purpose of learning this course is to:

1	To sharpen problem solving skill and to improve thinking capability of the students
2	To hone soft skill and analytical ability of students
3	To engage learners in using language purposefully and cooperatively
4	To expertise the writing and presentation skill to fulfill the corporate expectations

Course Outcome (s) (Cos):

At the end of this course, learners will be able to:

CO1	Students should be able to solve both analytical and logical problems in an effective manner
CO2	Students can design and deliver information in a proper manner
CO3	Presentation skills of students will be improved individually as well as a team member

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	-	-	-	2	2	-
CO2	-	-	-	-	-	-	-	-	-	2	-	-	2	2	-
CO3	-	-	-	-	-	-	-	-	2	-	-	-	2	2	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO (Avg)	3.00	-	-	-	-	-	-	-	2.00	2.00	-	-	2.00	2.00	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

M.KUMARASAMY COLLEGE OF ENGG.(AUTONOMOUS) Approved By Board of Information Technology On 25 MAR 2019 KARUR-639 113.

UNIT I	Module - 1	6
Aptitude: Coding & Decoding - Direction Sense Test. **Communication:** Self-Introduction and SWOT analysis - Letter writing - types.		
UNIT II	**Module - 2**	**6**
Aptitude: Venn Diagrams - Data Interpretation. **Communication:** Phrasal verbs - Voice of Valluvar.		
UNIT III	**Module - 3**	**6**
Aptitude: Averages. **Communication:** Idioms and Phrases - Skits.		
UNIT IV	**Module - 4**	**6**
Aptitude: Time and Distance - Problems on Trains. **Communication:** Prefix/Suffix - Root words - Adjectives - JAM (Extempore Speech).		
UNIT V	**Module - 5**	**6**
Aptitude: Clocks & Calendars. **Communication:** Homophones - Frame Tales.		

Text Book (s)

1	Dr.R.S.Aggarwal, "Quantitative Aptitude", S. Chand & Company Limited, 2015
2	Dr.R.S.Aggarwal, "A Modern Approach to Verbal & Non - Verbal Reasoning", S. Chand & Company Limited, 2015

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Board of Information Technology On
25 MAR 2019
KARUR-639113.

Regulation 2018		Semester	Total Hours			60
			Hours / Week			C
Category	Course Code	Course Name	L	T	P	
M	18CYM201T	Environmental Science	1	0	0	-

Prerequisite Course (s)

NIL

Course Objective (s):

The purpose of learning this course is to:

- To demonstrate in-depth knowledge within environmental engineering and an awareness of social, economic, political, and environmental impacts of engineering practices.
- To have competence for working with multi-disciplinary teams to arrive at solutions to environmental engineering problems.
- To get solutions which will minimize the negative impact of human activities on the environment and to protect human health

Course Outcome (s) (Cos):

At the end of this course, learners will be able to:

CO1	Improve fundamental knowledge of the inter-relationships between the built environment and natural systems
CO2	Characterize and mitigate man-made hazards like nuclear hazards. Understand the principles involved in the generation of different forms of energy
CO3	Improve the reliability, performance, disaster-management of natural calamities and solid waste and water supplies and treatment processes.
CO4	Understand the source, effects and control measure of various environmental pollution
CO5	Apply information technology in the control of human population and women and child welfare

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	2	-	-	-	-	3	-	-	-	-	-	-	-	-
CO2	-	2	-	-	-	3	3	-	-	-	-	-	-	-	-
CO3	-	2	-	2	-	3	3	-	-	-	-	-	-	-	-
CO4	-	2	-	-	-	3	3	2	-	-	-	-	-	-	-
CO5	-	2	-	2	-	3	3	-	-	-	-	-	-	-	2
CO (Avg)	-	2.00	-	2.00	-	3.00	3.00	2.00	-	-	-	-	-	-	2.00

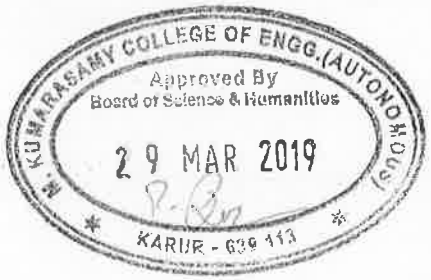
1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

M.KUMARASAMY COLLEGE OF ENGG (AUTONOMOUS) KARUR
Approved By
Board of Science & Humanities
29 MAR 2019

UNIT I	**ENVIRONMENT& BIODIVERSITY**	3
Definition-types of environment, components of environment, scope-importance of environmental studies- Bio diversity-definition-value of biodiversity-Threats to biodiversity - India a mega diversity nation-endangered and endemic species of India-conservation of		
UNIT II	**ENERGY SOURCES**	3
Energy resources- Growing energy needs- Renewable and Nonrenewable energy sources- Use of alternate energy sources - Nuclear Energy- Alternative energy fuels-power alcohol-Bio diesel (preparation, properties &uses)		
UNIT III	**SOCIAL ISSUES AND ENVIRONMENT**	3
Environment ethics – Climate change – Global warming – Acid rain – Ozone layer depletion –Nuclear accidents-holocaust. Solid waste management - Rain water Harvesting-watershed management-		
UNIT IV	**ENVIRONMENTAL POLLUTION & ACTs**	3
Source, types, effects & control- Air pollution -Water pollution – Soil pollution – Marine pollution and Plastic Pollution -The Environment (Protection) Act - Air (Prevention and control of pollution) Act - Water (Prevention and control of pollution) Act- Role of individual in prevention of pollution.		
UNIT V	**HUMAN POPULATION AND ENVIRONMENT**	3
Sustainable development – Urban Population growth and distribution – Population explosion – Family Welfare Program –Women and child welfare- Role of information technology in environment and human health- case studies		

Text / Reference (s) books:

1	Dr.J.P.Sharma, " Environmental studies" , Laxmi Publications(p) Ltd, New Delhi.
2	Miller "Environmental Science" 11th Edition, Cengage Learning India Private Limited, New Delhi, (2006).
3	Master. G.M., "Introduction to Environmental Engineering and Science", Pearson Education Pvt Ltd., (2004)
4	Dr.A.Ravikrishnan " Environmental Science and Engineering " Sri Krishna publications, Chennai(2015)
5	P.Anandan, R.Kumaravelan "Environmental Science and Engineering" Scitech Publication (India) Pvt. Ltd, Chennai, Reprint 2009.



Regulation 2018		Semester IV	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
B	18MAB206T	DISCRETE MATHEMATICS (B.E CSE & B.TECH IT)	3	1	0	4

Prerequisite Course (s)

NIL

Course Objective (s):

The purpose of learning this course is to:

1	Obtain general knowledge about the area of discrete mathematics
2	Understand a variety of methods and to construct mathematical proofs
3	Model situations in a mathematical way and derive useful results

Course Outcome (s) (Cos):

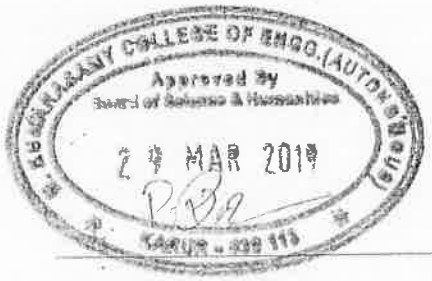
At the end of this course, learners will be able to:

CO1	Demonstrate their knowledge in propositional calculus
CO2	Demonstrate their knowledge in predicate calculus
CO3	Obtain the perception in the area of sets and the knowledge about functions.
CO4	Obtain perception in the area of combinatorics
CO5	Obtain perception in the area of graph theory

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	1	-	-	-	-	-	-	-	-	2	2	2
CO2	3	2	1	1	-	-	-	-	-	-	-	-	2	1	1
CO3	2	1	1	-	-	-	-	-	-	-	-	-	2	2	2
CO4	2	1	1	-	-	-	-	-	-	-	-	-	2	1	1
CO5	3	2	2	1	-	-	-	-	-	-	-	-	3	2	2
CO (Avg)	2.6	1.6	1.2	1	-	-	-	-	-	-	-	-	2.2	1.6	1.6

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)



UNIT I	PROPOSITIONAL CALCULUS	9* + 3*
Propositions- Logical connectives-Compound propositions-Conditional and biconditional propositions- Truth tables - Tautologies and Contradictions - Logical and equivalences and implications - DeMorgan's Laws-Normal forms-Principal conjunctive and disjunctive normal forms - Rules of inference-Arguments-Validity of arguments.		
UNIT II	PREDICATE CALCULUS	9* + 3*
Predicates-Statement Function -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-Validity of arguments.		
UNIT III	SET THEORY AND FUNCTIONS	9* + 3*
Set Operations-properties-Power set-Relations-Graph and matrix of a relation- Partial Ordering- Equivalence relations-Partitions- Functions -Types of Functions- composition of relation and functions- inverse functions.		
UNIT IV	COMBINATORICS	9* + 3*
Basics of Counting - Counting arguments- Pigeonhole Principle- Permutations and Combinations- Recursion and recurrence relations-Generating Functions- Mathematical Induction- Inclusion -Exclusion		
UNIT V	GRAPH THEORY	9* + 3*
Introduction to Graphs-Graph operations- Graph and Matrices-Graph Isomorphism- Connected Graphs- Euler Graphs- Hamilton paths and circuits- planar Graph-Graph colouring-Trees- Shortest path problem-Directed and Undirected Graphs- Flows in Networks.		

Text Book (s)	
1	Trembly J.P and Manohar R, —Discrete Mathematical Structures with Applications to Computer Science‖, Tata McGraw–Hill Pub. Co. Ltd, New Delhi, 2003.
2	Ralph. P. Grimaldi, —Discrete and Combinatorial Mathematics: An Applied Introduction‖, Fourth Edition, Pearson Education Asia, Delhi, 2002.
Reference (s)	
1	Kenneth H Rosen, Discrete Mathematics and its Applications with Combinatorics and Graph Theory, Seventh Edition, McGraw Hill Education India Private Limited, New Delhi, 2013.
2	A.Doerr and K.Levasseur, Applied Discrete Structures, Galgotia Publication, New Delhi, 2004.
3	Gilbert Strang, "Introduction to Linear Algebra", 4th edition Wellesley- Cambridge Press, 2009.
4	Johnsonbaugh, Richard, Discrete Mathematics, Sixth Edition, Maxwell, International Edition, 2006.

Regulation 2018		Semester IV	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
S	18ITS202J	Embedded Systems	2	0	2	3

Prerequisite Course (s)

Analog and Digital Communication

Computer Organization and Architecture

Course Objective (s):

The purpose of learning this course is to:

1	Explain about embedded processor, its hardware and software
2	Summarize the programming concepts and embedded programming in C and assembly language
3	Explain real time operating systems, inter task communication
4	Develop application using embedded software development tools

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Describe the differences between the general computing system and the embedded system, also recognize the classification of embedded systems.
CO2	Explain the architecture of the ATOM processor and its programming aspects
CO3	Describe the interrupts, hyper threading and software optimization
CO4	Design real time embedded systems using the concepts of RTOS
CO5	Analyze various examples of embedded systems based on ATOM processor

CO-PO Mapping

Cos	Pos												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO	PSO
CO1	3	2	1										2	2	
CO2	3	2	1										2	2	
CO3	3	2	2		2				2			2	2	2	
CO4	3	2	2		2				2			2	2	2	
CO5	3	2	2		2				2			2	2	2	
CO (Avg)	3	2	1.6		2				2			2	2	2	

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

UNIT I	EMBEDDED COMPUTING	6
Challenges of Embedded Systems – Embedded system design process. Embedded processors –ARM processor – Architecture, Instruction sets and programming.		
UNIT II	MEMORY AND INPUT / OUTPUT MANAGEMENT	6
Programming Input and Output – Memory system mechanisms – Memory and I/O devices and interfacing – Interrupts handling.		
UNIT III	PROCESSES AND OPERATING SYSTEMS	6
Multiple tasks and processes – Context switching – Scheduling policies – Inter process communication mechanisms – Performance issues.		
UNIT IV	EMBEDDED SOFTWARE	6
Programming embedded systems in assembly and C – Meeting real time constraints – Multi-state systems and function sequences. Embedded software development tools – Emulators and debuggers		
UNIT V	EMBEDDED SYSTEM DEVELOPMENT	6
Design issues and techniques – Case studies		
	LIST OF EXPERIMENTS	15

1. Interfacing ADC .
2. Interfacing LED and PWM.
3. Interfacing Remote Control.
4. Interfacing Keyboard and LCD.
5. Interfacing EPROM and interrupt.
6. Interfacing Temperature Sensor.
7. Seven Segment Display.
8. Flashing of LEDS.
9. Interfacing Vibration Sensor
10. Interfacing stepper motor.

Text Book (s)

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

Reference (s)

1	Steve Heath, "Embedded System Design", Elsevier, 2005
2	Muhammed Ali Mazidi, Janice Gillispie Mazidi and Rolin D. McKinlay, "The 8051 Microcontroller

M. KUMARASAMY COLLEGE OF ENGG. (AUTONOMOUS) Approved By Board of Information Technology On 25 MAR 2019 KARUR-639 113.

Regulation 2018		Semester IV	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
C	18ITC205T	Object Oriented Analysis And Design	3	0	0	3

Prerequisite Course (s)

Agile Development Methodology

Course Objective (s):

The purpose of learning this course is to:

1	Understand the Object-based view of Systems
2	Develop robust object-based models for Systems
3	Inculcate necessary skills to handle complexity in software design

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Understand the fundamentals of object oriented analysis and design.
CO2	Understand various object oriented concepts and methodologies.
CO3	Build object oriented analysis model using UML.
CO4	Identify design requirements by creating a design model.
CO5	Apply the concepts of refinement, iteration, reusability in Object Oriented Software Development.

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	2	1	-	-	-	-	-	1	3	3	3
CO2	3	3	3	2	-	1	1	-	-	-	-	-	3	3	3
CO3	3	3	3	2	-	-	-	-	-	-	-	-	3	3	3
CO4	3	3	2	1	-	2	1	-	-	-	-	2	3	3	2
CO5	3	3	3	2	2	2	1	2	3	3	3	2	3	3	3
CO (Avg)	3	3	2.8	1.8	2	1.5	1	2	3	3	3	1.66	3	3	2.8

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

M.KUMARASAMY COLLEGE OF ENGG. (AUTONOMOUS) Approved By Board of Information Technology On 25 MAR 2019 KARUR-639 113.

UNIT I	FUNDAMENTALS	9
Introduction OOAD – Two Orthogonal Views of the Software - Why object orientation – Object basics – Advanced topics – Object oriented systems development life cycle.		
UNIT II	**OBJECT ORIENTED METHODOLOGIES**	**9**
Rumbaugh methodology – Booch methodology – Jacobson methodology – Patterns – Frameworks – Unified approach – Unified modeling language – Use case diagram – Class diagram – Sequence diagram – Activity diagram.		
UNIT III	**OBJECT ORIENTED ANALYSIS**	**9**
Identifying use cases –Object analysis : Classification - Identifying object relationships – Attributes and methods.		
UNIT IV	**OBJECT ORIENTED DESIGN**	**9**
Design axioms – Designing classes – Object storage – Introduction – Object store and persistence overview – Database Management Systems - Object oriented Database Management Systems – Object relational systems.		
UNIT V	**SOFTWARE QUALITY AND USABILITY**	**9**
Introduction to SQA – Quality Assurance Tests – Testing Strategies – Impact of object orientation on Testing – Test cases-Test Plan – System usability and measuring user satisfaction		

Text Book (s)

1	Ali Bahrami, "Object Oriented Systems Development", Tata McGraw - Hill, 1999.
2	Martin Fowler, "UML Distilled", 2nd Edition, Prentice Hall of India / Pearson Education, 2002

Reference (s)

1	Stephen R. Schach, "Introduction to Object Oriented Analysis and Design", Tata McGraw - Hill, 2003.
2	James Rumbaugh, Ivar Jacobson and Grady Booch "The Unified Modeling Language Reference Manual", Addison Wesley, 1999.
3	Barclay, "Object-Oriented Design with UML and Java", Elsevier, 2008.

M.KUMARASAMY COLLEGE OF ENGG.(AUTONOMOUS) Approved By Board of Information Technology On 25 MAR 2019 KARUR-639 113.

Regulation 2018		Semester IV	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
C	18ITC206J	Computer Networks	3	0	2	4

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

1	Explain the layers of OSI model
2	Solve subnet and VLSM problems
3	Illustrate the application layer protocols

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Select the required topology for a network.
CO2	Analyze the various error detection and correction methods in data communication.
CO3	Design computer networks using sub-netting and routing concepts.
CO4	Apply the congestion control techniques for the data networks to improve the quality of service.
CO5	Identify the application layer protocols required to build applications.

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2											3		
CO2	2	1	2										2		
CO3	3	2	3		2			2					3	1	2
CO4	2		2										2	1	
CO5	2		2									2		2	
CO (Avg)	2.4	1.66	2.3		2			2				2	2	1.33	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	Fundamentals and Physical Layer	9
Evolution of Computer networks-Categories of networks-Network Topology- Network devices: modems, HUB, Bridge, Switches, Routers, Gateways -Layered Network Architecture - OSI, TCP/IP-Multiplexing - Transmission media		
UNIT II	**Data Link Layer**	**9**
LAN Techonologies (Ethernet, Token Ring) - WAN Technologies (Frame Relay) - Framing - Error control - flow control – Media access control		
UNIT III	**Network Layer**	**9**
IPV4- Addressing, Subnetting, VLSM, CIDR - IPV6 Addressing (Structure and Address Space) - ARP - ICMP - Routing protocols - Distance Vector - Link state		
UNIT IV	**Transport Layer**	**9**
Overview of Transport layer-UDP-TCP-Reliable byte stream-connection management –flow control-congestion control-congestion avoidance		
UNIT V	**Application Layer Protocols And Network Performance Measures**	**9**
Web and HTTP - FTP- DNS – SMTP – POP - SNMP - Bandwidth – latency – Throughput - Jitter – Delay		
LIST OF EXPERIMENTS		**15**

1. Study of CISCO packet tracer
2. Study of Network devices and Network cables
3. Demonstrate how traffic is sent between nodes in a LAN
4. Demonstrate how traffic is sent between nodes in a WAN
5. Make use of Sub-netting and Simulate computer communication network for an organization
6. Implement VLAN for a computer network
7. Configure DHCP server
8. DNS configuration
9. E-mail server configuration
10. FTP configuration

Text Book (s)

1	Behrouz A.Ferouzan,"Data Communications and Networking", Fifth Edition, Tata McGraw-Hill Publication, 2013.
2	Larry L. Peterson, Bruce S. Davie, "Computer Networks: A Systems Approach", Fifth Edition, Morgan Kaufmann Publishers Inc., 2011.

M.KUMARASAMY COLLEGE OF ENGG. (AUTONOMOUS)
Approved By
Board of Information Technology On
25 MAR 2019
KARUR-639 113.

Reference (s)	
1	William Stallings, "Data and Computer Communications", Tenth edition, Pearson Education, 2013.
2	James F. Kurose, Keith W. Ross, "Computer Networking, A Top–Down Approach Featuring the Internet", Sixth edition, Pearson Education, 2012.
3	Nader. F. Mir, —Computer and Communication Networksl, Pearson Prentice Hall Publishers, 2010.

Regulation 2018		Semester IV	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
C	18ITC207J	Database Management Systems	3	0	2	4

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

1	Introduce Database concepts and models
2	Access the Relational Database using SQL queries
3	Understand Transaction processing and concurrency control

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Differentiate Database systems from file systems
CO2	Construct queries to manipulate data in Database
CO3	Illustrate the conditions of Normal forms
CO4	Interpret the issues of Transaction Processing
CO5	Demonstrate an understanding of Storage and Recovery

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2		2										2		
CO2	3	2	3		2				2			2	1	2	
CO3	2	2	3										2	1	
CO4	2		3	2									1		
CO5	3		2					2					3		1
CO (Avg)	2.4	2	2.6	2	2			2	2			2	1.8	1.5	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	DATABASE SYSTEMS AND ER-MODEL	9
The Evolution of Database Systems and DBMS - Overview of a Database Management System – Views of data – Data Models - Database System Architecture – Data Models – Entity Relationship model – ER Model: Objects-Attributes and its type-Entity and Relationship-Design issues of ER model- Constraints.		
UNIT II	**RELATIONAL MODEL AND SQL**	**9**
Relational model Concepts - Keys – Tabular representation of various ER schema - Overview of query processing - Relational Algebra – Basic operations - SQL overview - Basic SQL Query - Nested queries - Correlated and Aggregate functions - Integrity constraints in SQL - Embedded SQL		
UNIT III	**NORMALIZATION**	**9**
Problem encountered with bad schema design - functional dependencies - Decomposition - Motivation for normal forms -Normalization (INF, 2NF, 3NF, BCNF) - Multivalued dependencies (4NF) - Join dependencies (5NF)		
UNIT IV	**TRANSACTION PROCESSING**	**9**
Introduction to Transactions - ACID Properties – Serializability and Recoverability - Conflict Serializability - Concurrency Control Techniques - Two Phase locking mechanism, Timestamp based protocol – Deadlock Detection and Management		
UNIT V	**RECOVERY AND STORAGE**	**9**
Types of failures - Undo, Redo Techniques - Log based Recovery - Shadow paging Techniques - ARIES Recovery algorithm - Overview of primary and secondary storage media - File organization – RAID - Data Dictionary Storage		
LIST OF EXPERIMENTS		**15**
1. Data Definition Language (DDL) commands 2. Data Manipulation Language (DML) and Data Control Language (DCL) 3. Constraints and Views 4. Joins and Nested Queries 5. High level language extensions Procedures and Functions 6. High level language extensions with Cursors and Triggers 7. Embedded SQL 8. Study of E-R model and Normalization 9. Database Connectivity Using PHP/Python/Java		
Text Book (s)		
1	Abraham Silberschatz, Henry Korth, and S. Sudarshan, Database System Concepts, Sixth edition, McGraw-Hill.2011.	

M.KUMARASAMY COLLEGE OF ENGG. (AUTONOMOUS)
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Board of Information Technology On
25 MAR 2019
KARUR-639113.

2	R. Elmasri and S. Navathe, Fundamentals of Database Systems, Sixth Edition, Pearson Education, 2011.
Reference (s)	
1	Gupta G K, "Database Management Systems", Tata McGraw Hill Education Private Limited, New Delhi, 2011.
2	Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", Sixth Edition, Pearson / Addision Wesley, 2010.
3	Raghu Ramakrishnan, Johannes Gehrke "Database Management Systems", Third Edition, McGrawHill, 2007.
4	Date C.J, An Introduction to Database, Addison-Wesley Pub Co, 8thEdition, 2006.
5	Thomas M. Connolly and Carolyn E. Begg, "Database Systems - A Practical Approach to Design, Implementation, and Management", fifth edition, Pearson Education, 2010.

Regulation 2018		Semester IV	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
C	18ITC208T	OPERATING SYSTEMS	3	0	0	3

Prerequisite Course (s)

Computer Architecture

Course Objective (s):

The purpose of learning this course is to:

1	Understand the different services provided by the operating systems
2	Provide the students the basic knowledge about the operating system concepts
3	Analyze the various algorithms used by operating systems to perform its activities
4	Familiarize the various management policies adopted by the operating systems

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Recall the various basic concepts of operating systems and Process scheduling.
CO2	Classify various CPU scheduling algorithms and Process Synchronization problems
CO3	Summarize the characteristics of Deadlock and various Memory Management techniques
CO4	Classify the various types of File systems and Disk Scheduling Algorithms
CO5	Illustrate the various concepts on virtualization

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	-	-	-	-	-	-	1	-	-	2	3	1	1
CO2	3	2	-	2	-	-	-	-	1	-	-	2	3	1	1
CO3	3	2	-	2	-	-	-	-	1	-	-	2	3	1	1
CO4	3	2	-	2	-	-	-	-	1	-	-	2	3	1	1
CO5	3	1	-	-	-	-	-	-	1	-	-	2	3	1	1
CO (Avg)	3	1.6	-	2.00	-	-	-	-	1	-	-	2.00	3	1	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

M.KUMARASAMY COLLEGE OF ENGG. (AUTONOMOUS) Approved By Board of Information Technology On 25 MAR 2019 KARUR-639 113.

UNIT I	OVERVIEW OF OPERATING SYSTEMS	9
Operating system-Types of Computer Systems-System components-System calls-system programs-System Structure-Process concept-Process scheduling-Operations on processes-Cooperating processes-Inter process Communication-Thread-Multithreading model-Threading issues.		
UNIT II	**CPU SCHEDULING AND PROCESS SYNCHRONIZATION**	**9**
Scheduling criteria-Scheduling Algorithms-Algorithm evaluation-Critical section problem-Synchronization hardware-semaphores-Classical problem of synchronization-Critical region-Monitors.		
UNIT III	**DEADLOCK AND MEMORY MANAGEMENT**	**9**
Deadlock-System Model-Deadlock characteristic-Methods of handling deadlocks-Recovery from Deadlock-Memory Management-Swapping-contiguous memory allocation-Paging-Page tables-Segmentation -Segmentation with paging. Virtual memory-Demand paging-Page replacements-Page replacement –Allocation of frames-Thrashing-causes of thrashing		
UNIT IV	**FILE SYSTEMS & SECONDARY STORAGE**	**9**
File concept-Access methods- Directory structure-File system mounting-directory implementation-Allocation Methods-Free space Management-Disk scheduling-Disk Management-Case study in Linux		
UNIT V	**VIRTUALIZATION**	**9**
Virtual machines; supporting multiple operating systems simultaneously on a single hardware platform-running one operating system on another-Reducing the software engineering effort of developing operating systems for new hardware architectures. Types of virtualization-optimizing performance of virtualization-hypervisor call interface		

Text Book (s)

1	Silberschatz, Galvin & Gagne,"Operating System concepts," Ninth edition.JohnWiley & Sons Inc 2012.
2	Operating Systems:Internals and Deign Principles, 9th Edition,William Stallings, Pearson Education India

Reference (s)

1	Andrew S. Tanenbaum,"Modern Operating System",Fourth edition,Addison Wesley,2014.
2	Gary Nutt,"Operating Systems",Third edition,Addison Wesley,2004.
3	H.M.Deital, PJ Deital and DR Choffnes,"Operating Systems",Pearson Education,2004

Regulation 2018		Semester IV	Total Hours			30
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
M	18MBM202L	CRITICAL AND CREATIVE THINKING SKILLS	0	0	2	1

Course Objective (s):

The purpose of learning this course is to:

1	To focus on listening, speaking, & writing skills through audio & video sessions
2	To hone soft skill and analytical ability of students
3	To overcome the fear in group communication and to provide the effective communication
4	To expertise intelligible pronunciation, stress and intonation patterns

Course Outcome (s) (Cos):

At the end of this course, learners will be able to:

CO1	Students can be able to solve both analytical and logical problems in an effective manner
CO2	Students can demonstrate an ability to design and deliver messages
CO3	The quality of student's communication with practical experience is improved

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	-	-	-	2	2	-
CO2	-	-	-	-	-	-	-	-	-	2	-	-	2	2	-
CO3	-	-	-	-	-	-	-	-	-	2	-	-	2	2	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO (Avg)	3.00	-	-	-	-	-	-	-	-	2.00	-	-	2.00	2.00	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	**Module - 1**	**6**
Aptitude: Time and Work - Pipes and Cisterns. **Communication:** Sentence Pattern - Debate.		
UNIT II	**Module - 2**	**6**
Aptitude: Boats and Streams. **Communication:** Tenses and voices - Tech Talk.		
UNIT III	**Module - 3**	**6**
Aptitude: Problems on Ages - Probability **Communication:** Analogies - Biography.		
UNIT IV	**Module - 4**	**6**
Aptitude: Data sufficiency - Logical Puzzles. **Communication:** Punctuation - Connection.		
UNIT V	**Module - 5**	**6**
Aptitude: Mensuration. **Communication:** Preposition - News of the Week.		
Text Book (s)		
1	Dr.R.S.Aggarwal, "Quantitative Aptitude", S. Chand & Company Limited, 2015	
2	Dr.R.S.Aggarwal, "A Modern Approach to Verbal & Non - Verbal Reasoning", S. Chand & Company Limited, 2015	

M.KUMARASAMY COLLEGE OF ENGG. (AUTONOMOUS)
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25 MAR 2019
KARUR - 639 113.

Regulation 2018		Semester IV	Total Hours			15
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
M	18LEM103T	INDIAN TRADITION AND HERITAGE	1	0	0	-

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

CLR-1	Make students understand the role and impact of culture in human life.
CLR-2	Draw attention towards languages and literatures of ancient period.
CLR-3	Cultivate secularism in students
CLR-4	Equip students with the knowledge of Indian art and architectural evolution over years.
CLR-5	Make students identify Indian culture in abroad.

Course Outcome (s) (Cos):

At the end of this course, learners will be able to:

CO1	Understand the meaning of culture, trace the influence and significance of geographical features on Indian culture.
CO2	Develop an awareness of the variety of languages and literatures in India.
CO3	Recognise the characteristics of various religious movements in ancient India.
CO4	Identify the characteristics and various styles of Indian architecture and sculpture at different times.
CO5	Examine various modes through which Indian culture spread abroad.

CO-PO Mapping

COs	POs												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	-	-	-	-	-	2	2	2	2	2	-	2	-	-	-
CO2	-	-	-	-	-	2	2	1	2	2	1	2	-	-	-
CO3	-	-	-	-	-	1	1	1	1	1	1	1	-	-	-
CO4	2	2	2	2	2	2	2	2	2	2	1	2	-	-	-
CO5	-	-	-	-	-	2	2	2	2	2	-	2	-	-	-
CO (Avg)	2	2	2	2	2	1.8	1.8	1.6	1.8	1.8	1	1.8	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	HISTORY OF INDIAN CULTURE	2

Characteristics of Indian Culture - Significance of Geography on Indian Culture -Society in India through ages- Ancient Period - Varna and Jati, family and marriage in India - Position of women in ancient India- Contemporary period; Caste system and communalism.

UNIT II	LITERATURE AND EDUCATION	4

M.KUMARASAMY COLLEGE OF ENGG. (AUTONOMOUS) KARUR - 639 113
Approved by Board of Studies & Humanities
29 MAR 2019

Evolution of script and languages in India : Harappan Script and Brahmi Script, Short History of the Sanskrit Literature: The Vedas, The Brahmanas and Upanishads and Sutras, Epics: Ramayana and Mahabharata&Puranas - History of Buddhist and Jain Literature in Pali, Prakrit and Sanskrit, Sangam Literature and Odia Literature.		
UNIT III	**RELIGION AND PHILOSOPHY**	**4**
Religion and Philosophy in India: Ancient Period: Pre-Vedic and Vedic Religion, Buddhism and Jainisim, Indian Philosophy - Vedanta and Mimansa school of Philosophy.		
UNIT IV	**ART AND ARCHITECTURE**	**2**
Indian Art & Architecture: Gandhara School and Mathura School of Art; Hindu Temple Architecture, Budhhist Architecture, Medieval Architecture and Colonial Architecture, Indian Painting Tradition, Performing Arts: Divisions of Indian classical music: Hindustani and Carnatic, Dances of India, Rise of modern theatre and Indian cinema.		
UNIT V	**SPREAD OF INDIAN CULTURE ABROAD**	**3**
Causes, Significance and Modes of Cultural Exchange - Through Traders, Teachers, Emissaries, Missionaries and Gypsies, Indian Culture in South East Asia, India, Central Asia and Western World through ages.		
Text Book (s)		
	Nil	
Reference (s)		
Chakravarti, Ranabir: Merchants, Merchandise & Merchantmen, in: Prakash, Om (ed.): *The Trading World of the Indian Ocean, 1500-1800* (*History of Science, Philosophy and Culturein Indian Civilization,* ed. by D.P. Chattopadhyaya, vol. III, 7), Pearson, Delhi, 2012.		

M. KUMARASAMY COLLEGE OF ENGG. (AUTONOMOUS)
Approved by
Board of Science & Humanities
29 MAR 2019
KARUR - 639 113

Regulation 2018		Semester V	Total Hours			60
			Hours / Week			C
Category	Course Code	Course Name	L	T	P	
C	18ITC301T	Formal Language and Automata Theory	3	1	0	4

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

1	Give an overview of the theoretical foundations of computer science from the perspective of formal languages
2	illustrate finite state machines to solve problems in computing
3	To explain the hierarchy of problems arising in the computer sciences.
4	To familiarize Regular grammars, context frees grammar..

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Understand the basic concepts of formal languages of finite automata techniques and Solve regular expressions and various problems to minimize FA.
CO2	Apply various languages to construct context free grammar.
CO3	Solve Various problems on PDA using normal form techniques
CO4	Solve various problems on Turing Machine
CO5	Understand the basic concepts of unsolvable problems and Computational Functions

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	1	-	-	-	-	-	-	-	3	3	1	1
CO2	3	3	3	2	-	-	-	-	-	-	-	3	3	1	1
CO3	3	3	3	2	-	-	-	-	-	-	-	3	3	1	1
CO4	3	3	2	3	-	1	-	1	-	-	1	3	3	1	1
CO5	3	3	3	2	-	1	-	1	-	-	1	3	3	1	1
CO (Avg)	3	3	2.6	2	-	1	-	1	-	-	1	3	3	1	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	FINITE AUTOMATA	9
Introduction- Basic Mathematical Notation and techniques- Finite State systems – Basic Definitions –Finite Automaton – DFA & NDFA – Finite Automaton with Є- moves – Regular Languages- Regular Expression – Equivalence of NFA and DFA – Equivalence of NDFA's with and without Є-moves –Equivalence of finite Automaton and regular expressions –Minimization of DFA		
UNIT II	**GRAMMARS**	**9**
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	**PUSH DOWN AUTOMATA**	**9**
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	**TURING MACHINE**	**9**
Definitions of Turing machines – Models – Computable languages and functions –Techniques for Turing machine construction – Multi head and Multi tape Turing Machines – Problems about Turing machine-Chomsky hierarchy of languages.		
UNIT V	**Unsolvable Problems and Computable Functions**	**9**
Primitive recursive functions – Recursive and recursively enumerable languages – Universal Turing machine – Post's correspondence problem - The Halting problem –definition of P and NP problems, NP complete and NP hard Problem		

Text Book (s)

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" McGraw-Hill Education, 01-May-2010

Reference (s)

1	Michael Sipser, "Introduction to the Theory of Computation" Cengage Learning, 2012.
2	Kamala Krithivasan and Rama. R, "Introduction to Formal Languages, Automata Theory and Computation",Pearson Education 2009
3	Peter Linz, "An Introduction to Formal Language and Automata", Third Edition, Narosa Publishers, New Delhi, 2002.

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Regulation 2018		Semester V	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
C	18ITC302J	Software Testing	2	0	2	3

Prerequisite Course (s)

Software Engineering,Agile Development Methodology

Course Objective (s):

The purpose of learning this course is to:

1	Learn the fundamental concepts in software testing .
2	Understand the design of test cases.
3	Understand test management and test automation techniques.
4	Apply test metrics and measurements.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Design test cases suitable for a software development for different domains.
CO2	Identify suitable tests to be carried out.
CO3	Understand the wide variety of testing techniques at various testing levels
CO4	Develop document test plans and test case design.
CO5	Use automatic testing tools.

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	2	-	1	1	-	-	2	-	1	1	3	-	-
CO2	3	2	-	-	-	-	-	-	-	1	-	-	3	-	-
CO3	3	2	1	-	-	-	-	-	-	1	-	-	3	-	-
CO4	3	3	2	-	-	-	-	-	1	-	-	1	3	-	-
CO5	3	3	3	3	-	-	-	-	1	1	-	1	3	-	-
CO (Avg)	3	2.2	1.6	3	1	1	-	-	1.33	1.0	1.0	1	3	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	TESTING FUNDAMENTALS	5
Objectives and Principles - Fundamental Test Process -Test Levels - Establishing a Testing Policy - Structured Approach to Testing -Test Factors - Developing Risk Matrix - Steps in Software Testing Process		
UNIT II	**TESTING TECHNIQUES**	**6**
White Box Testing - Basis Path Testing - Control Structure Testing – Mutation Testing - Black Box Testing - Equivalence Partitioning - Boundary Value Analysis - Testing for Web applications – Content Testing - User Interface Testing - Component Level Testing - Navigation Testing - Configuration Testing		
UNIT III	**LEVELS OF TESTING - I**	**6**
The need for Levels of Testing – Unit Test – Unit Test Planning – Designing the Unit Tests – The Test Harness – Running the Unit tests and Recording results – Integration tests – Designing Integration Tests– Integration Test Planning – Scenario testing – Defect bash elimination System Testing.		
UNIT IV	**LEVELS OF TESTING - II**	**6**
Acceptance testing – Performance testing – Regression Testing – Internationalization testing – Ad-hoc testing – Alpha, Beta Tests – Testing OO systems – Usability and Accessibility testing – Configuration testing – Compatibility testing – Testing the documentation – Website testing.		
UNIT V	**TEST MANAGEMENT**	**7**
People and organizational issues in testing – Organization structures for testing teams – testing services – Test Planning – Test Plan Components – Test Plan Attachments – Locating Test Items – test management – test process – Reporting Test Results – Introducing the test specialist – Skills needed by a test specialist – Building a Testing Group- The Structure of Testing Group- .The Technical Training Program		

List Of Experiments:
1. Understand The Automation Testing Approach
2. Using Selenium IDE, Write a test suite containing minimum 4 test cases.
3. Conduct a test suite for any two web sites
4. Install Selenium server and demonstrate it using a script in Java/PHP
5. Write and test a program to login a specific web page
6. Write and test a program to update 10 student records into table into Excel file
7. Write and test a program to select the number of students who have scored more than 60 in any one subject (or all subjects)
8. Write and test a program to provide total number of objects present / available on the page
9. Write and test a program to get the number of list items in a list / combo box

Text Book (s)

1	Gopalaswamy Ramesh and Srinivasan Desikan,"Software Testing: Principles and Practices",Pearson Education, New Delhi, 2006
2	Ron Patton,"Software Testing", Second Edition, Sams Publishing, Pearson Education, 2007. AULibrary.com.

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Board of Information Technology On
19 OCT 2020
KARUR-639 113.

Reference (s)	
1	Ilene Burnstein, "Practical Software Testing", Springer International Edition, 2003
2	Edward Kit, "Software Testing in the Real World Improving the Process" , Pearson Education, 1995
3	Boris Beizer,"Software Testing Techniques – 2nd Edition",Van Nostrand Reinhold, New York,1990.

Regulation 2018		Semester V	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
C	18ITC303L	Mobile Application Developement Laboratory	0	0	2	1

Prerequisite Course (s)

Java

Course Objective (s):

The purpose of learning this course is to:

1	To make the students to be familiar with the basic concepts of Mobile Communication Development and Mobile Devices.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Illustrate the components and structure of mobile application development frameworks for Android and Windows OD based mobiles
CO2	Explain about how to work with various mobile application development frameworks.
CO3	Explain the basic and important design concepts and issues in development of mobile applications
CO4	Discuss the capabilities and limitations of mobile devices

List Of Experiments:

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

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Approved By
Board of Information Technology On
19 OCT 2020
KARUR-639 113.

Regulation 2018		Semester V	Total Hours			30
			Hours / Week			C
Category	Course Code	Course Name	L	T	P	
M	18MBM301L	ANALYTICAL AND LOGICAL THINKING SKILLS	0	0	2	1

Course Objective (s): The purpose of learning this course is to:

1	Sharpen problem solving skills and to improve thinking capability of the students
2	Drive the students to use language with great commitment and cooperation
3	Expertise the creative thinking and presentation skills to meet the company needs

Course Outcome (s) (Cos): At the end of this course, learners will be able to:

CO1	Solve both analytical and logical problems in a fruitful manner
CO2	Organize and convey the information in such an incomparable way
CO3	Improve their presentation skills

UNIT I	**Module - 1**	6

Aptitude: Alligations or Mixtures - Blood Relations.
Communication: How to set Goals - Interpersonal Relationships - JOHARI Window - Work & Business Etiquette

UNIT II	**Module - 2**	6

Aptitude: Partnership - Statement and Assumptions.
Communication: Transition to Corporate World - Career opportunities in Various Sectors and know your industry.

UNIT III	**Module - 3**	6

Aptitude: Arithmetic and Geometric Progressions - Syllogisms.
Communication: Time Management - Anger and Stress Management - Conflict Management.

UNIT IV	**Module - 4**	6

Aptitude: Permutations and Combinations - Statements & Conclusions.
Communication: Launch a Product - Telephonic Etiquette.

UNIT V	**Module - 5**	6

Aptitude: Geometric Problems.
Communication: Presentation Skills - Oral presentation and public speaking skills, Business presentations.

Text Book (s)

1	Dr.R.S.Aggarwal, "Quantitative Aptitude", S. Chand & Company Limited, 2015
2	Dr.R.S.Aggarwal, "A Modern Approach to Verbal & Non - Verbal Reasoning", S. Chand & Company Limited, 2015

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Regulation 2018		Semester V/ VI	Total Hours			15
			Hours / Week			C
Category	Course Code	Course Name	L	T	P	
M	18LEM301T	INDIAN ART FORMS (Common to all UG Programmes)	1	0	0	-

Prerequisite Course (s)

NIL

Course Objective (s):

The purpose of learning this course is to:

CLR-1	Introduce the learners to various art forms and whet their aesthetics sense.
CLR-2	Improve learners' knowledge on history of theatre and drama and draw connections between theatrical practices and social contexts in both modern and pre modern periods..
CLR-3	Enable the learners to identify and understanding various types of dance and music concepts
CLR-4	Make learners explore the diversity of Architecture, Sculpture, Painting and its intersection with community, culture and society.
CLR-5	Make students to get familiarized with the formal, historical, and theoretical aspects of literary arts.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Identify aesthetics traits found throughout Indian art.
CO2	Demonstrate understanding of the social and artistic movements that have shaped theatre and dance.
CO3	Recognize different concepts involved in music and dance.
CO4	Identify and appreciate the salient features and various styles of Indian Architecture, Sculpture and Painting at different times.
CO5	Demonstrate a broad understanding of Indian literary arts and appreciate the role that historical context plays in the creation and interpretation of literary works

CO-PO Mapping

	POs												PSOs		
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO 11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	1	1	2	2	2	-	2	-	-	-
CO2	-	-	-	-	-	1	1	2	2	1	-	2	-	-	-
CO3	-	-	-	-	-	1	1	2	2	1	-	2	-	-	-
CO4	-	-	-	-	-	1	1	2	2	2	-	2	-	-	-
CO5	-	-	-	-	-	1	1	2	2	2	-	2	-	-	-
CO (Avg)	-	-	-	-	-	1	1	2	2	1.6	-	2	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Regulation 2018		Semester VI	Total Hours			30
			Hours / Week			C
Category	Course Code	Course Name	L	T	P	
H	18MBH201T	MANAGEMENT PRINCIPLES FOR ENGINEERS	2	0	0	2

Prerequisite Course (s)

Nil

Course Objective (s): The purpose of learning this course is to:

1	Enable the students to study the evolution of management.
2	Study about planning tools and techniques in management for engineers.
3	Learn about career planning for engineers.
4	Enable the effective and barriers communication in the organization.
5	Study the system and process of effective controlling in the organization.

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Acquired the knowledge on fundamental concept of management and its various functions.
CO2	Gained knowledge on planning and decision making process.
CO3	Attained the knowledge of organization structure and career planning.
CO4	Demonstrate the ability to directing, leadership and communicate effectively.
CO5	Analysis isolates issues and formulates best control methods.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	-	-	-	-	1	-	-	1	-	1	2	-	-
CO2	2	2	-	-	-	1	-	-	1	1	1	1	-	-
CO3	2	-	-	-	-	1	-	-	-	-	1	2	-	-
CO4	1	-	-	-	-	1	-	-	1	1	1	-	-	-
CO5	2	-	-	-	-	1	-	-	-	1	1	3	-	-
CO (Avg)	1.80	2.00	-	-	-	1.00	-	-	1.00	1.00	1.00	2.00	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	INTRODUCTION TO MANAGEMENT PRINCIPLES	6
Meaning, Definition of Management – Managerial Role - POSDCORB -Management vs. Administration- Evolution of Management Thoughts- Henry Fayol's 14 Principles- Opportunities and Challenges in Management.		
UNIT II	**PLANNING**	**6**
Nature and purpose of planning – Planning process – Types of planning – Objectives – Setting - Objectives – policies – Planning premises – Strategic Management – Planning Tools and Techniques – Decision making steps and process.		
UNIT III	**ORGANIZING**	**6**
Nature and purpose – Formal and informal organization – organization chart – Organization Structure– Types – Line and staff authority – Departmentalization – Delegation of Authority – Centralization and Decentralization – Job Design.		
UNIT IV	**DIRECTING**	**6**
Foundations of individual and group behavior – Motivation – Motivation Theories – Motivational - Techniques –Leadership – Types and Theories of Leadership – Communication – Process of Communication – Barrier in Communication – Effective Communication.		
UNIT V	**CONTROLLING**	**6**
System and Process of Controlling – budgetary and Non-Budgetary Control Techniques – Use of Computers and IT in Management control – Control and performance – Direct and Preventive control – Reporting.		

Reference (s)

1	P.C.Tripathi., P.N Reddy, Principles of Management, McGraw Hill, 5th Edition 2012.
2	Harold Koontz, Heinz Weihrich, A RamachandraAryasri, Tata McGraw Hill, Principles of Management, 2016
3	Charles W Hill, Stephen L Mcshane, Principles of Management, McGraw Hill, Special Indian Edition 2007.
4	1.Stephen A. Robbins & David A. Decenzo& Mary Coulter, "Fundamentals of Management" 7th Edition, Pearson Education, 2011.
5	Harold Koontz & Heinz Weihrich "Essentials of management" Tata McGraw Hill, 1998.

Regulation 2018		Semester VI	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
C	18ITC304J	Web Technology	3	0	2	4

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

1	Design web pages more effectively
2	Handle the DOM objects
3	Develop server side programs

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Create simple web pages using HTML and CSS
CO2	Structure data for storage and transport
CO3	Access the HTML elements using JavaScript
CO4	Design simple Dynamic web pages using Servlet and JSP
CO5	Access the Database using PHP

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	3	-	-	-	-	-	-	-	-	2	1	3	2
CO2	3	1	3	2	-	-	-	-	-	-	-	2	1	3	2
CO3	2	1	3	2	-	-	-	-	-	-	-	2	1	3	2
CO4	2	1	3	2	2	1	-	2	1	-	1	2	1	3	2
CO5	3	1	3	2	2	1	-	2	1	-	2	2	1	3	2
CO (Avg)	2.6	1	3	2	2	1		2	1		1.5	2	1	3	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	INTRODUCTION	9
Introduction to www, web 2.0, web browser, web server; three tier web architecture, HTML: basic HTML tags, HTML5 features, CSS		
UNIT II	**XML AND JSON**	**9**
Introduction to XML – XML fundamentals, DTD, Schema - XML namespaces - XPath - XSLT JSON: Data types and objects		
UNIT III	**JAVASCRIPT AND AJAX**	**9**
Introduction, Java Script DOM model, Built-in objects, validation, Event Handling, Ajax: AJAX Introduction, AJAX Components, Handling Dynamic HTML with Ajax		
UNIT IV	**SERVER SIDE PROGRAMMING USING JAVA**	**9**
Servlet: Overview - Architecture -Generating Dynamic Content-Life Cycle- Sessions-Cookies, JSP : Overview – Standard tag library		
UNIT V	**PHP**	**9**
PHP Introduction, Structure of PHP, PHP Functions, Arrays, function and built-in variables, connecting to Database		
	LIST OF EXPERIMENTS	**15**

1. Creation of simple HTML5 pages with divisions, links, tables, canvas and other tags.
2. Webpage – CSS3, Style sheet Inclusion Techniques
3. Client Side Programming
   a. JavaScript for displaying date and comparing two dates.
   b. Form validation including text field, radio buttons, checkboxes, list box and other controls
4. Create a simple Ajax code to retrieve data from a TXT file
5. XML – DTD
6. XML – XSL
7. Simple Dynamic web page creation using Servlet
8. Simple web application using JSP to access the Database
9. PHP web application using JSON

Reference (s)

1	Kogent Learning Solutions Inc., —Web Technologies: HTML, CSS, Javascript, ASP.NET, Servlets, JSP, PHP, ADO.NET, JDBC and XML‖, Dreamtech Press, New Delhi, 2013
2	Paul Deitel (Author), Harvey Deitel (Author), Abbey Deitel (Author) - Internet and World Wide Web, Fifth Edition, Pearson, 2018
3	Rashim Mogha, Preetham.V.V., — Java Web Services Programming‖, Wiley Dream tech, New Delhi, 2002.

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Approved By
Board of Information Technology On
19 OCT 2020
KARUR-639 113.

4	Giulio Zambon, —Beginning JSP, JSF and Tomcat: Java Web Developmentl, Apress, New York, 2012.
5	Jeffrey C Jackson, — Web Technology – A computer Science perspectivel, Persoson Education, 2007.

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KARUR - 639 113.

Regulation 2018		Semester VI	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
C	18ITC305J	Bigdata Technologies	2	0	2	3

Prerequisite Course (s)

Data mining and warehousing ,Big data analytics.

Course Objective (s):

The purpose of learning this course is to:

Know the fundamental concepts of Big Data Technologies, explore Tools and practices for working with Big data, stream computing and the research that requires the integration of large amounts of data.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Describe about Big Data and understanding the working process of hadoop environment.
CO2	Explain about streaming Data and learing about the key/value pair in spark
CO3	Explain conceptually how Big Data is stored using various tools.
CO4	Explain how Big Data can be analysed.
CO5	Illustrate the Communication with data using various bigdata applications.

CO-PO Mapping

COs	Pos												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	2	-	2	-	-	-	-	-	-	3	3	3
CO2	3	2	2	2	-	2	-	-	-	-	-	-	3	2	3
CO3	2	2	2	2	-	2	-	-	-	-	-	-	3	2	2
CO4	3	2	2	2	-	2	-	-	-	-	-	-	2	2	3
CO5	2	2	2	2	-	2	-	-	-	-	-	-	2	2	2
CO (Avg)	2.60	2.00	2.00	2.00	-	2.00	-	-	-	-	-	-	2.60	2.20	2.60

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	INTRODUCTION TO HADOOP ENVIRONMENT	9
A brief history of hadoop-Introduction to hadoop frame work-Map reduce-YARN-Hadoop Distributed file system-Setting up Hadoop cluster.		
UNIT II	**LEARNING SPARK LIGHTNING**	**9**
Introduction to BigData using Spark-Downloading Spark and Getting started –Working with Key/Value pair-Loading and Saving data – Advanced Spark programming-Running on Clusters.		
UNIT III	**STUDY OF MONGODB**	**9**
Introduction and getting started to Mongodb-Creating,Updating,and Deleting documents – Querying-Indexing-Aggregation-Administration –Replication.		
UNIT IV	**INTRODUCTION TO PIG ,HIVE and H-BASE**	**9**
Introduction to PIG - Pig latin - User Define Functions - Data Processing Operation - Introduction to HIVE - Comparision with traditional database - HiveQL – Tables - Querying data- User Define Functions - Introduction to H-Base-H-Base concepts -H-Base versus RDBMS.		
UNIT V	**DATA TRANSFER USING ZOOKEEPER**	**9**
Introduction to Zookeeper-Installing and Running zookeeper-An Example-Zookeeper services-Building application with Zookeeper.		

LIST OF EXPERIMENTS

1. Setting up hadoop single node cluster.
2. Hadoop word count program.
3. Accuring streaming data using apache spark.
4. Using Mongodb create, update,delete,aggregate data.
5. Data storage using H-base.
6. Data processing using HIVE.
7. Data transfer using Zookeeper.

Text Book (s)

1	Tom White "Hadoop: The Definitive" Copyright © 2009 Tom White.Printed in the United States of America. Published by O'Reilly Media, Inc., 1005 Gravenstein Highway North, Sebastopol, CA 95472.
2	Holden Karau, Andy Konwinski, Patrick Wendell, and Matei Zaharia "Learning Spark" Copyright © 2015 Databricks. Printed in the United States of America. Published by O'Reilly Media, Inc., 1005 Gravenstein Highway North, Sebastopol, CA 95472
3	Kristina Chodorow and Michael Dirolf "MongoDB: The Definitive Guide"Copyright © 2010 Kristina Chodorow and Michael Dirolf. Printed in the United States of America.Published by O'Reilly Media, Inc., 1005 Gravenstein Highway North, Sebastopol, CA 95472.

Reference (s)

1	https://www.edureka.co/blog/top-big-data-technologies/
2	http://index-of.co.uk/Big-Data-technologies/Big%20Data%20Analytics%20with%20R%20and%20Hadoop.pdf
3	https://analyticsindiamag.com/7-emerging-big-data-technologies-to-watch-out-for/

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Regulation 2018		Semester VI	Total Hours			30
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
C	18ITC306L	Software Design Laboratory	0	0	2	1

Prerequisite Course (s)

Software Engineering,Object Oriented Analysis and Design

Course Objective (s):

The purpose of learning this course is to:

1	Develop a software package in any application relevant to any area of study of your curriculum by applying the Software Engineering Practices generally done by software industries

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Use industry standard software in a professional set up.
CO2	Understand the elements of finite element modeling, specification of loads and boundary condition, performing analysis and interpretation of results for final design
CO3	Develop customized automation tools

List Of Experiments:

1. Identification of Use cases for each application system and SRS preparation.
2. Identification of reusable Components/Frameworks from open source and customizing them for each application.
3. Coding/Customizing/Wrapping for components/subsystems.
4. Testing – Scenario testing and test case preparation for each components/subsystems
5. Integration of subsystems and Testing
6. Simulation of datasets and load testing to analyze performance of the system.

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Regulation 2018		Semester VI	Total Hours			30
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
M	18MBM302L	EMPLOYABILITY SKILLS AND PRACTICES	0	0	2	1

Course Objective (s): The purpose of learning this course is to:

1	Learn the application of mathematical or statistical models to different real-world contexts
2	Focus on writing & speaking skills through vigorous practices.
3	Enhance soft skills and analytical ability of students
4	Defeat the fear while communicating in group and to master the effective communication

Course Outcome (s) (Cos): At the end of this course, learners will be able to:

CO1	Solve both analytical and logical problems in a productive manner
CO2	Launch their ability of comprising and delivering the information
CO3	Upgrade their communication quality in near future

UNIT I	Module - 1	6

Aptitude: Time and Distance (Speed, Streams) - Problems on Trains - Arrangements and Blood Relations.
Communication: Job Application – Cover letter,Bio-data,Resume & CV building.

UNIT II	Module - 2	6

Aptitude: Time and Work - Pipes & Cisterns - Situation Reaction Test & Data Interpretations.
Communication: Writing practices on circulars, notices, memos, Agenda preparation and Minutes of meeting.

UNIT III	Module - 3	6

Aptitude: Ages - Averages - Probability - Profit and Loss.
Communication: Email Etiquette -Essay writing

UNIT IV	Module - 4	6

Aptitude: Mensuration - SI & CI - Cause and Effect Analysis - Statement, Assumptions & Conclusions. **Communication:** Group Discussion and guidelines.

UNIT V	Module - 5	6

Aptitude: Permutation and Combinations - Partnership - Alligations or Mixtures.
Communication: Interview skills - General instructions, Review of interview questions, Mock Interviews.

Text Book (s)

1	Dr.R.S.Aggarwal, "Quantitative Aptitude", S. Chand & Company Limited, 2015
2	Dr.R.S.Aggarwal, "A Modern Approach to Verbal & Non - Verbal Reasoning", S. Chand & Company Limited, 2015.

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Regulation 2018		Semester V/VI	Total Hours			15
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
M	18LEM302T	SELF DEVELOPMENT AND ENTREPRENEURSHIP	1	0	0	Nil

Prerequisite Course (s)

Nil

Course Objective (s): The purpose of learning this course is to:

1	Develop entrepreneurship and self-employment abilities to start any venture plan, use, and monitor and control resources optimally and economically.
2	Know the Micro, small and medium industries Registration Process.
3	Study about product selection and development.
4	Learn about the Project report preparation.
5	Analysis the Enterprise risk management.

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Identify entrepreneurial quality.
CO2	Know the entrepreneurial support agencies.
CO3	Prepare project setup planning and project report
CO4	Select appropriate agencies for technical and financial support.
CO5	Explain SWOT analysis and strategies to achieve goals.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	1	-	-	1	1	1	1	-	-
CO2	-	1	-	-	-	2	1	1	1	2	2	1	-	-
CO3	1	3	-	-	-	-	2	1	1	1	2	1	-	-
CO4	-	1	-	-	-	1	2	1	1	1	2	1	-	-
CO5	2	1	-	-	-	-	1	-	1	1	1	1	-	-
CO (Avg)	1.50	1.50	-	-	-	1.33	1.50	1.00	1.00	1.20	1.60	1.00		

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	INTRODUCTION TO SELF-EMPLOYMENT AND ENTREPRENEURSHIP DEVELOPMENT	6
Introduction of self-employment – Characteristics- Creativity. Entrepreneurship development-Qualities of entrepreneur and Characteristics of Diploma holder as a self-employer like developing networking and personal contacts, importance of productivity, quality, cost consciousness and customers' satisfaction. Types of enterprise-Sole partnership -Partnership firm- Joint stock company- Co-operative society.		
UNIT II	**ENTREPRENEURIAL SUPPORT AGENCIES**	**6**
Definition – Micro, small and medium industries- Registration process of an enterprise with Government agencies-Name, type and role of state and national level support agencies. Current state & National Level Promotional Schemes for establishment of new.		
UNIT III	**PROJECT SET UP PLANNING**	**6**
Product Selection: importance- Product development stages. Process Selection: Factors affecting process selection - Technology lifecycle. Process Conversion-Capacity Planning: Basic method to assess / estimate capacity. Selection of location and layouts: Factors affecting selection of location - Objectives and types of plant layout.		
UNIT IV	**PROJECT PROPOSAL PLANNING**	**6**
7-M resources- Marketing- definition, need for enterprise, 4Ps channels- Market survey. Methods - Project report preparation for mechanical feature based product: Meaning of project planning and report: Feasibility study. Details required for preparing project plan. Project cost estimation.		
UNIT V	**ENTERPRISE AND RISK MANAGEMENT**	**6**
Concept of risk in the context of enterprise/ project-Uncertainty and certainty of project elements-Decision making under risk-Methods of risk management-Strength, Weakness, Opportunity and Threat (SWOT) analysis.		

Reference (s)

1	Entrepreneurship & Venture Management, Clifford and Bombak, JosephR.Momanso.
2	Small Industries management – Karmakar.M.B.
3	Creativity –Pradeep Khandwala
4	Entrepreneurship development and Management, R.K.Singal, S.K.Kataria Sons.

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Regulation 2018		Semester VII	Total Hours			30
			Hours / Week			C
Category	Course Code	Course Name	L	T	P	
H	18MBH202T	SOCIAL ENGINEERING	2	0	0	2

Prerequisite Course (s)

Nil

Course Objective (s): The purpose of learning this course is to:

1	Learn about fundamental concept of social engineering
2	Know the different elements of ethical hacking and social engineering.
3	Understand the concepts of threats and attack vectors
4	Understand the ethical hacking
5	Learn about the attacks against individuals and organizations

Course Outcome (s) (COs): At the end of this course, learners will be able to:

CO1	Understand the concept of social engineering and types of attacks.
CO2	Identify the key security concepts, CIA and IT governance and best practices
CO3	Understand principles of social engineering.
CO4	Exhibit the ethical hacking concepts and scopes, threats and attack vectors and common areas of vulnerability.
CO5	Gain knowledge of attacks against individuals and organizations.

CO-PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	-	-	-	1	1	1	1	1	-	1	-	-
CO2	1	1	-	-	-	2	-	2	1	-	-	1	-	-
CO3	-	1	-	-	-	-	1	2	1	-	-	1	-	-
CO4	-	-	-	-	-	-	-	3	-	-	-	1	-	-
CO5	1	1	-	-	-	-	-	-	1	1	-	1	-	-
CO (Avg)	1.33	1.25	-	-	-	1.50	1.00	2.00	1.00	1.00	-	1.00	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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KARUR - 639 113

UNIT I	INTRODUCTION TO SOCIAL ENGINEERING	6
Social Engineering Defined - Why Does Social Engineering Work - Identify Communication Style - key aspects of social engineering - Categories of Social Engineering Attacks – human – based attacks and technology - based attacks		
UNIT II	**KEY SECURITY**	**6**
Key security - concepts - Types of key security concepts – Cyber security position. The CIA Triad - the significance of incident response and frameworks around cyber security. IT Governance - Best practices - compliance.		
UNIT III	PSYCHOLOGY OF SOCIAL ENGINEERING	6
Mind Tricks: Psychological Principle - Four fundamental aspects of human nature that social engineers - the desire to be helpful - the tendency to be trusting - the fear of offending others - the tendency to cut corners		
UNIT IV	ETHICAL HACKING AND SOCIAL ENGINEERING	6
Ethical Hacking Concepts and Scopes - Threats and Attack Vectors - Information Assurance - Threat Modelling - Enterprise Information Security Architecture - Vulnerability Assessment and Penetration Testing - Types of Social Engineering - Insider Attack - Preventing Insider Threats - Social Engineering Targets and Defence Strategies. Common Areas of Vulnerability - Appropriate access - Assessed resistance - Information availability		
UNIT V	CASES OF SOCIAL ENGINEERING	6
Notable Cases of Social Engineering - Attacks against Individuals - Attacks against Organizations - Preventing Social Engineering Attacks - Mitigating the Damage of Social Engineering Attacks - Segregation of Access - Maintain Access Logs - Ensure That Backups Occur Regularly - Automatically Revoke User Privileges If Suspicious Activity Is Detected		

Reference (s)

1	Kevin D. Mitnick, William L. Simon, Steve Wozniak, The Art of Deception: Controlling the Human Element of Security, Wiley, October 17th 2003
2	Christopher Hadnagy, Social Engineering: The Science of Human Hacking Paperback- Wiley Publishing Inc.,Edition 2018
3	Lester Evans, Cybersecurity: An Essential Guide to Computer and Cyber Security for Beginners, Including Ethical Hacking, Risk Assessment, Social Engineering, Attack and Defense Strategies, and Cyberwarfare Paperback –2018
4	Dr. Erdal Ozkaya, Learn Social Engineering: Learn the art of human hacking with an internationally renowned expert-2018

Regulation 2018		Semester VII	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
C	18ITC401L	Security Laboratory	0	0	2	1

Prerequisite Course (s)

Cryptography Network Security

Course Objective (s): The purpose of learning this course is to:

1.	Be exposed to the different cipher techniques
2.	Learn to implement the algorithms DES, RSA,MD5,SHA-1
3.	Learn to use tools like GnuPG, KF sensor, Net Strumbler

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Implement the cipher techniques
CO2	Develop the various security algorithms
CO3	Use different open source tools for network security and analysis

List of Experiments

1. Implement the following SUBSTITUTION & TRANSPOSITION TECHNIQUES concepts:
    1. Caesar Cipher
    2. Playfair Cipher
    3. Hill Cipher
    4. Vigenere Cipher
    5. Rail fence – row & Column Transformation
2. Implement the following algorithms
    1. DES
    2. RSA Algorithm
    3. Diffiee-Hellman
    4. MD5
    5. SHA-1
3. Implement the SIGNATURE SCHEME – Digital Signature Standard
4. Demonstrate how to provide secure data storage, secure data transmission and for creating digital signatures (GnuPG).
5. Setup a honey pot and monitor the honeypot on network (KF Sensor)
6. Installation of rootkits and study about the variety of options
7. Perform wireless audit on an access point or a router and decrypt WEP and WPA.(Net Stumbler)
8. Demonstrate intrusion detection system (ids) using any tool (snort or any other s/w)

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BOARD OF INFORMTION TECHNOLOGY

Meeting No: 9 **Date: 19.10.2020** **Venue: MKCE**

Platform: Microsoft Teams App (Online) **Time: 10.00AM**

MINUTES OF THE MEETING

9.1. Confirmation of Previous Board of Studies Meeting Minutes

The minutes of the Eighth Board of Studies Meeting held on 25.03.19 was confirmed.

9.2. Any revision of subject syllabus

No revisions and recommendations by Faculty, Students, Expert Members.

9.3. Confirmation of Syllabus for R2018

General:

- Number of minor projects can be reduced.
- Data Structures and Algorithms can divided as two subjects such as Data Structures (in III Sem) and Algorithms (in IV Sem)
- Operating Systems and Computer Networks should not be in same semester.
- Only 6 Professional Elective's can be given. Few important courses can be pushed from professional elective to professional core.
- The following list of courses can be included in the R2018 Curriculam
    - 5G Technology
    - Robotic Process Automation
    - Software Defined Ratio
    - Block Chain
    - Augmented Reality and Virtual Reality
    - Unix Internals
    - Computer Vision
    - Edge Computing

Vth Sem:

***Software Testing*:** The Syllabus was accepted by board members without any change.

Formal Language Automata Theory: The Syllabus was accepted by board members without any change.

Mobile App Development Laboratory: The Syllabus was accepted by board members without any change.

Regulation 2018		Semester	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18ITC401J	Cryptography and Network Security	3	0	2	4

Prerequisite Course (s)

Computer Networks

Course Objective (s):

The purpose of learning this course is to:

CO1	Explain the basics of number theory and compare various encryption techniques.
CO2	Summarize the functionality of public key cryptography.
CO3	Apply various message authentication functions and secure algorithms.
CO4	Demonstrate different types of security systems and applications.
CO5	Discuss different levels of security and services.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Understand OSI security architecture and classical encryption techniques.
CO2	Acquire fundamental knowledge on the concepts of finite fields and number theory.
CO3	Understand various block cipher and stream cipher models.
CO4	Describe the principles of public key cryptosystems, hash functions and digital signature.
CO5	Protect any network from the threats in the world.

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO-1	PSO2	PSO3
CO1	3	3	2	1	1	-	-	-	-	-	-	1	-	1	-
CO2	3	3	2	2	-	-	-	-	-	-	-	1	-	1	-
CO3	3	3	3	2	2	1	1	-	-	-	-	1	-	1	-
CO4	3	3	3	2	2	1	1	-	-	-	-	1	-	1	-
CO5	3	3	1	1	1	1	2	2	-	-	-	1	-	1	-
CO (Avg)	**3**	**3**	**2**	**2**	**1**	**1**	**1**	**1**	-	-	-	**1**	-	**1**	-

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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UNIT I	INTRODUCTION & NUMBER THEORY	9
Services, Mechanisms and attacks-the OSI security architecture-Network security model-Classical Encryption techniques .Finite Fields And Number Theory: Groups, Rings, Fields-Modular arithmetic-Euclid's algorithm-Finite fields-Prime numbers-Fermat's and Euler's theorem- -The Chinese remainder theorem.		
UNIT II	**BLOCK CIPHERS & PUBLIC KEY CRYPTOGRAPHY**	**9**
Data Encryption Standard-Block cipher principles-block cipher modes of operation-Advanced Encryption Standard (AES)-Triple DES-Blowfish-RC5 algorithm. Public key cryptography: Principles of public key cryptosystems-The RSA algorithm-Key management - Diffie Hellman Key exchange		
UNIT III	**HASH FUNCTIONS AND DIGITAL SIGNATURES**	**9**
Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC –MD5 - SHA - HMAC – CMAC - Digital signature and authentication protocols– DSS – EI Gamal – Schnorr.		
UNIT IV	**SECURITY PRACTICE & SYSTEM SECURITY**	**9**
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 – Trusted systems		
UNIT V	**E-MAIL, IP & WEB SECURITY**	**9**
E- mail Security: Security Services for E- mail- attacks possible through E- mail - establishing keys privacy-authentication of the source-Message Integrity-Non-repudiation-Pretty Good Privacy-S/MIME. IPSecurity: Overview of IPSec - IP and IPv6-Authentication Header-Encapsulation Security Payload (ESP)- Web Security: SSL/TLS Basic Protocol-computing the keys- client authentication.		

List of Experiments

1. Implement the following SUBSTITUTION & TRANSPOSITION TECHNIQUES concepts:
    1. Caesar Cipher
    2. Playfair Cipher
    3. Hill Cipher
    4. Vigenere Cipher
    5. Rail fence – row & Column Transformation
2. Implement the following algorithms
    1. DES
    2. RSA Algorithm
    3. Diffiee-Hellman
    4. MD5
    5. SHA-1

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3. Implement the SIGNATURE SCHEME – Digital Signature Standard 4. Demonstrate how to provide secure data storage, secure data transmission and for creating digital signatures (GnuPG). 5. Setup a honey pot and monitor the honeypot on network (KF Sensor) 6. Installation of rootkits and study about the variety of options 7. Perform wireless audit on an access point or a router and decrypt WEP and WPA.(Net Stumbler) 8. Demonstrate intrusion detection system (ids) using any tool (snort or any other s/w)	
Text Book (s)	
1	William Stallings, Cryptography and Network Security, 6th Edition, Pearson Education, March 2013.
2	Charlie Kaufman, Radia Perlman and Mike Speciner, —Network Security", Prentice Hall of India, 2002.
Reference (s)	
1	Behrouz A. Ferouzan, "Cryptography & Network Security", Tata Mc Graw Hill, 2007.
2	Man Young Rhee, "Internet Security: Cryptographic Principles", Algorithms and Protocols,Wiley Publications, 2003.
3	Charles Pfleeger,"Security in Computing", 4th Edition, Prentice Hall of India, 2006

Regulation 2018		Semester VII	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
C	18ITC402L	FOSS LABORATORY	0	0	2	1

Prerequisite Course (s)

C programming and Linux.

Course Objective (s):

The purpose of learning this course is to:

1	Understand the basic principles of open source software and learn to work in different open source platforms.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Build the installation of various open source softwares in different modes.
CO2	Develop simple applications in PHP
CO3	Develop simple application in Perl
CO4	Design programs using QT and GTK programming
CO5	Build interfaces using IDEs

LIST OF EXPERIMENTS

1	GNU/Linux OS installation (provide details of how to detect, configure disk partitions & file system and successfully install a GNU/Linux distribution)
2	Basic shell commands –logging in, listing files, editing files, copying/moving files, viewing file contents, changing file modes and permissions, process managements.
3	User and group management, file ownerships and permissions, PAM authentication, Introduction to common system configuration files & log files.
4	Configuring networking, basics of TCP/IP networking and routing , connection to the internet (through dialup, DSL, Ethernet, leased line)
5	Performing everyday tasks using GNU/Linux-accessing the internet, playing music, editing documents and spreadsheets, sending and receiving email, copy files from disks and over the network, playing games, writing CDs.
6	Setting up web servers-using apache(for HTTP services), setting up proxy services, printer services, firewall .Using the GNU compiler collection –getting acquainted with the GNU compiler tools-the C preprocessor (cpp), the C compiler (gcc) and the c++ compiler (g++), and the assembler(gas)
7	QT and GTK Programming.
8	Text processing with Perl.
9	PHP & MY SQL Connectivity.
10	Set up the complete network interface.

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Regulation 2018			Total Hours			60
			Hours / Week			C
Category	Course Code	Course Name	L	T	P	
E	18ITE001J	Python Programming	3	0	2	4

Prerequisite Course (s)

C Programming

Course Objective (s):

The purpose of learning this course is to:

1	Outline the core syntax and semantics of Python programming language.
2	Identify the need for working with the strings and functions.
3	Illustrate the basic operations and methods of python datastructures-lists, dictionaries, tuples and sets.
4	Understand the Object-oriented Programming concepts in Python.
5	Infer the applications of data science using python.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Interpret the fundamental Python syntax and semantics and be fluent in the use of Python control flow statements.
CO2	Express proficiency in the handling of strings and functions.
CO3	Determine the methods to create and manipulate Python programs by utilizing the data structures like lists, dictionaries, tuples and sets.
CO4	Articulate the Object-Oriented Programming concepts such as encapsulation, inheritance and polymorphism as used in Python.
CO5	Intrept the fundamental of data science using python

CO-PO Mapping

COs	Pos												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	1	3	-	-	-	-	-	-	-	1	2	-
CO2	2	2	2	1	3	-	-	-	-	-	-	-	1	2	-
CO3	3	3	2	2	3	-	-	-	-	-	-	-	3	3	-
CO4	3	3	2	2	3	-	-	-	-	-	-	-	2	3	-
CO5	3	3	2	1	3	-	-	-	-	-	-	-	2	3	-
CO (Avg)	2.8	2.8	2	1.4	3	-	-	-	-	-	-	-	1.8	2.6	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	FUNDAMENTAL OF PYTHON PROGRAMMING LANGUAGE	9
Introduction to python programming language,Python Data Types, Indentation, Type Conversions,operators, Control Flow Statements, The while Loop, The for Loop, The continue and break Statements, Catching Exceptions Using try and except Statement		
UNIT II	**FUNCTIONS AND STRINGS**	**9**
Functions, Built-In Functions, Function Definition and Calling the Function, The return Statement and void Function, Scope and Lifetime of Variables, Default Parameters, Creating and Storing Strings, Basic String Operations, String Slicing and Joining, String Methods, Formatting Strings		
UNIT III	**LIST, DICTIONARIES, TUPLES AND SETS**	**9**
Creating Lists, Basic List Operations, Built-In Functions Used on Lists, List Methods, Creating Dictionary, Accessing and Modifying key:value Pairs in Dictionaries, Built-In Functions Used on Dictionaries, Dictionary Methods, Creating Tuples, Basic Tuple Operations, Built-In Functions Used on Tuples, Sets, Set Methods.		
UNIT IV	**FILES AND OBJECT ORIENTED PROGRAMMING**	**9**
Types of Files, Creating and Reading Text Data, Regular Expression Operations, Object-Oriented Programming, Classes and Objects, Creating Classes in Python, Creating Objects in Python, The Constructor Method, Classes with Multiple Objects, Class Attributes versus Data Attributes, Encapsulation, Inheritance, The Polymorphism		
UNIT V	**INTRODUCTION TO DATA SCIENCE**	**9**
Data science process, Introduction to python data science libraries (numpy and pandas), Random forest regression in python,Applications of Data Science		

List of Experiments

1.Programs on Data Types
2.Programs on Control Statements
3.Programs on Functions
4.Programs on List
5.Programs on Tuples
6.Programs on Dictionary
7.Programs on Strings
8.Program on Files
9.Programs On Classes and Objects
10.Program on Modules, Packages
11.Mini Project

Text Book (s)

1	Gowrishankar S, Veena A, **"Introduction to Python Programming"**, 1st Edition, CRC Press/Taylor & Francis, 2018. ISBN-13: 978-0815394372
2	Jake VanderPlas, **"Python Data Science Handbook: Essential Tools for Working with Data"**, 1st Edition, O'Reilly Media, 2016. ISBN-13: 978-1491912058

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Reference (s)	
1	Aurelien Geron, **Hands-On Machine Learning with Scikit-Learn and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems",** 1st Edition,O'Reilly Media, 2017. ISBN – 13: 978-1491962299
2	Wesley J Chun, **"Core Python Applications Programming",** 3rd Edition, Pearson Education India, 2015. ISBN-13: 978-9332555365
3	Miguel Grinberg, **"Flask Web Development: Developing Web Applications with Python",** 2nd Edition, O'Reilly Media, 2018. ISBN-13: 978-1491991732.

Regulation 2018			Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18ITE002J	C#.NET Framework	3	0	2	4

Prerequisite Course (s)

C Programming

Course Objective (s):

The purpose of learning this course is to:

1	The purpose of learning this course is to use the features of Dot Net Framework along with the features of C#.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Infer the fundamental concepts of the C# language and the .Net Framework.
CO2	Infer the concept of .NET framework, study the different techniques of security.
CO3	Identify base class libraries to be used with Network programming.
CO4	Build windows based application and web services
CO5	Compare different types of Assemblies.

CO-PO Mapping

COs	Pos												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	3	-	-	-	-	-	-	-	-	2	1	3	2
CO2	3	1	3	2	-	-	-	-	-	-	-	2	1	3	2
CO3	2	1	3	2	-	-	-	-	-	-	-	2	1	3	2
CO4	2	1	3	2	2	1		2	1		1	2	1	3	2
CO5	3	1	3	2	2	1		2	1		2	2	1	3	2
CO (Avg)	**2.6**	**1**	**3**	**2**	**2**	**1**		**2**	**1**		**1.5**	**2**	**1**	**3**	**2**

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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UNIT I	**C# LANGUAGE BASICS**	**9**
C# and the .NET framework- C# basics-Objects and types-Inheritance-Arrays-Operators and casts-Indexes		
UNIT II	**C# ADVANCED FEATURES**	**9**
Delegates and Events-Strings and regular expressions-Generics- Collections-Memory management and pointers-Errors and exceptions		
UNIT III	**BASE CLASS LIBRARIES AND DATA MANIPULATION**	**9**
Tracing and events-Threading and synchronization-.NET security-Localization –Manipulating XML–Managing the file System –Basic network programming		
UNIT IV	**DATABASE WEB SERVICES**	**9**
Window based applications-Data access with .NET-basic of ASP.NET-Introduction to web services.		
UNIT V	**.NET FRAMEWORK**	**9**
Architecture –Assemblies-Shared assembling –CLR hosting- App domains-Reflection		

List of Experiments:

1. Study of .NET Framework
2. Control statements in C# .Net.
3. Class object
4. Inheritance and abstract class
5. Interface and Exception handling
6. Design Login form and create windows form using basic form controls application.
7. Design calculator application and traffic signal application.
8. ADO .Net
9. Validation control in ASP .Net.
10. Master page in Asp .Net.
11. Database connectivity in ASP.Net.
12. Miniproject

TEXT BOOK (S)

1. Christian Nagel et.al. "Professional C# 2005 with .NET 3.0", Wiley India, 2007.

REFERENCE (S)

1. Ian Gariffiths Mathew Adams, Jesse Liberty, "Programming C# 4.0", O'Reilly, Fourth Edition,2010.
2. Andrew Troelson, "Pro C# with .NET 3.0", Apress, 2007.
3. Kevin Hoffman, "Microsoft Visual C# 2005", Pearson Education, 2006.
4. S.ThamaraiSelvi, R.Murugesan, "A Text Book of C#", Pearson Education, 2003.

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Regulation 2018			Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18ITE003J	Data Mining And Data Ware housing	3	0	2	4

Prerequisite Course (s)

Database Management System.

Course Objective (s):

The purpose of learning this course is to:

1.	Learn about how the required data can be mined from database and how to store big data.
2.	Understand the concepts of OLAP.
3.	Illustrate the algorithms for Classification, Clustering and Prediction.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Outline the concepts of Data warehousing and design schemas.
CO2	Interpret the OLAP concepts.
CO3	Identify the functionalities and issues of data mining.
CO4	Illustrate the working of Classification Algorithms.
CO5	Select suitable Clustering Algorithm for a problem.

CO-PO Mapping

Cos	Pos												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	3	3	1	-	1	-	2	-	1	3	2	1
CO2	3	2	1	3	3	1	-	1	-	2	-	1	3	2	1
CO3	3	2	1	3	3	1	-	1	-	2	-	1	3	2	1
CO4	3	2	1	3	3	1	-	-	-	2	-	1	3	2	1
CO5	3	2	1	3	3	1	-	-	-	2	-	1	3	2	1
CO (Avg)	3	2	1	3	3	1	-	1	-	2	-	1	3	2	1

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

UNIT I	DATA WAREHOUSING	9
Data warehousing Components–Building a Data warehouse–Mapping the Data Warehouse to a Multiprocessor Architecture–DBMS Schemas for Decision Support–Data Extraction, Cleanup, and Transformation Tools–Metadata.		
UNIT II	**BUSINESS ANALYSIS**	**9**
Reporting and Query tools and Applications–Tool Categories–The Need for Applications–Cognos Impromptu–Online Analytical Processing (OLAP)–Need–Multidimensional Data Model–OLAP Guidelines–Multidimensional versus Multirelational OLAP–Categories of Tools–OLAP Tools and the Internet.		
UNIT III	**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 IV	**ASSOCIATION RULE MINING AND CLASSIFICATION**	**9**
Mining Frequent Patterns, Associations and Correlations–Mining Methods–Mining various Kinds of Association Rules–Classification and Prediction- Basic Concepts-Decision Tree Induction-Bayesian Classification–Rule Based Classification–Classification by Back propagation–Support Vector Machines–Associative Classification–Lazy Learners–Prediction.		
UNIT V	**CLUSTERING AND TRENDS IN DATA MINING**	**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–Outlier Analysis–Data Mining Applications.		
LIST OF EXPERIMENTS		**15**

1. Attributes in Data Mining.
2. Data Cleaning on Dataset.
3. Develop a model for Decision Tree.
4. Train a Decision Tree with Cross-Validation.
5. Compare simple and complex decision tree.
6. Pruning the nodes in decision tree.
7. Conversion of decision tree into If..Then Rules.
8. Naive Bayes Classifier.
9. K-Means.
10. K-Medoids.

Text Book (s)

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

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Board of Information Technology On
19 OCT 2020
KARUR-639 113.

2	Jiawei Han and Micheline Kamber, "Data Mining Concepts and Techniques", Third Edition,Elsevier, 2012.
Reference (s)	
1	Pang-Ning Tan, Michael Steinbach and Vipin Kumar, "Introduction to Data Mining",Person Education, 2007.
2	K.P. Soman, Shyam Diwakar and V. Aja,"Insight into DataMining Theory and Practice", Eastern Economy Edition, Prentice Hall of India, 2006.

Regulation 2018			Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18ITE004J	Computer Graphics And Multimedia	3	0	2	4

Prerequisite Course (s)

Course Objective (s):

The purpose of learning this course is to:

CO1	To appreciate illumination and color models
CO2	To understand the two-dimensional graphics and their transformations.
CO3	To understand the three-dimensional graphics and their transformations.
CO4	To develop an understanding and awareness how issues such as content, information architecture, motion, sound, design, and technology merge to form effective and compelling interactive experiences for a wide range of audiences and end users.
CO5	To become familiar with various software programs used in the creation and implementation of multi- media

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Illustrate the basics of computer graphics and applications of computer graphics.
CO2	Apply various algorithms for scan conversion and filling of basic objects and their comparative Analysis.
CO3	Build scene with different clipping methods and its transformation to graphics display device.
CO4	Understood Different types of Multimedia File Format
CO5	Create an effective interactive site for use on the internet

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	-		-	2	-	-	-	-	-	1	2	-
CO2	3	2	2	-	3	-	-	-	-	-	-	-	1	2	-
CO3	3	2	1	-	2	-	3	-	-	-	-	-	1	2	-
CO4	3	2	1	-	2	2	-	-	-	-	-	-	1	2	-
CO5	3	2	1	-	3	2	1	-	-	-	-	-	1	2	-
CO (Avg)	3	2	1.2	-	2	1	1	-	-	-	-	-	1	2	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	ILLUMINATION AND COLOR MODELS	9
Light sources – basic illumination models – halftone patterns and dithering techniques; Properties of light – Standard primaries and chromaticity diagram; Intuitive colour concepts – RGB colour model – YIQ colour model – CMY colour model – HSV colour model – HLS colour model; Colour selection. Output primitives – points and lines, line drawing algorithms, loading the frame buffer, line function; circle and ellipse generating algorithms; Pixel addressing and object geometry, filled area primitives.		
UNIT II	**TWO DIMENSIONAL GRAPHICS**	**9**
Two dimensional geometric transformations–Matrix representations and homogeneous Coordinates, composite transformations; Two dimensional viewing–viewing pipeline, viewing coordinate reference frame; widow-to-viewport coordinate transformation, Two dimensional viewing functions; clipping operations–point, line, and polygon clipping algorithms.		
UNIT III	**THREE DIMENSIONAL GRAPHICS**	**9**
Three dimensional concepts; Three dimensional object representations – Polygon surfaces- Polygon tables- Plane equations – Polygon meshes; Curved Lines and surfaces, Quadratic surfaces; Blobby objects; Spline representations – Bezier curves and surfaces -B-Spline curves and surfaces. TRANSFORMATION AND VIEWING: Three dimensional geometric and modeling transformations – Translation, Rotation, Scaling, composite transformations; Three dimensional viewing – viewing pipeline, viewing coordinates, Projections, Clipping; Visible surface detection methods.		
UNIT IV	**MULTIMEDIA SYSTEM DESIGN & MULTIMEDIA FILE HANDLING**	**9**
Multimedia basics – Multimedia applications – Multimedia system architecture – Evolving technologies for multimedia – Defining objects for multimedia systems – Multimedia data interface standards – Multimedia databases. Compression and decompression – Data and file format standards – Multimedia I/O technologies – Digital voice and audio – Video image and animation – Full motion video – Storage and retrieval technologies.		
UNIT V	**HYPERMEDIA**	**9**
Multimedia authoring and user interface – Hypermedia messaging -Mobile messaging – Hypermedia message component – Creating hypermedia message – Integrated multimedia message standards – Integrated document management – Distributed multimedia systems. CASE STUDY: BLENDER GRAPHICS Blender Fundamentals – Drawing Basic Shapes – Modelling – Shading & Textures		
Text Book (s)		
1	Donald Hearn and Pauline Baker M, —Computer Graphics", Prentice Hall, New Delhi, 2007 [UNIT I – III]	
2	Andleigh, P. K and Kiran Thakrar, —Multimedia Systems and Design‖, PHI, 2003. [UNIT IV,V]	

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Reference (s)	
1	Judith Jeffcoate, —Multimedia in practice: Technology and Applications‖, PHI, 1998.
2	Foley, Vandam, Feiner and Hughes, —Computer Graphics: Principles and Practice‖, 2nd Edition, Pearson Education, 2003.
3	Jeffrey McConnell, —Computer Graphics: Theory into Practice‖, Jones and Bartlett Publishers,2006.
4	Hill F S Jr., "Computer Graphics", Maxwell Macmillan , 1990.
5	Peter Shirley, Michael Ashikhmin, Michael Gleicher, Stephen R Marschner, Erik Reinhard,KelvinSung, and AK Peters, —Fundamentals of Computer Graphics‖, CRC Press, 2010.

Regulation 2018			Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18ITE005J	3D Game Programming Foundations	3	0	2	4

Prerequisite Course (s)

Python Programming,Computer Graphics

Course Objective (s):

The purpose of learning this course is :

1	To provide an introduction to Pygame and 3D gaming foundations and enable the student to create simple 3D gaming application.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Describe the functionalities of Pygame
CO2	Analyse the handling method of colors and images in pygame to create 3D visuals
CO3	Discuss the frame rates and vectors moments in 3D
CO4	Understand the concepts of points projection methods in 3D
CO5	Understand the concepts of openGL and sound handling in Pygame.

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	3	-	3	-	-	1	-	-	-	1	3	3	1
CO2	2	1	2	1	3	-	-	1	-	-	-	1	3	2	1
CO3	3	2	3	2	2	-	-	1	-	-	-	1	3	2	1
CO4	3	1	2	2	2	-	-	1	1	-	-	1	2	2	1
CO5	2	2	2	2	2	-	-	1	1	-	-	1	2	2	1
CO (Avg)	2.40	1.40	2.40	1.40	2.40	-	-	1.00	1.00	-	-	1.00	2.60	2.20	1.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	INTRODUCTION TO PYGAME	9 + 3
History of Pygame - Installing Pygame - Using Pygame - Hello World Revisited - Understanding Events - Opening a Display - Using the Font Module – Error handling - Pygame in Action		
UNIT II	**CREATING VISUALS**	**9 + 3**
Using Pixel Power - Working with Color - Working with Images - Drawing with Pygame		
UNIT III	**MAKING THINGS MOVE**	**9 + 3**
Understanding Frame Rate - Moving in a Straight Line - Exploring Vectors - Using Vectors to Create Movement		
UNIT IV	**MOVING INTO THE THIRD DIMENSION**	**9 + 3**
Creating the Illusion of Depth - Understanding 3D Space -Using 3D Vectors - Time-Based Movement in 3D - Projecting 3D Points - Parallel Projections - Perspective Projections - A 3D World		
UNIT V	**EXPLORING THE THIRD DIMENSION WITH SOUND**	**9 + 3**
OpenGL - Seeing OpenGL in Action – Introduction to Sound and Storing Sound - Playing Sounds with Pygame - Playing Music with Pygame		

LIST OF EXPERIMENTS (15)

1. Installing and configuring Pygame in python
2. Simple game application using Pygame
3. Hello World Redux using Pygame
4. Keyboard Events to Move a Background
5. Generating an Image Containing Every Color
6. Drawing Polygons with Pygame
7. Simple Straight-Line Movement
8. Free Rotation Control using Pygame
9. Sound mixer application using Pygame
10. Develop a AI Simulation game application using Pygame

Text Book (s)

1	Beginning Game Development with Python and Pygame: From Novice to Professional -2007 by Will McGugan
2	Python Game Programming By Example - by Joseph Howse (Author), Alejandro Rodas de Paz (Author)

Reference (s)

1	Beginning Python Games Development: With Pygame, Second Edition" Harrison Kinsley
2	Program Arcade Games: With Python and Pygame by Paul Craven

M.KUMARASAMY COLLEGE OF ENGG. (AUTONOMOUS)
Approved By
Board of Information Technology On
19 OCT 2020
KARUR-639 113.

Regulation 2018			Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18ITE006T	Artificial Intelligence	3	1	0	4

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

1	Outline the searching strategies ued in AI
2	Analyze appropriate AI methods to solve a given problem.
3	Identify the language/framework of different AI methods.
4	Illustrate the basic AI algorithms
5	Infer the expert systems and its application.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Identify problems that are amenable to solution by AI methods
CO2	Describe the way of representation of knowledge
CO3	Formalise a given problem in the language/framework of different AI methods.
CO4	Design and summarize Different type of Activity Planning.
CO5	Outline the concepts of Expert Systems and illustrate its applications

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	1	-	-	-	-	-	-	-	-	3	2	-
CO2	3	2	2	1	-	-	-	-	-	-	-	-	3	2	-
CO3	3	3	2	2	-	1	-	-	-	-	-	-	3	2	-
CO4	3	3	2	2	1	1	1	1	1	-	-	-	3	2	-
CO5	3	3	2	1	1	1	1	2	1	1	1	2	3	2	-
CO (Avg)	3	2.8	2	1.4	1	1	1	1.5	1	1	1	2	3	2	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

M.KUMARASAMY COLLEGE OF ENGG. (AUTONOMOUS) Approved By Board of Information Technology On 19 OCT 2020 KARUR-639113.

UNIT I	INTRODUCTION TO AI AND SEARCH STRATEGIES	9
Introduction to AI– Characteristics of Intelligent Agents – Typical Intelligent Agents - Breadth-first search- Uniform cost search- Depth-first search- Depth-limited search.		
UNIT II	**REPRESENTATION OF KNOWLEDGE**	**9**
Game playing - Knowledge representation, Knowledge representation using Predicate logic, Introduction to predicate calculus, Resolution, Use of predicate calculus, Knowledge representation using other logicStructured representation of knowledge.		
UNIT III	**KNOWLEDGE INFERENCE**	**9**
Knowledge representation -Production based system, Frame based system. Inference - Backward chaining, Forward chaining, Rule value approach, Fuzzy reasoning - Certainty factors, Bayesian TheoryBayesian Network-Dempster - Shafer theory.		
UNIT IV	**PLANNING AND MACHINE LEARNING**	**9**
Basic plan generation systems - Strips -Advanced plan generation systems – K strips -Strategic explanations - Why, Why not and how explanations. Learning- Machine learning, adaptive Learning.		
UNIT V	**EXPERT SYSTEMS**	**9**
Expert systems - Architecture of expert systems, Roles of expert systems - Knowledge Acquisition –Meta knowledge, Heuristics. Typical expert systems - MYCIN, DART, XOON, Expert systems shells.		

Text Book (s)

1	Kevin Night and Elaine Rich, Nair B., "Artificial Intelligence (SIE)", Mc Graw Hill- 2008. (UnitsI,II,IV & V)
2	Dan W. Patterson, "Introduction to AI and ES", Pearson Education, 2007. (Unit-III).

Reference (s)

1	Peter Jackson, "Introduction to Expert Systems", 3rd Edition, Pearson Education, 2007.
2	Stuart Russel and Peter Norvig "AI – A Modern Approach", 2nd Edition, Pearson Education 2007.
3	Deepak Khemani "Artificial Intelligence", Tata Mc Graw Hill Education 2013.

Regulation 2018			Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18ITE007T	Compiler Engineering	3	1	0	4

Prerequisite Course (s)

Formal Language and Automata Theory

Course Objective (s):

The purpose of learning this course is to:

1	To acquire analytical ability in solving mathematical problems as applied to the respective branches of Engineering

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Describe the functionality of each phase involved in Compilation process.
CO2	Implement the parsing techniques including Bottom-up and Top-down parsing for the given programming construct described in Context Free Grammar.
CO3	Describe the concepts of storage administration for different programming environments.
CO4	Understand the concepts of steps involved in Code Generation Phase
CO5	Generate the machine code by considering all the functionalities involved in different phases of the compilation process.

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	1	1	-	-	-	-	-	-	-	2	-	-
CO2	3	3	1	3	2	-	-	-	-	-	-	-	2	-	-
CO3	3	3	1	3	2	-	-	-	-	-	-	-	2	-	-
CO4	3	3	3	2	3	2	1	1	-	-	-	-	2	-	-
CO5	1	3	3	2	3	2	1	1	2	-	-	1	2	-	-
	2.6	2.8	2	2.2	2.2	2	1	1	2	-	-	1	2	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

M.KUMARASAMY COLLEGE OF ENGG. (AUTONOMOUS) Approved By Board of Information Technology On 19 OCT 2020 KARUR-639113.

Unit I	INTRODUCTION TO COMPILER & AUTOMATA	9
Compilers – Analysis of the source program -Phases of a compiler – Cousins of the Compiler - Grouping of Phases – Compiler construction tools Compilers – Lexical Analysis – Role of Lexical Analyzer -Input Buffering – Specification of Tokens- design of lexical analysis - Finite automation (deterministic & non deterministic) – Conversion of regular expression of NDFA – Thompson's - Conversion of NDFA to DFA- minimization of NDFA- Derivation - parse tree – ambiguity		
Unit II	**SYNTAX ANALYSIS – PARSING**	**9**
Definition - role of parsers - top down parsing - bottom-up parsing - Left recursion - left factoring - Handle pruning , Shift reduce parsing- LEADING- TRAILING- Operator precedence parsing - FIRST-FOLLOW Predictive parsing - Recursive descent parsing - LR parsing – LR (0) items - SLR parsing - Canonical LR parsing -LALR parsing.		
Unit III	**INTERMEDIATE CODE GENERATION**	**9**
Intermediate Languages - prefix - postfix - Quadruple - triple - indirect triples - Syntax tree- Evaluation of expression - three-address code - Synthesized attributes – Inherited attributes - Intermediate languages – Declarations - Assignment Statements - Boolean Expressions - Case Statements - Back patching – Procedure calls.		
Unit IV	**CODE GENERATION**	**9**
Issues in the design of code generator - The target machine – Runtime Storage management - Basic Blocks and Flow Graphs - Next-use Information – A simple Code generator - DAG representation of Basic Blocks - Peephole Optimization		
Unit V	**CODE OPTIMIZATION**	**9**
Introduction– Principal Sources of Optimization - Optimization of basic Blocks - Loop Optimization - Introduction to Global Data Flow Analysis - Runtime Environments – Source Language issues- Storage Organization - Storage Allocation strategies – Access to non-local names - Parameter Passing.		

TEXT BOOK (S)

1.	Alfred V Aho , Jeffery D Ullman , Ravi Sethi, " Compilers , Principles techniques and tools ", Pearson Education 2011.
2.	S.Godfrey Winster,S.Aruna Devi,R.Sujatha,"Compiler Design",Yesdee Publishing Pvt.Ltd, 2016

REFERENCE (S)

1.	K.Muneeswaran , ,"Compiler Design", Oxford Higher Education,Fourth edition 2015
2.	David Galles, "Modern Compiler Design", Pearson Education, Reprint 2012.
3.	Raghavan V., "Principles of Compiler Design", Tata McGraw Hill Education Pvt. Ltd., 2010

M.KUMARASAMY COLLEGE OF ENGG. (AUTONOMOUS)
Approved By
Board of Information Technology On
19 OCT 2020
KARUR-639 113.

Regulation 2018		Semester	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18ITE008T	Cryptography And Network Security	3	1	0	4

Prerequisite Course (s)

Computer Networks

Course Objective (s):

The purpose of learning this course is to:

CO1	Explain the basics of number theory and compare various encryption techniques.
CO2	Summarize the functionality of public key cryptography.
CO3	Apply various message authentication functions and secure algorithms.
CO4	Demonstrate different types of security systems and applications.
CO5	Discuss different levels of security and services.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Understand OSI security architecture and classical encryption techniques.
CO2	Acquire fundamental knowledge on the concepts of finite fields and number theory.
CO3	Understand various block cipher and stream cipher models.
CO4	Describe the principles of public key cryptosystems, hash functions and digital signature.
CO5	Protect any network from the threats in the world.

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO-1	PSO2	PSO3
CO1	3	3	2	1	1	-	-	-	-	-	-	1	-	1	-
CO2	3	3	2	2	-	-	-	-	-	-	-	1	-	1	-
CO3	3	3	3	2	2	1	1	-	-	-	-	1	-	1	-
CO4	3	3	3	2	2	1	1	-	-	-	-	1	-	1	-
CO5	3	3	1	1	1	1	2	2	-	-	-	1	-	1	-
CO (Avg)	3	3	2	2	1	1	1	1	-	-	-	1	-	1	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

M.KUMARASAMY COLLEGE OF ENGG. (AUTONOMOUS) Approved By Board of Information Technology On 19 OCT 2020 KARUR-639113.

UNIT I	INTRODUCTION & NUMBER THEORY	9
Services, Mechanisms and attacks-the OSI security architecture-Network security model-Classical Encryption techniques .Finite Fields And Number Theory: Groups, Rings, Fields-Modular arithmetic-Euclid's algorithm-Finite fields-Prime numbers-Fermat's and Euler's theorem- -The Chinese remainder theorem.		
UNIT II	**BLOCK CIPHERS & PUBLIC KEY CRYPTOGRAPHY**	**9**
Data Encryption Standard-Block cipher principles-block cipher modes of operation-Advanced Encryption Standard (AES)-Triple DES-Blowfish-RC5 algorithm. Public key cryptography: Principles of public key cryptosystems-The RSA algorithm-Key management - Diffie Hellman Key exchange		
UNIT III	**HASH FUNCTIONS AND DIGITAL SIGNATURES**	**9**
Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC –MD5 - SHA - HMAC – CMAC - Digital signature and authentication protocols– DSS – El Gamal – Schnorr.		
UNIT IV	**SECURITY PRACTICE & SYSTEM SECURITY**	**9**
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 – Trusted systems		
UNIT V	**E-MAIL, IP & WEB SECURITY**	**9**
E- mail Security: Security Services for E- mail- attacks possible through E- mail - establishing keys privacy-authentication of the source-Message Integrity-Non-repudiation-Pretty Good Privacy-S/MIME. IPSecurity: Overview of IPSec - IP and IPv6-Authentication Header-Encapsulation Security Payload (ESP)- Web Security: SSL/TLS Basic Protocol-computing the keys- client authentication.		

Text Book (s)

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

Reference (s)

1	Behrouz A. Ferouzan, "Cryptography & Network Security", Tata Mc Graw Hill, 2007.
2	Man Young Rhee, "Internet Security: Cryptographic Principles", Algorithms and Protocols,Wiley Publications, 2003.
3	Charles Pfleeger,"Security in Computing", 4th Edition, Prentice Hall of India, 2006

M.KUMARASAMY COLLEGE OF ENGG. (AUTONOMOUS)
Approved By
Board of Information Technology On
19 OCT 2020
KARUR-639 113.

Regulation 2018			Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18ITE009T	Human Computer Interaction	3	0	0	3

Prerequisite Course (s)

Programming for Problem Solving,Software Engineering

Course Objective (s):

The purpose of learning this course is to:

CO1	Learn the foundations of Human Computer Interaction
CO2	Be familiar with the design technologies for individuals and persons with disabilities
CO3	Understand the communication & collaborative models
CO4	Be aware of mobile HCI
CO5	Learn the guidelines for user interface.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Identify the Foundations of human computer interaction
CO2	Illustrate the technologies for individuals and persons with disabilities
CO3	Summarize the basic concepts of cognitive, Collaborative and Cognitive models.
CO4	Apply the application framework to design a tool.
CO5	Show the Guidelines For User Interface.

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	3	-	-	-	3	-	1	-	-
CO2	3	3	2	-	-	-	3	-	-	-	3	-	1	-	-
CO3	1	-	-	-	-	2	-	-	-	-	-	-	1	-	-
CO4	3	2	2	-	-	-	-	-	-	1	3	-	1	-	-
CO5	3	2	1	-	-	-	-	-	-	2	3	-	1	-	-
CO (Avg)	2.6	1.4	1			.4	1.2	-	-	.6	2.4	-	1	-	-

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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	**COGNITIVE, COMMUNICATION & COLLABORATIVE MODELS**	**9**
Cognitive models – Goal & task hierarchies – Linguistic models – Physical & device models; communication & collaboration models – Face-to-face communication – conversation – text based – group working; Task analysis – task decomposition – Knowledge based analysis – ER based techniques		
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.		

Text Book (s)

1	Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, "Human Computer Interaction", 3rd Edition, Pearson Education, 2004 (UNIT I , II & III)
2	Brian Fling, "Mobile Design and Development", First Edition , O'Reilly Media Inc., 2009 (UNIT –IV)

Reference (s)

1	Bill Scott and Theresa Neil, "Designing Web Interfaces", First Edition, O'Reilly, 2009.(UNIT-V)

Regulation 2018			Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18ITE010T	Internet Of Things	3	0	0	3

Prerequisite Course (s)

Embedded Systems

Course Objective (s):

The purpose of learning this course is to:

1	To understand the basics of Internet of Things and to get an idea of some of the application areas where Internet of Things can be applied

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Outline the basic concepts of IoT.
CO2	Analyze the various types of protocols for IoT.
CO3	Compare the middleware for WoT and IoT.
CO4	Explain the role of cloud and security in IoT.
CO5	Analyze applications of IoT in real time scenario.

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	3	1	1	1	1	-	2	-	-	2	2	2	2
CO2	3	3	3	2	2	2	1	-	2	-	-	2	2	3	2
CO3	3	3	3	2	3	2	2	-	2	-	-	2	2	3	2
CO4	3	3	3	3	3	2	2	-	2	-	-	3	2	3	2
CO5	3	3	3	2	3	2	2	-	2	-	-	3	2	3	2
CO (Avg)	2.80	2.80	3.00	2.00	2.40	1.80	1.60	-	2.00	-	-	1.60	2.00	2.80	2.00

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	FUNDAMENTALS OF IoT	9
Definitions and Functional Requirements –Motivation – Architecture - Web 3.0 View of IoT– Four Pillars of IoT – DNA of IoT – IoT Models. Middleware for IoT: Overview – Communication middleware for IoT –IoT Information Security		
UNIT II	**IOT PROTOCOLS**	**9**
Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFID Protocols – Issues with IoT Standardization – Unified Data Standards – Protocols – IEEE 802.15.4 – BACNet Protocol – ZigBee Architecture – Network layer – APS layer – Security		
UNIT III	**WEB OF THINGS**	**9**
Web of Things versus Internet of Things – Two Pillars of the Web – Architecture Standardization for WoT– Platform Middleware for WoT – Unified Multitier WoT Architecture – WoT Portals and Business Intelligence.		
UNIT IV	**IOT IN CLOUD AND SECURITY**	**9**
Internet of Things (IoT) as Interconnection of Threats (IoT) – Privacy Preservation for IoT used in Smart Buildings – Preventing Unauthorized Access to Sensor Data – Authentication in IoT – Security Protocols for IoT Access Networks - Cloud and IoT		
UNIT V	**CASE STUDIES/INDUSTRIAL APPLICATIONS**	**9**
Cisco IoT system - IBM Watson IoT platform – Manufacturing - Converged Plantwide Ethernet Model (CPwE) – Power Utility Industry – GridBlocks Reference Model - Smart and Connected Cities: Layered architecture, Smart Lighting, Smart Parking Architecture and Smart Traffic Control.		

Text Book (s)

1	David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, —IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, Cisco Press, 2017
2	The Internet of Things in the Cloud: A Middleware Perspective - Honbo Zhou – CRC Press – 2012
3	Architecting the Internet of Things - Dieter Uckelmann; Mark Harrison; Florian Michahelles-(Eds.) – Springer – 2011

Reference (s)

1	Networks, Crowds, and Markets: Reasoning About a Highly Connected World - David Easley and Jon Kleinberg, Cambridge University Press – 2010
2	The Internet of Things: Applications to the Smart Grid and Building Automation by – Olivier Hersent, Omar Elloumi and David Boswarthick - Wiley -2012
3	Olivier Hersent, David Boswarthick, Omar Elloumi , "The Internet of Things – Key applications and Protocols", Wiley, 2012

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Board of Information Technology On
19 OCT 2020
KARUR-639 113.

Regulation 2018			Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18ITE011T	INFORMATION THEORY & CODING	3	0	0	3

Prerequisite Course (s)

Multimedia Systems

Course Objective (s):

The purpose of learning this course is to:

Introduce the fundamental concepts of information theory: data compaction, data compression, data trans error detection and correction.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	To have a complete understanding of error–control coding
CO2	To understand encoding and decoding of digital data streams
CO3	To introduce methods for the generation of these codes and their decoding techniques
CO4	To have a detailed knowledge of compression and decompression techniques.
CO5	To introduce the concepts of multimedia communication.

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	-	-	-	-	-	-	3	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-	3	-	-
CO3	2	2	-	-	-	-	-	-	-	-	-	-	3	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-	2	-	-
CO5	2	2	-	-	-	-	-	-	-	-	-	-	2	-	-
CO (Avg)	2.60	2.00	-	-	-	-	-	-	-	-	-	-	2.60	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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19 OCT 2020
KARUR-639 113.

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.		

Text Book (s)

1	Simon Haykin, Michael Moher, "Communication Systems",5th Edition, 2009
2	Fred Halsall, "Multimedia Communications, Applications Networks Protocols and Standards", Pearson Education, Asia 2002; Chapters: 3.4.5.

Reference (s)

1	Mark Nelson, "Data Compression Book", BPB Publication 1992
2	Watkinson J, "Compression in Video and Audio", Focal Press, London, 1995.
3	https://nptel.ac.in/courses/117/108/117108097/

M.KUMARASAMY COLLEGE OF ENGG. (AUTONOMOUS)
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Board of Information Technology On
19 OCT 2020
KARUR-639113.

Regulation 2018			Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18ITE012T	Decision Support Systems	3	0	0	3

Prerequisite Course (s)

Management Information Systems

Course Objective (s):

The purpose of learning this course is to:

1	To attain knowledge in the Components of decision making and development process of Decision support systems.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Illustrate the concept and components of Decision Support Systems
CO2	Identify the different types of Models in Model Management and process the commands
CO3	Demonstrate the different data sources and data base languages
CO4	Demonstrate User Interface and the issues related to User Interface
CO5	Outline the development process of the Decision Support Systems

CO-PO Mapping

COs	Pos												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1	1	2	-	-	-	-	-	-	-	-	2	2
CO2	3	2	2	2	2	-	-	-	-	-	-	-	-	2	2
CO3	3	2	2	3	2	-	-	-	-	-	-	-	-	2	2
CO4	3	2	1	1	2	-	-	-	-	-	-	-	-	2	2
CO5	3	2	3	2	3	-	-	-	-	-	-	-	-	2	2
CO (Avg)	3.0	1.8	1.8	1.8	2.2	-	-	-	-	-	-	-	-	2.0	2.0

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	DECISION SUPPORT SYSTEMS	9
Decision concept-steps-Decision support systems-Components-Characteristics-Classification-Applications		
UNIT II	**MODEL MANAGEMENT**	**9**
Models-Modeling Process-Types of Models-Optimization-Simulation-Heuristics-Descriptive-Predictive -Model base-Modeling languages-Model Directory-Model Base Management System-Model Execution,Integration,Command processing-Model Packages		
UNIT III	**DATA MANAGEMENT SYSTEMS**	**9**
Database-Sources of Data-Data Directory-Data structures-Data base Languages-Query Facility-Data Management System-DBMS as DSS Development Tool		
UNIT IV	**DIALOG MANAGEMENT**	**9**
User Interface-Graphics-Multimedia-Visual Interactive Modeling-Natural Language Processing-Speech Recognition-Understanding- Issues in User Interface		
UNIT V	**DEVELOPMENT OF DECISION SUPPORT SYSTEMS**	**9**
Development Process-Software and Hardware and Data Acquisition-Model Acquistion-Dialog Development-Integration-Testing and Validation-Training and Implementation		

Text Book (s)

1	Efraim Turban and Jay E Aronson,'Decision Support Systems and Intelligent Sytems',Prentice Hall of India,7th Edition,April 2004.
2	Janaki Raman V.S. and Sarukesi K,'Decision Support Systems',Mc Graw Hill Inc.,International Edition,New Delhi,1999

Reference (s)

1	Lofti ,'Decision Support System and Management',McGraw Hill Inc,International Edition,New Delhi,1996
2	Marakas,'Decision Support System',Prentice Hall Internation Paper Back Edition,Delhi 1998

Regulation 2018			Total Hours			45
			Hours / Week			C
Category	Course Code	Course Name	L	T	P	
E	18ITE013T	Wireless Adhoc And Sensor Networks	3	0	0	3

Prerequisite Course (s)

Mobile Computing

Course Objective (s):

The purpose of learning this course is to:

1	Understand the design issues and challenges associated with implementations of ad hoc and sensor network applications

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Identify various issues in wireless ad-hoc networks.
CO2	Understand various issues and challenges in the design of wireless ad hoc networks.
CO3	Understand the working of MAC and Routing Protocols for ad hoc and sensor networks
CO4	Summariaze about the Transport Layer protocols and their QoS for ad hoc and sensor networks.
CO5	Understand various security issues in ad hoc and sensor networks and the corresponding solutions.

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	2	-	-	-	-	-	-	1	2	2	2
CO2	2	2	2	3	2	-	-	-	-	-	-	1	2	2	2
CO3	2	3	3	3	2	-	-	-	-	-	-	1	2	3	2
CO4	3	3	3	2	2	-	-	-	-	-	-	1	2	2	2
CO5	3	3	3	3	3	-	-	-	-	-	-	1	2	2	2
CO (Avg)	2.60	2.60	2.60	2.40	2.20	-	-	-	-	-	-	1.00	2.00	2.20	2.00

UNIT I	MAC & ROUTING IN AD HOC NETWORKS	9
Introduction – Issues and challenges in ad hoc networks – MAC Layer Protocols for wireless ad hoc networks – Contention-Based MAC protocols – MAC Protocols Using Directional Antennas – Multiple-Channel MAC Protocols – Power-Aware MAC Protocols – Routing in Ad hoc Networks – Design Issues – Proactive, Reactive and Hybrid Routing Protocols		
UNIT II	**TRANSPORT & QOS IN AD HOC NETWORKS**	**9**
TCP"s challenges and Design Issues in Ad Hoc Networks – Transport protocols for ad hoc networks – Issues and Challenges in providing QoS – MAC Layer QoS solutions – Network Layer QoS solutions – QoS Model.		
UNIT III	**MAC & ROUTING IN WIRELESS SENSOR NETWORKS**	**9**
Introduction – Applications – Challenges – Sensor network architecture – MAC Protocols for wireless sensor networks – Low duty cycle protocols and wakeup concepts – Contention-Based protocols – Schedule-Based protocols – IEEE 802.15.4 Zigbee – Topology Control – Routing Protocols.		
UNIT IV	**TRANSPORT & QOS IN WIRELESS SENSOR NETWORKS**	**9**
Data-Centric and Contention-Based Networking – Transport Layer and QoS in Wireless Sensor Networks – Congestion Control in network processing – Operating systems for wireless sensor networks – Examples.		
UNIT V	**SECURITY IN AD HOC AND SENSOR NETWORKS**	**9**
Security Attacks – Key Distribution and Management – Intrusion Detection – Software based Anti-tamper techniques – Water marking techniques – Defense against routing attacks - Secure Ad hoc routing protocols – Broadcast authentication WSN protocols – TESLA – Biba – Sensor Network Security Protocols – SPINS.		

Text Book (s)

1	C.Siva Ram Murthy and B.S.Manoj, —Ad Hoc Wireless Networks – Architectures and Protocols‖, Pearson Education, 2006.
2	Holger Karl, Andreas Willing, —Protocols and Architectures for Wireless Sensor Networks‖, John Wiley & Sons, Inc., 2005.

Reference (s)

1	Carlos De Morais Cordeiro, Dharma Prakash Agrawal, —Ad Hoc and Sensor Networks: Theory and Applications (2nd Edition)‖, World Scientific Publishing, 2011
2	Waltenegus Dargie, Christian Poellabauer, —Fundamentals of Wireless Sensor Networks Theory and Practice‖, John Wiley and Sons, 2010
3	Xiang-Yang Li , "Wireless Ad Hoc and Sensor Networks: Theory and Applications‖, 1227 th edition, Cambridge university Press,2008.
4	Subir Kumar Sarkar, T G Basavaraju, C Puttamadappa, —Ad Hoc Mobile Wireless Networks‖, Auerbach Publications, 2008.

M.KUMARASAMY COLLEGE OF ENGG. (AUTONOMOUS)
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19 OCT 2020
KARUR-639 113.

Regulation 2018			Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18ITE014T	Service Oriented Architecture	3	0	0	3

Prerequisite Course (s)

Web Technology

Course Objective (s):

The purpose of learning this course is to:

1	Build SOA-based applications for intra-enterprise and inter-enterprise application.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Illustrate the properties of XML.
CO2	Demonstrate standards related to XML.
CO3	Outline the basic principles and characteristics of Service Oriented Architecture
CO4	Utilize Web services and its transactions.
CO5	Develop an SOA-based application

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	2	-	-	-	-	-	-	-	2	2	2
CO2	3	3	3	3	3	-	-	-	-	-	-	-	2	2	2
CO3	2	2	2	2	2	-	-	-	-	-	-	-	2	2	2
CO4	3	3	2	2	2	-	-	-	-	-	-	-	2	2	2
CO5	3	3	3	3	3	-	-	-	-	-	-	-	3	3	2
CO (Avg)	2.80	2.80	2.40	2.40	2.40	-	-	-	-	-	-	-	2.20	2.20	2.00

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Board of Information Technology On
19 OCT 2020
KARUR-639113.

UNIT I	INTRODUCTION TO XML	9
XML document structure – Well formed and valid documents – Namespaces – DTD – XML Schema – X- Files.		
UNIT II	**BUILDING XML- BASED APPLICATIONS**	**9**
Parsing XML – using DOM, SAX – XML Transformation and XSL – XSL Formatting – Modeling Databases in XML.		
UNIT III	**SERVICE ORIENTED ARCHITECTURE**	**9**
Characteristics of SOA, Comparing SOA with Client-Server and Distributed architectures – Benefits of SOA - - Principles of Service orientation – Service layers.		
UNIT IV	**WEB SERVICES**	**9**
Service descriptions – WSDL – Messaging with SOAP – Service discovery – UDDI – Message Exchange Patterns – Orchestration – Choreography –WS Transactions.		
UNIT V	**BUILDING SOA-BASED APPLICATIONS**	**9**
Service Oriented Analysis and Design – Service Modeling– WS-BPEL – WS-Coordination – WS-Policy – WS-Security – SOA support in J2EE.		

Text Book (s)	
1	Ron Schmelzer et.al "XML and Web Services",pearson education,2002
2	Thomas Erl"Service Oriented Architecture:Concepts,Technology and Design",Pearson Education,2005
Reference (s)	
1	Munindar P. Singh and Michael N. Huhns "Service-Oriented Computing: Semantics, Processes, Agents" John Wiley & Sons, Ltd., 2005 ISBN: 0-470-09148-7

Regulation 2018			Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18ITE015T	Mobile Communication	3	0	0	3

Prerequisite Course (s)

Computer Architecture,Operating Systems

Course Objective (s):

The purpose of learning this course is to:

1	Understand the basic concepts of mobile computing.
2	Explain the basics of mobile telecommunication system.
3	Outline the network layer protocols and Ad-Hoc networks.
4	Classify the basics of transport and application layer protocols.
5	Apply the different mobile platforms and build few application development.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Explain the basics of mobile telecommunication systems.
CO2	Illustrate the generations of telecommunication systems in wireless networks.
CO3	Demonstrate the functionality of MAC, network layer and Identify a routing protocol for a given Ad hoc network.
CO4	Summarise the functionality of Transport and Application layers.
CO5	Develop a mobile application using android/blackberry/ios/Windows SDK.

CO-PO Mapping

Cos	Pos												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	1	1	1	1	1	3	3	1	2	3	1	1
CO2	3	3	2	1	1	1	1	1	3	3	1	2	3	1	1
CO3	3	3	2	1	2	1	1	1	3	3	1	2	3	1	1
CO4	3	3	2	1	2	1	1	1	3	3	1	2	3	1	1
CO5	3	3	2	1	3	1	1	1	3	3	1	2	3	1	1
CO (Avg)	3	3	2	1	1.8	1	1	1	3	3	1	2	3	1	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	INTRODUCTION	9
Introduction to Mobile Computing – Applications of Mobile Computing- Generations of Mobile Communication Technologies- Multiplexing – Spread spectrum -MAC Protocols – SDMA- TDMA- FDMA- CDMA.		
UNIT II	**MOBILE TELECOMMUNICATION SYSTEM**	**9**
Introduction to Cellular Systems - GSM – Services & Architecture – Protocols – Connection Establishment – Frequency Allocation – Routing – Mobility Management – Security – GPRS- UMTS – Architecture – Handover – Security		
UNIT III	**MOBILE NETWORK LAYER**	**9**
Mobile IP – DHCP – AdHoc– Proactive protocol-DSDV, Reactive Routing Protocols – DSR, AODV Hybrid routing –ZRP, Multicast Routing- ODMRP, Vehicular Ad Hoc networks (VANET) – MANET Vs VANET – Security.		
UNIT IV	**MOBILE TRANSPORT AND APPLICATION LAYER**	**9**
Mobile TCP– WAP – Architecture – WDP – WTLS – WTP –WSP – WAE – WTA Architecture – WML		
UNIT V	**MOBILE PLATFORMS AND APPLICATIONS**	**9**
Mobile Device Operating Systems – Special Constraints & Requirements – Commercial Mobile Operating Systems – Software Development Kit: iOS, Android, BlackBerry, Windows Phone – MCommerce – Structure – Pros & Cons – Mobile Payment System – Security Issues		

Text Book (s)

1	Jochen Schiller, -Mobile Communications‖, PHI, Second Edition, 2003.
2	Prasant Kumar Pattnaik, Rajib Mall, -Fundamentals of Mobile Computing‖, PHI Learning Pvt.Ltd, New Delhi – 2012

Reference (s)

1	Dharma Prakash Agarval, Qing and An Zeng, "Introduction to Wireless and Mobile systems",Thomson Asia Pvt Ltd, 2005.
2	Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, -Principles of Mobile Computing‖, Springer, 2003.
3	William.C.Y.Lee,-Mobile Cellular Telecommunications-Analog and Digital Systems‖, Second Edition,TataMcGraw Hill Edition ,2006.
4	C.K.Toh, -AdHoc Mobile Wireless Networks‖, First Edition, Pearson Education, 2002.
5	Android Developers : http://developer.android.com/index.html

Regulation 2018			Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18ITE016T	Enterprise Computing	3	0	0	3

Prerequisite Course (s)

Software Engineering,Java Programming

Course Objective (s):

The purpose of learning this course is to:

1	Demonstrate with knowledge of software construction at enterprise level.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Infer the basic concepts of an Enterprise and applications.
CO2	Classify the requirements for validation, planning and estimation.
CO3	Develop a basic enterprise architecture with hardware and software components
CO4	Demonstrate code review, static and dynamic code analysis.
CO5	Identify the different types of testing for an enterprise application.

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1		1	1			1	1	1	1	1	1	1
CO2	3	3	3	2	2	3	2	2	3	3	3	3	3	3	3
CO3	3	3	3	2	2	3	2	2	3	3	3	3	3	3	3
CO4	3	3	3	2	2	3	2	2	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	2	3	3	3	3	3	3	3
CO (Avg)	3	3	2.6	2.25	2	2.6	2.25	2	2.6	2.6	2.6	2.6	2.6	2.6	2.6

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	INTRODUCTION	9
Introduction to enterprise applications and their types, software engineering methodologies, life cycle of raising an enterprise application, introduction to skills required to build an enterprise application, key determinants of successful enterprise applications, and measuring the success of enterprise applications		
UNIT II	**MODELING**	**9**
Inception of enterprise applications, enterprise analysis, business modeling, requirements elicitation, use case modeling, prototyping, non functional requirements, requirements validation, planning and estimation		
UNIT III	**ARCHITECTURE**	**9**
Concept of architecture, views and viewpoints, enterprise architecture, logical architecture, technical architecture and design, Infrastructure architecture and design		
UNIT IV	**CONSTRUCTION**	**9**
Construction readiness of enterprise applications - defining a construction plan, defining a package structure, setting up a configuration management plan, setting up a development environment, introduction to the concept of Software Construction Maps, construction of technical Solutions layers, methodologies of code review, static code analysis, build and testing, dynamic code analysis – code profiling and code coverage.		
UNIT V	**TESTING**	**9**
Types and methods of testing an enterprise application, testing levels and approaches, testing environments, integration testing, performance testing, penetration testing, usability testing, globalization testing and interface testing, user acceptance testing, rolling out an enterprise application.		

Text Book (s)

1	Anubhav Pradhan, Satheesan B.Nanjappa, Senthil K.Nallasamy, Veerakumar Esakimuthu, "Raising Enterprise Applications", Wiley India, First Edition, 2012.

Reference (s)

1	George Reese, —Database programming, with JDBC and Java" Second Edition, O'Reiliy Publishers, New Delhi, 2000.
2	Dustin R. Callaway - "Inside Servlets‖ - Addison Wesley Longman Inc, New Delhi, 2001.

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KARUR-639 113.

Regulation 2018			Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18ITE017T	Grid Computing	3	0	0	3

Prerequisite Course (s)

Computer Architecture

Course Objective (s):

The purpose of learning this course is to:

CO1	To understand and explain the key concepts of grid computing.
CO2	To identify the resource selection for grid environment
CO3	To understand about grid computing history, evolution of grid and its Security issues.
CO4	To understand data management and transfer in grid environment
CO5	To understand the recent version Globus toolkit

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Interpret the need for evolution of grids in the context of processor and data intensive applications
CO2	Illustrate the key concepts of grid computing
CO3	Compare the resources selections for grid environment
CO4	Outline the fundamental components of grid environments
CO5	Infer grid computing applications using globus or similar toolkits

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	-	-	-	-	-	-	-	-	-	1	-	-
CO2	3	2	1	-	-	-	-	-	-	-	-	-	1	-	-
CO3	3	2	1	-	-	-	-	-	-	-	-	-	1	-	-
CO4	3	2	1	-	-	-	-	-	-	-	-	-	1	-	-
CO5	3	2	1	-	1	-	-	-	1	-	-	-	1	-	-
CO (Avg)	3	2	1	-	1	-	-	-	1	-	-	-	1	-	-

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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19 OCT 2020
KARUR-639 113.

UNIT I	CONCEPTS AND ARCHITECTURE	9
Introduction-Parallel and Distributed Computing-Cluster Computing-Grid Computing- Anatomy and Physiology of Grid-Review of Web Services-OGSA-WSRF.		
UNIT II	**GRID MONITORING**	**9**
Grid Monitoring Architecture (GMA) - An Overview of Grid Monitoring Systems- GridICE– JAMM -MDS-Network Weather Service-R-GMA-Other Monitoring Systems- Ganglia and GridMon		
UNIT III	**GRID SECURITY AND RESOURCE MANAGEMENT**	**9**
Grid Security-A Brief Security Primer-PKI-X509 Certificates-Grid Security-Grid Scheduling and Resource Management-Scheduling Paradigms- Working principles of Scheduling -A Review of Condor, SGE, PBS -Grid Scheduling with QoS.		
UNIT IV	**DATA MANAGEMENT AND GRID PORTALS**	**9**
Data Management-Categories and Origins of Structured Data-Data Management Challenges-Architectural Approaches-Collective Data Management Services-Federation Services-Grid Portals-Its types		
UNIT V	**GRID MIDDLEWARE**	**9**
List of globally available Middlewares - Case Studies-Recent version of Globus Toolkit and gLite - Architecture, Components and Features.		

Text Book (s)	
1	Maozhen Li, Mark Baker, The Grid Core Technologies, John Wiley & Sons ,2005.
Reference (s)	
1	Ian Foster & Carl Kesselman, The Grid 2 – Blueprint for a New Computing Infrastructure , Morgan Kaufman – 2004.
2	Joshy Joseph & Craig Fellenstein, "Grid Computing", Pearson Education 2004

Regulation 2018			Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18ITE018T	Semantic Web	3	0	0	3

Prerequisite Course (s)

Web Technology.

Course Objective (s):

The purpose of learning this course is to:

1	Understand the importance and merits of semantic web over traditional web.
2	Summarize the methods to discover, classify and build ontology for more reasonable results in searching.
3	Outline about the RDF and its taxonomy.
4	Explain the basics of OWL and its usage in semantic web.
5	Build an applications that can access, use and manipulate the ontology.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Understand semantic web basics, architecture and technologies.
CO2	Explain the concepts in Ontology Engineering.
CO3	Understand the semantic relationships among the data elements using Resource Description Framework (RDF)
CO4	Illustrate about OWL in detail.
CO5	Design and implement real-world applications that "discovers" the data and/or other web services via the semantic web.

CO-PO Mapping

COs	Pos												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	1	-	-	-	-	-	-	-	-	-	3	2	1
CO2	-	2	-	-	-	-	-	-	-	-	-	-	3	2	1
CO3	1	-	1	-	2	-							3	2	1
CO4	-	2	-	-	-	-	-	-	-	-	-	-	3	2	1
CO5	1	-	3	-	2	--	-	-	-	-	-	-	3	2	1
CO (Avg)	1.33	2	1.67	-	2	-	-	-	-	-	-	-	3	2	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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	**DESCRIBING WEB RESOURCES**	**9**
RDF Overview-The basic elements of RDF-RDF triples-Fundamental rules of RDF-Aggregation and distributed information-RDF tools-RDFS, Taxonomy, and Ontology-Need for RDFS-Core elements of RDFS .		
UNIT IV	**WEB ONTOLOGY LANGUAGE**	**9**
Requirements for Ontology Languages-OWLSublanguages-Description of the OWL Language-Layering of OWL-Examples for OWL-OWL in OWL-Namespaces, Classes of Classes, Class Equivalence, Building Classes from Other Classes, Restricting Properties of Classes.		
UNIT V	**REAL-WORLD EXAMPLES AND APPLICATIONS**	**9**
Swoogle- architecture, usage and examples-FOAF: Friend of a Friend-Basic FOAF vocabulary and examples-Applications-Information publishing, data integration, knowledge management, e-learning, web-services.		

Reference (s)

1	Grigoris Antoniou, Frank Van, "Semantic Web Primer", MIT Press
2	Karin K. Breitman, Marco Antonio Casanova and Walter Truszowski, "Semantic Web Concepts: Technologies and Applications", Springer, 2007
3	LiyangYu , "Introduction to the Semantic Web and Semantic web services" Chapman & Hall/CRC, Taylor & Francis group, 2007
4	Peter Mika, "Social networks and the SemanticWeb", Springer, 1st edition 2007.
5	Robert M. Colomb, "Ontology and the Semantic Web", Volume 156 ,Frontier in Artificial Intelligence and Applications, IOS Press, 2007

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19 OCT 2020
KARUR-639 113.

Regulation 2018			Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18ITE019T	Information Retrieval Techniques	3	0	0	3

Prerequisite Course (s)

Database Management Systems,Data mining and Data Ware Housing

Course Objective (s):

The purpose of learning this course is to:

1	Identify the techniques and algorithms existing in practical retrieval of data such as those in web search Engines

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Understand the basic models and methods of information retrieval.
CO2	Understand the classical techniques of Information Retrieval and basics of Queries.
CO3	Interpret relevant information and subsequently extract meaningful patterns out of it.
CO4	Summarize information on retrieval and user interface design applications.
CO5	Understand the information retrieval techniques using various applications.

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	2	-	-	-	-	-	-	-	1	2	1
CO2	3	3	3	3	3	2	-	-	-	-	-	-	2	3	3
CO3	2	2	2	2	2	2	-	-	-	-	-	-	2	2	2
CO4	3	3	2	2	2	2	-	-	-	-	-	-	2	2	2
CO5	3	3	3	3	3	2	-	-	-	-	-	-	3	3	2
CO (Avg)	2.80	2.80	2.40	2.40	2.40	1.60	-	-	-	-	-	-	2.00	2.40	2.00

UNIT I	INTRODUCTION	9
Basic Concepts – Retrieval Process – Modeling – Classic Information Retrieval – Set Theoretic, Algebraic and Probabilistic Models.		
UNIT II	**RETRIEVAL TECHNIQUES AND QUERYING**	**9**
Structured Text Retrieval Models –Retrieval Evaluation –Word Sense Disambiguation- Languages – Key Word based Querying – Pattern Matching – Structural Queries – Query Operations.		
UNIT III	**TEXT OPERATIONS**	**9**
Document Pre-processing – Clustering – Text Compression - Indexing and Searching – Inverted files – Boolean Queries – Sequential searching – Pattern matching.		
UNIT IV	**USER INTERFACE**	**9**
User Interface and Visualization – Human Computer Interaction – Access Process – Starting Points – Query Specification - Context – User relevance Judgment – Interface for Search.		
UNIT V	**APPLICATIONS**	**9**
Searching the Web – Challenges – Characterizing the Web – Search Engines – Browsing – Metasearchers – Online IR systems – Online Public Access Catalogs.		

Text Book (s)

1	Ricardo Baeza-Yate, Berthier Ribeiro-Neto, Modern Information Retrieval, Pearson Education Asia, 2012.

Reference (s)

1	G.G. Chowdhury, Introduction to Modern Information Retrieval, Second Edition, Neal-Schuman Publishers, 2010.

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19 OCT 2020
KARUR-639 113.

Regulation 2018			Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18ITE020T	Social Network Analysis	3	0	0	3

Prerequisite Course (s)

Data mining and Data Ware housing

Course Objective (s):

The purpose of learning this course is to:

1	To understand the components of the social network.
2	To model and visualize the social network.
3	To mine the users in the social network.
4	To understand the evolution of the social network.
5	To know the applications in real time systems

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Understand the internals components of the social network
CO2	Model and visualize the social network
CO3	Analyze the behavior of the users in the social network
CO4	Predict the possible next outcome of the social network
CO5	Apply social network in real time applications

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	3	3	1	-	1	-	2	-	1	3	2	1
CO2	3	2	1	3	3	1	-	1	-	2	-	1	3	2	1
CO3	3	2	1	3	3	1	-	1	-	2	-	1	3	2	1
CO4	3	2	1	3	3	1	-	-	-	2	-	1	3	2	1
CO5	3	2	1	3	3	1	-	-	-	2	-	1	3	2	1
CO (Avg)	3	2	1	3	3	1	-	1	-	2	-	1	3	2	1

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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	APPLICATIONS	9

A Learning Based Approach for Real Time Emotion Classification of Tweets, A New Linguistic Approach to Assess the Opinion of Users in Social Network Environments, Explaining Scientific and Technical Emergence Forecasting, Social Network Analysis for Biometric Template Protection

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KARUR-639 113.

Reference (s)	
1	Ajith Abraham, Aboul Ella Hassanien, Václav Snášel, —Computational Social Network Analysis: Trends, Tools and Research Advances‖, Springer, 2012
2	Borko Furht, —Handbook of Social Network Technologies and Applications‖, Springer, 1 st edition, 2011
3	Charu C. Aggarwal, —Social Network Data Analytics‖, Springer; 2014
4	Giles, Mark Smith, John Yen, —Advances in Social Network Mining and Analysis‖, Springer, 2010.

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19 OCT 2020
KARUR-639 113.

Regulation 2018			Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18ITE021T	User Interface Design	3	0	0	3

Prerequisite Course (s)

Human Computer Interaction

Course Objective (s):

The purpose of learning this course is to:

1	Gain knowledge of the theoretical foundations of human computer interaction.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Infer the various user interfaces to be applied for design.
CO2	Identify different methods and standards for human interaction.
CO3	Analyze practical abilities in visual and technical aspects of the design process.
CO4	Make use of advanced testing tools.
CO5	Develop webpages.

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	3	2	2	-	-	-	-	-	-	-	2	2	2
CO2	3	3	3	2	2	-	-	-	-	-	-	-	3	3	3
CO3	3	3	3	3	3	-	-	-	-	-	-	-	3	2	2
CO4	3	3	3	3	3	-	-	-	-	-	-	-	3	3	3
CO5	3	2	3	3	3	-	-	-	-	-	-	-	2	2	2
CO (Avg)	2.8	2.8	3	2.6	2.6	0	0	0	0	0	0	0	2.6	2.4	2.4

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	INTRODUCTION	9
Human–Computer Interface – Characteristics Of Graphics Interface –Direct Manipulation Graphical System – Web User Interface –Popularity –Characteristic & Principles.		
UNIT II	**HUMAN COMPUTER INTERACTION**	**9**
User Interface Design Process – Obstacles –Usability –Human Characteristics In Design– Human Interaction Speed –Business Functions –Requirement Analysis – Direct –Indirect Methods – Basic Business Functions – Design Standards –Human Consideration In Screen Design – Structures Of Menus – Functions Of Menus.		
UNIT III	**WINDOWS**	**9**
Characteristics– Components– Presentation Styles– Types– Managements–Organizations– Operations– Web Systems– Device– Based Controls Characteristics–Screen – Based Controls – Operate Control – Text Boxes– Selection Control–Combination Control– Custom Control– Presentation Control.		
UNIT IV	**MULTIMEDIA**	**9**
Text For Web Pages – Effective Feedback– Guidance & Assistance–Internationalization– Accesssibility– Icons– Image– Multimedia – Coloring.		
UNIT V	**WINDOWSLAYOUT–TEST**	**9**
Prototypes – Kinds Of Tests – Retest – Information Search – Visualization –Hypermedia – WWW– open source tools for UI design.		

Text Book (s)

1	Wilbent. O. Galitz ,"The Essential Guide To User Interface Design", John Wiley&Sons, 2002.
2	Ben Sheiderman, "Design The User Interface", Pearson Education, 1998.

Reference (s)

1	Alan Cooper, "The Essential Of User Interface Design", Wiley – Dream Tech Ltd., 2002.

Regulation 2018			Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18ITE022T	Machine Learning	3	0	0	3

Prerequisite Course (s)

Data Mining and Data Ware Housing

Course Objective (s):

The purpose of learning this course is :

1	To understand the need for machine learning for various problem solving
2	To study the various supervised, semi-supervised and unsupervised learning algorithms in machine learning
3	To learn the new approaches in machine learning
4	To design appropriate machine learning algorithms for problem solving

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Understand the basic concepts of machine learning
CO2	Illustarate the terminologies used in Neural Networks And Genetic Algorithms
CO3	Illustrate the terminologies used in Bayesian And Computational Learning
CO4	Understand the techniques involved in Instant Based Learning using case study
CO5	Understand the techniques involved Advanced Learning using case study

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	3	3	1	-	1	-	2	-	1	3	2	1
CO2	3	2	1	3	3	1	-	1	-	2	-	1	3	2	1
CO3	3	2	1	3	3	1	-	1	-	2	-	1	3	2	1
CO4	3	2	1	3	3	1	-	-	-	2	-	1	3	2	1
CO5	3	2	1	3	3	1	-	-	-	2	-	1	3	2	1
CO (Avg)	3	2	1	3	3	1	-	1	-	2	-	1	3	2	1

UNIT I	INTRODUCTION	9
Learning Problems – Perspectives and Issues – Concept Learning – Version Spaces and Candidate Eliminations – Inductive bias – Decision Tree learning – Representation – Algorithm – Heuristic Space Search.		
UNIT II	**NEURAL NETWORKS AND GENETIC ALGORITHMS**	**9**
Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithms – Advanced Topics – Genetic Algorithms – Hypothesis Space Search – Genetic Programming – Models of Evaluation and Learning.		
UNIT III	**BAYESIAN AND COMPUTATIONAL LEARNING**	**9**
Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes Classifier – Bayesian Belief Network – EM Algorithm – Probability Learning – Sample Complexity – Finite and Infinite Hypothesis Spaces – Mistake Bound Model.		
UNIT IV	**INSTANT BASED LEARNING**	**9**
K- Nearest Neighbour Learning – Locally weighted Regression – Radial Bases Functions – Case Based Learning		
UNIT V	**ADVANCED LEARNING**	**9**
Learning Sets of Rules – Sequential Covering Algorithm – Learning Rule Set – First Order Rules – Sets of First Order Rules – Induction on Inverted Deduction – Inverting Resolution – Analytical Learning – Perfect Domain Theories – Explanation Base Learning – FOCL Algorithm – Reinforcement Learning – Task – Q-Learning – Temporal Difference Learning.		

TEXT BOOK(S)

1	Tom M. Mitchell, —Machine Learning‖, McGraw-Hill Education (India) Private Limited, 2013.

REFERENCE(S)

1	. Ethem Alpaydin, —Introduction to Machine Learning (Adaptive Computation and Machine Learning)‖, The MIT Press 2004.
2	Stephen Marsland, —Machine Learning: An Algorithmic Perspective , CRC Press, 2009.

M.KUMARASAMY COLLEGE OF ENGG. (AUTONOMOUS)
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Regulation 2018			Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18ITE023T	Parallel Computing	3	0	0	3

Prerequisite Course (s)

Computer Architecture,Operating Systems

Course Objective (s):

The purpose of learning this course is to:

1	This course focuses on hardware, algorithm, and programming of parallel systems, providing students a complete picture to understand parallel computing.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Infer scalability and clustering techniques.
CO2	Compare Hierarchical, Shared and Distributed memory architecture.
CO3	Demonstrate complete idea about interconnection of systems.
CO4	Develop programs for parallel programming techniques.
CO5	Build programs for message passing techniques.

CO-PO Mapping

COs	Pos												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	-	-	-	-	-	-	-	-	-	2	-	-
CO2	3	2	1	-	-	-	-	-	-	-	-	-	2	-	-
CO3	3	2	1	-	-	-	-	-	-	-	-	-	2	-	-
CO4	3	3	3	-	-	-	-	-	-	-	-	-	2	-	-
CO5	3	2	1	-	-	-	-	-	-	-	-	-	2	-	-
CO (Avg)	3.0	2.2	1.4	-	-	-	-	-	-	-	-	-	2.0	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	SCALABILITY AND CLUSTERING	9
Evolution of Computer Architecture– Dimensions of Scalability–Parallel Computer Models - Basic Concepts Of Clustering – Scalable Design Principles –Parallel Programming Overview –Processes, Tasks and Threads –Parallelism Issues –Interaction / Communication Issues –Semantic Issues In Parallel Programs.		
UNIT II	**ENABLING TECHNOLOGIES**	**9**
System Development Trends–Principles of Processor Design – Microprocessor Architecture Families –Hierarchical Memory Technology –Cache Coherence Protocols –Shared Memory Consistency –Distributed Cache Memory Architecture –Latency Tolerance Techniques – Multithreaded Latency Hiding.		
UNIT III	**SYSTEM INTERCONNECT**	**9**
Basics of Interconnection Networks –Network Topologies and Properties –Buses, Crossbar and Multistage Switches, Software Multithreading –Synchronization Mechanisms.		
UNIT IV	**PARALLEL PROGRAMMING**	**9**
Paradigms And Programmability – Parallel Programming Models –Shared Memory Programming.		
UNIT V	**MESSAGE PASSING PROGRAMMING**	**9**
Message Passing Paradigm –Message Passing Interface–Parallel Virtual Machine.		

Text Book (s)	
1	Kai Hwang and Zhi.Wei Xu, —Scalable Parallel Computing, Tata Mc GrawHill, New Delhi, 2007.
2	Michael J. Quinn, —Parallel Computing Theory and Practice, Second Edition, Tata McGraw -Hill Publishing Co. Ltd., New Delhi, 2003.
Reference (s)	
1	David E. Culler & Jaswinder Pal Singh, —Parallel Computing Architecture: A Hardware/Software Approach, Morgan Kaufman Publishers, 1999.
2	Michael J. Quinn, —Parallel Programming in C with MPI & OpenMP, Tata McGraw -Hill, New Delhi, 2003.
3	Kai Hwang, —Advanced Computer Architecture Tata McGraw-Hill, New Delhi, 2003.

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Regulation 2018			Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18ITE024T	ROBOTICS	3	0	0	3

Prerequisite Course (s)

Knowledge about the Artificial Intelligence system and its uses, states and their usage.

Course Objective (s):

The purpose of learning this course is to:

CO1	This course begins by introducing the subject of robotics, presents a brief history of Robotic
CO2	To understand the types of robots available in the current trends
CO3	Understand the fundamental concepts classification and Matrix multiplication in vector
CO4	Outline the fundamental mechanism and kinematics usage
CO5	Illustrate the concepts of Robots approach and methods

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Demonstrate the key components of robotics technologies
CO2	Classify the different types of robots.
CO3	Apply different vector spaces and transformations applied to movement of robots.
CO4	Compare kinematics and Inverse kinematics
CO5	Apply graph based method in Configuration spaces

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	3	-	2	-	2	-	-	-	-	-	3	3	3
CO2	3	1	3	-	2	-	2	-	-	-	-	-	3	3	3
CO3	2	1	2	-	2	-	2	-	-	-	-	-	3	3	2
CO4	3	1	3	-	2	-	2	-	-	-	-	-	2	3	3
CO5	2	1	3	-	2	-	2	-	-	-	-	-	2	3	2
CO (Avg)	2.60	1.00	3.00	-	2.00	-	2.00	-	-	-	-	-	2.60	3.00	2.60

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	INTRODUCTION TO ROBOTICS AND BASIC COMPONENTS	9
Introduction – Types of Robots –Uses of Robots – Robot mechanics – Robot electronic design – Sensors – Robots in Industry		
UNIT II	**TYPES OF ROBOTS**	**9**
Articulated – Cartesian – Cylindrical – Polar – Scara – Delta –Types of Robot Sensors – Sensors Used – Ultrasonic Systems – Mobile Robots – Robot Motion		
UNIT III	**VECTORS**	**9**
Vector spaces - inner products - vector norms – orthogonality - Linear transformations - matrix multiplication - matrix groups - Coordinate transformations - rigid transformations – rotation matrices quaternions - Matrix groups		
UNIT IV	**ROBOT KINEMATICS**	**9**
Introduction - Homogenous Transformation Modelling Convention - Forward kinematics - Inverse kinematics – Open and closed Kinematic chains – Two Basic Joints- Revolute - Prismatic - Parallel mechanisms.		
UNIT V	**KINEMATIC PATH PLANNING**	**9**
Potential Field Approach - Probabilistic Road Map Method - Graph based methods - Dijkstra's method - A*Star RRT - configuration space –Artificial potential fields		

Text Book (s)	
1	Fundamentals of Robotics Engineering By Poole, Harry H. 1989
2	Fundamentals of Robotics Engineering By Poole, Harry H. 2012(Springer)
Reference (s)	
1	Robot Building for Beginners (Technology in Action), ISBN 1430227486
2	Additional Resource Material on https://www.edx.org/course/robotics-fundamentals-pennx-robo1x
3	https://nptel.ac.in/courses/112/105/112105249/
4	https://nptel.ac.in/courses/112/108/112108093/
5	https://nptel.ac.in/courses/112/101/112101098/

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Regulation 2018			Total Hours			45
			Hours / Week			C
Category	Course Code	Course Name	L	T	P	
E	18ITE025T	Ethical Hacking	3	0	0	3

Prerequisite Course (s)

Cryptography & Network Security

Course Objective (s):

The purpose of learning this course is to:

1	Understand vulnerabilities, mechanisms to identify threats/attacks ,perform penetration & security testing

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Understand and analyse information security threats & coutermeasures
CO2	Perform security auditing & testing
CO3	Understand issues relating to ethical hacking
CO4	Interpret various web services and session Hijacking
CO5	Understand penetration and security testing issues

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	2	-	-	-	-	-	-	2	3	3	2
CO2	3	3	3	3	3	-	-	-	-	-	-	2	3	3	2
CO3	2	2	2	2	2	-	-	-	-	-	-	2	2	2	3
CO4	3	3	2	2	2	-	-	-	-	-	-	2	2	3	2
CO5	3	3	3	3	3	-	-	-	-	-	-	2	3	2	2
CO (Avg)	2.80	2.80	2.40	2.40	2.40	-	-	-	-	-	-	2	2.60	2.60	2.20

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UNIT I	ETHICAL HACKING OVERVIEW & VULNERABILITIES	9
Understanding the importance of security, Concept of ethical hacking and essential TerminologiesThreat, Attack, Vulnerabilities, Target of Evaluation, Exploit. Phases involved in hacking		
UNIT II	**FOOTPRINTING**	**9**
Footprinting - Introduction to foot printing, Understanding the information gathering methodology of the hackers,Tools used for the reconnaissance phase.		
UNIT III	**SYSTEM HACKING**	**9**
Aspect of remote password guessing, Role of eavesdropping ,Various methods of password cracking, Keystroke Loggers, Understanding Sniffers ,Comprehending Active and Passive Sniffing, ARP Spoofing and Redirection, DNS and IP Sniffing, HTTPS Sniffing.		
UNIT IV	**HACKING WEB SERVICES & SESSION HIJACKING**	9
Web application vulnerabilities, application coding errors, SQL injection into Back-end Databases, cross-site scripting, cross-site request forging, authentication bypass, web services and related flaws, protective http headers Understanding Session Hijacking, Phases involved in Session Hijacking,Types of Session Hijacking, Session Hijacking Tools		
UNIT V	**HACKING WIRELESS NETWORKS**	9
Introduction to 802.11, Role of WEP, Cracking WEP Keys, Sniffing Traffic,Wireless DOS attacks, WLANScanners, WLANSniffers, HackingTools, Securing Wireless Networks.		

Text Book (s)

1	Kimberly Graves, "Certified Ethical Hacker", Wiley India Pvt Ltd, 2010
2	Michael T. Simpson, "Hands-on Ethical Hacking & Network Defense", Course Technology, 2010

Reference (s)

1	Rajat Khare, "Network Seuciryt and Ethical Hacking", Luniver Press, 2006
2	Ramachandran V, BackTrack 5 Wireless Penetration Testing Beginner's Guide (3rd ed.). Packt Publishing, 2011
3	Thomas Mathew, "Ethical Hacking", OSB publishers, 2003

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19 OCT 2020
KARUR-639 113.

Regulation 2018			Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18ITE026T	Distributed Systems	3	0	0	3

Prerequisite Course (s)

Database Management Systems,Operating Systems

Course Objective (s):

The purpose of learning this course is to:

1	To gain knowledge about the distributed system and its uses, their file system, states and their memory usage.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Illustrate the characterization of distributed system.
CO2	Infer in creating distributed objects and methods for invoking it
CO3	Identify file system of distributed system
CO4	Experiment with states of a process
CO5	Compare memory storage concepts

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	-	-	-	-	-	-	-	-	-	2	2	-
CO2	3	2	1	-	-	-	-	-	-	-	-	-	2	2	-
CO3	3	2	2	-	2	-	-	-	2	-	-	2	2	2	-
CO4	3	2	2	-	2	-	-	-	2	-	-	2	2	2	-
CO5	3	2	2	-	2	-	-	-	2	-	-	2	2	2	-
CO (Avg)	3	2	1.6	-	2	-	-	-	2	-	-	2	2	2	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	Characterization of Distributed Systems	9
Introduction-Examples-Resource Sharing and the Web-Challenges. System Models-Architectural-Fundamental. Interprocess Communication-Introduction-API for Internet protocols-External data representation and marshalling--Client-server communication-Group communication-Case study: Interprocess Communication in UNIX.		
UNIT II	**Distributed Objects and Remote Invocation**	**9**
Introduction-Communication between distributed objects-Remote procedure calls-Events and notifications-Case study: Java RMI.Operating System Support-Introduction-OS layer-Protection-Processes and threads-Communication and invocation OS architecture.		
UNIT III	**Distributed File Systems**	**9**
Introduction-File service architecture-Case Study:Sun Network File System-Enhancements and further developments.Name Services-Introduction-Name Services and the Domain Name System-Directory Services-Case Study: Global Name Service.		
UNIT IV	**Time and Global States**	**9**
Introduction-Clocks, events and process states-Synchronizing physical clocks-Logical time and logical clocks-Global states-Distributed debugging. Coordination and Agreement-Introduction-Distributed mutual exclusion-Elections-Multicast communication-Consensus and related problems.		
UNIT V	**Distributed Shared Memory**	**9**
Introduction-Design and implementation issues-Sequential consistency and Ivy case study Release consistency and Munin case study-Other consistency models. CORBA Case Study- Introduction-CORBA RMI-CORBA services.		

TEXT BOOK (S)	
1.	George Coulouris, Jean Dollimore, Tim Kindberg, , "Distributed Systems: Concepts and Design", 4th Edition, Pearson Education, 2009.
REFERENCE (S)	
1.	A.tS. Tanenbaum and M. V. Steen, "Distributed Systems: Principles and Paradigms", Second Edition, Prentice Hall, 2006.
2.	M.L.Liu, "Distributed Computing Principles and Applications", Pearson Addison Wesley, 2004.

M.KUMARASAMY COLLEGE OF ENGG.(AUTONOMOUS)
Approved By
Board of Information Technology On
19 OCT 2020
KARUR-639 113.

Regulation 2018			Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18ITE027T	Business Intelligence	3	0	0	3

Prerequisite Course (s)

Data Base Management Systems
Data Warehousing and Data Mining

Course Objective (s):

The purpose of learning this course is to:

1	Outline the basic rudiments of business intelligence system
2	understand the modeling aspects behind Business Intelligence
3	understand of the business intelligence life cycle and the techniques used in it
4	Infer with different data analysis tools and techniques

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Explain the fundamentals of business intelligence.
CO2	Compare data mining with business intelligence.
CO3	Apply various modeling techniques.
CO4	Apply business intelligence methods to various situations.
CO5	Decide on appropriate technique.

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	-	-	-	-	-	-	-	-	3	2	-
CO2	3	2	2	1	-	-	-	-	-	-	-	-	3	2	-
CO3	3	3	2	2	-	-	-	-	-	1	-	-	3	2	-
CO4	3	3	2	2	-	-	-	-	-	-	-	-	3	2	-
CO5	3	3	1	1	1	-	-	-	-	-	-	-	3	2	-
CO (Avg)	3	2.6	1.8	1.4	1	-	-	-	-	1	-	-	3	2	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	INTRODUCTION TO BUSINESS INTELLIGENCE	9
Effective and timely decisions – Data, information and knowledge – Role of mathematical models – Business intelligence architectures: Cycle of a business intelligence analysis – Enabling factors in business intelligence projects – Development of a business intelligence system – Ethics and business intelligence.		
UNIT II	**KNOWLEDGE DELIVERY**	**9**
The business intelligence user types, Standard reports, Interactive Analysis and Ad Hoc Querying, Parameterized Reports and Self-Service Reporting, dimensional analysis, Alerts/Notifications, Visualization: Charts, Graphs, Widgets, Scorecards and Dashboards, Geographic Visualization, Integrated Analytics, Considerations: Optimizing the Presentation for the Right Message.		
UNIT III	**EFFICIENCY**	**9**
Efficiency measures – The CCR model: Definition of target objectives- Peer groups – Identification of good operating practices; cross efficiency analysis – virtual inputs and outputs – Other models. Pattern matching – cluster analysis, outlier analysis		
UNIT IV	**BUSINESS INTELLIGENCE APPLICATIONS**	**9**
Marketing models – Logistic and Production models – Case studies.		
UNIT V	**FUTURE OF BUSINESS INTELLIGENCE**	**9**
Future of business intelligence – Emerging Technologies, Machine Learning, Predicting the Future, BI Search & Text Analytics – Advanced Visualization – Rich Report, Future beyond Technology.		

Text Book (s)

1	Efraim Turban, Ramesh Sharda, Dursun Delen, "Decision Support and Business Intelligence Systems", 9th Edition, Pearson 2013.
2	Larissa T. Moss, S. Atre, "Business Intelligence Roadmap: The Complete Project Lifecycle of Decision Making", Addison Wesley, 2003.

Reference (s)

1	David Loshin, Business Intelligence ,Second Edition, Morgan Kaufmann Series,2012
2	Carlo Vercellis, "Business Intelligence: Data Mining and Optimization for Decision Making", Wiley Publications, 2009.
3	David Loshin Morgan, Kaufman, "Business Intelligence: The Savvy Manager's Guide", Second Edition, 2012.
4	Cindi Howson, "Successful Business Intelligence: Secrets to Making BI a Killer App", McGraw- Hill, 2007
5	Ralph Kimball , Margy Ross , Warren Thornthwaite, Joy Mundy, Bob Becker, "The Data Warehouse Lifecycle Toolkit", Wiley Publication Inc.,2007.

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19 OCT 2020
KARUR-639 113.

Regulation 2018			Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18ITE028T	Digital Image Processing	3	0	0	3

Prerequisite Course (s)

Digital Signal Processing

Course Objective (s):

The purpose of learning this course is to:

1	Learn digital image fundamentals and concepts of image enhancement techniques, degradation function, segmentation, image compression and recognition methods

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Know and understand the basics and fundamentals of digital image processing, such as digitization, sampling, quantization, and 2D-transforms.
CO2	Operate on images using the techniques of smoothing, sharpening and enhancement.
CO3	Understand the restoration concepts and filtering techniques.
CO4	Learn the basics of segmentation, features extraction.
CO5	Learn the basics of compression and recognition methods for color models.

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	1	-	-	-	-	-	-		2	1	1	1
CO2	3	3	-	1	-	1	1	-	-	-	1	3	2	1	1
CO3	3	3	2	1	-	1	1	-	-	-	1	3	2	1	2
CO4	3	3	1	1	-	1	1	-	-	-	1	3	2	2	1
CO5	3	3	2	2	2	1	2	-	-	-	2	3	2	3	3
CO (Avg)	3	3	1.67	1.2	2	1	1.25	-	-	-	1.25	2.8	1.8	1.6	1.6

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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Board of Information Technology On
19 OCT 2020
KARUR - 639 113.

UNIT I	DIGITAL IMAGE FUNDAMENTALS	9
Image Processing – Components – Elements of Visual Perception – Image Sensing and Acquisition – Image Sampling and Quantization – Relationships between pixels - Color image fundamentals - RGB, HSI models, Two-dimensional mathematical preliminaries, 2D transforms - DFT, DCT.		
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, Homomorphic filtering, Color image enhancement.		
UNIT III	**IMAGE RESTORATION**	**9**
Image Restoration - degradation model, Properties, Noise models – Mean Filters – Order Statistics – Adaptive filters – Band reject Filters – Band pass Filters – Notch Filters – Optimum Notch Filtering – Inverse Filtering – Wiener filtering		
UNIT IV	**IMAGE SEGMENTATION**	**9**
Edge detection, Edge linking via Hough transform – Thresholding - Region based segmentation – Region growing – Region splitting and merging – Morphological processing- erosion and dilation, Segmentation by morphological watersheds – basic concepts – Dam construction – Watershed segmentation algorithm.		
UNIT V	**IMAGE COMPRESSION AND RECOGNITION**	**9**
Need for data compression, Huffman, Run Length Encoding, Shift codes, Arithmetic coding, JPEG standard, MPEG. Boundary representation, Boundary description, Fourier Descriptor, Regional Descriptors – Topological feature, Texture - Patterns and Pattern classes - Recognition based on matching.		

Text Book (s)

1	Rafael C. Gonzalez, Richard E. Woods, 'Digital Image Processing', Pearson, Fourth Edition, 2018.
2	Anil K. Jain, 'Fundamentals of Digital Image Processing', Pearson, 2002.

Reference (s)

1	Kenneth R. Castleman, 'Digital Image Processing', Pearson, 2006.
2	Rafael C. Gonzalez, Richard E. Woods, Steven Eddins, 'Digital Image Processing using MATLAB', Pearson Education, Inc., 2011.
3	D,E. Dudgeon and RM. Mersereau, 'Multidimensional Digital Signal Processing', Prentice Hall Professional Technical Reference, 1990.
4	William K. Pratt, 'Digital Image Processing', John Wiley, New York, 2002
5	Milan Sonka et al 'Image processing, analysis and machine vision', Brookes/Cole, Vikas Publishing House, 2nd edition, 1999

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Board of Information Technology
19 OCT 2020
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Regulation 2018			Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18ITE029J	Advanced Java Programming	2	0	2	3

Prerequisite Course (s)

Java Programming

Course Objective (s): The purpose of learning this course is to:

1.	To learn advanced Java programming concepts like interface, threads,Swings etc.
2.	To develop network programs in Java
3.	To understand Concepts needed for distributed and multi-tier applications
4.	To understand issues in enterprise applications development.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Understand the fundamentals of java streaming
CO2	Illustrate The Techniques to Develope Applications In Distributed Environment
CO3	Develope applications in Distributed Environment
CO4	Apply the techniques involved in multi tier application development
CO5	Understand the architecture of enterprise applications

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	-	-	-	-	-	2	1	2	-	3	3	3
CO2	3	2	2	-	-	-	-	-	2	1	2	-	3	2	3
CO3	2	2	3	-	-	-	-	-	2	1	2	-	3	2	2
CO4	3	2	3	-	-	-	-	-	2	1	2	-	2	2	3
CO5	2	2	3	-	-	-	-	-	2	1	2	-	2	2	2
CO (Avg)	2.60	2.00	2.60	-	-	-	-	-	2.00	1.00	2.00	-	2.60	2.20	2.60

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	JAVA FUNDAMENTALS	6+3
Java I/O streaming – filter and pipe streams – Byte Code interpretation - Threading –Swing.		
UNIT II	**NETWORK PROGRAMMING IN JAVA**	**6+3**
Sockets – secure sockets – custom sockets – UDP datagrams – multicast sockets – URL classes – Reading Data from the server – writing data – configuring the connection – Reading the header – telnet application – Java Messaging services		
UNIT III	**APPLICATIONS IN DISTRIBUTED ENVIRONMENT**	**6+3**
Remote method Invocation – activation models – RMI custom sockets – Object Serialization – RMI – IIOP implementation – CORBA – IDL technology – Naming Services – CORBA programming Models - JAR file creation		
UNIT IV	**MULTI-TIER APPLICATION DEVELOPMENT**	**6+3**
Server side programming – servlets – Java Server Pages - Applet to Applet communication – applet to Servlet communication - JDBC – Applications on databases – Multimedia streaming applications – Java Media Framework.		
UNIT V	**ENTERPRISE APPLICATIONS**	**6+3**
Server Side Component Architecture – Introduction to J2EE – Session Beans – Entity Beans – Persistent Entity Beans .		

TEXT BOOK(S)

1	Elliotte Rusty Harold, " Java Network Programming", O'Reilly publishers, 2000 (UNIT II)
2	Ed Roman, "Mastering Enterprise Java Beans", John Wiley & Sons Inc., 1999. (UNIT III and UNIT V)
3	Hortsmann & Cornell, "CORE JAVA 2 ADVANCED FEATURES, VOL II", Pearson Education, 2002. (UNIT I and UNIT IV)

REFERENCE(S)

1	Webreference:http://java.sun.com.
2	Patrick Naughton, "COMPLETE REFERENCE: JAVA2", Tata McGraw-Hill, 2003.

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Regulation 2018			Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18ITE030T	Software Quality Assurance	3	0	0	3

Prerequisite Course (s)

Software Engineering

Course Objective (s):

The purpose of learning this course is to:

1	The development of appropriate quality assurance strategies via the application of current stand models and measurement techniques

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Outline the basic tenets of software quality and quality factors.
CO2	Apply the Software Quality Assurance (SQA) architecture and the details of components.
CO3	Demonstrate how the SQA components can be integrated into the project life cycle .
CO4	Construct the familiar software quality infrastructure .
CO5	Illustrate about the management components of software quality.

CO-PO Mapping

COs	Pos												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	-	-	-	-	-	-	-	-	-	3	-	-
CO2	3	2	2	-	-	-	-	-	-	-	-	-	3	-	-
CO3	3	2	2	-	-	-	-	-	-	-	-	-	3	-	-
CO4	3	2	2	-	-	-	-	-	-	-	-	-	3	-	-
CO5	3	2	2	-	-	-	-	-	-	-	-	-	3	-	-
CO (Avg)	3.0	2.0	2.0	-	-	-	-	-	-	-	-	-	3.0	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

M.KUMARASAMY COLLEGE OF ENGG. (AUTONOMOUS) Approved By Board of Information Technology On 19 OCT 2020 KARUR-639 113.

UNIT I	INTRODUCTION TO SOFTWARE QUALITY & ARCHITECTURE	9
Need for Software quality – Quality challenges – Software quality assurance (SQA) – Definition and objectives – Software quality factors- McCall' s quality model – SQA system and architecture – Software Project life cycle Components – Pre project quality components – Development and quality plans		
UNIT II	**SQA COMPONENTS AND PROJECT LIFE CYCLE**	**9**
Software Development methodologies – Quality assurance activities in the development process- Verification & Validation – Reviews – Software Testing – Software Testing implementations – Quality of software maintenance – Pre-Maintenance of software quality components – Quality assurance tools – CASE tools for software quality – Software maintenance quality – Project Management		
UNIT III	**SOFTWARE QUALITY INFRASTRUCTURE**	**9**
Procedures and work instructions - Templates - Checklists – 3S development - Staff training and certification Corrective and preventive actions – Configuration management – Software change control – Configuration management audit -Documentation control – Storage and retrieval		
UNIT IV	**SOFTWARE QUALITY MANAGEMENT & METRICS**	**9**
Project process control – Computerized tools - Software quality metrics – Objectives of quality measurement – Process metrics – Product metrics – Implementation – Limitations of software metrics – Cost of software quality – Classical quality cost model – Extended model – Application of Cost model		
UNIT V	**STANDARDS, CERTIFICATIONS & ASSESSMENTS**	**9**
Quality management standards – ISO 9001 and ISO 9000-3 – capability Maturity Models – CMM and CMMI assessment methodologies - Bootstrap methodology – SPICE Project – SQA project process standards – IEEE st 1012 & 1028 – Organization of Quality Assurance – Department management responsibilities – Project management responsibilities		

Text Book (s)	
1	Daniel Galin, "Software Quality Assurance", Pearson Publication, 2009
Reference (s)	
1	Alan C. Gillies, "Software Quality: Theory and Management", International Thomson Computer Press, 1997
2	Mordechai Ben-Menachem "Software Quality: Producing Practical Consistent Software", International Thompson Computer Press, 1997.

M.KUMARASAMY COLLEGE OF ENGG. (AUTONOMOUS)
Approved By
Board of Information Technology On
19 OCT 2020
KARUR-639 113.

Regulation 2018			Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18ITE031T	Software Project Management	3	0	0	3

Prerequisite Course (s)

Software Engineering

Course Objective (s):

The purpose of learning this course is to:

1	To attain knowledge in training software project managers and other individuals involved in Software project planning and tracking and oversight in the implementation of the software project management process.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Compare the skills and roles of functional and technical managers for software efforts and their relationship with other organizations.
CO2	Outline specific sections of the plan used to manage the software development and maintenance efforts.
CO3	Identify software project management practices within an organization and recommend practical improvements based upon your evaluation.
CO4	Apply schedule and cost techniques to estimate the cost of the software projects
CO5	Demonstrate the organizational behavior, selection process in software projects.

CO-PO Mapping

COs	Pos												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	-	-	-	-	-	1	2	3	-	3	-	2
CO2	3	2	1	-	-	-	-	-	1	2	3	-	3	-	2
CO3	3	2	1	-	-	-	-	-	1	2	3	-	3	-	2
CO4	3	2	1	-	-	-	-	-	1	2	3	-	3	-	2
CO5	3	2	1	-	-	-	-	-	1	2	3	-	3	-	2
CO (Avg)	3.0	2.0	1.0	-	-	-	-	-	1.0	2.0	3.0	-	3.0	-	2.0

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	PROJECT EVALUATION AND PROJECT PLANNING	9
Importance of Software Project Management – Activities Methodologies – Categorization of Software Projects – Setting objectives – Management Principles – Management Control – Project portfolio Management – Cost-benefit evaluation technology – Risk evaluation – Strategic program Management – Stepwise Project Planning		
UNIT II	**PROJECT LIFE CYCLE AND EFFORT ESTIMATION**	**9**
Software process and Process Models – Choice of Process models – mental delivery – Rapid Application development – Agile methods – Extreme Programming – SCRUM – Managing interactive processes – Basics of Software estimation – Effort and Cost estimation techniques – COSMIC Full function points – COCOMO II A Parametric Productivity Model – Staffing Pattern.		
UNIT III	**ACTIVITY PLANNING AND RISK MANAGEMENT**	**9**
Objectives of Activity planning – Project schedules – Activities – Sequencing and scheduling – Network Planning models – Forward Pass & Backward Pass techniques – Critical path (CRM) method – Risk identification – Assessment – Monitoring – PERT technique – Monte Carlo simulation – Resource Allocation – Creation of critical patterns – Cost schedules		
UNIT IV	**PROJECT MANAGEMENT AND CONTROL**	**9**
Framework for Management and control – Collection of data Project termination – Visualizing progress – Cost monitoring – Earned Value Analysis- Project tracking – Change control- Software Configuration Management – Managing contracts – Contract Management		
UNIT V	**PROJECT MANAGEMENT AND CONTROL**	**9**
Managing people – Organizational behavior – Best methods of staff selection – Motivation – The Oldham-Hackman job characteristic model – Ethical and Programmed concerns – Working in teams – Decision making – Team structures – Virtual teams		

Text Book (s)	
1	Bob Hughes, Mike Cotterell and Rajib Mall: Software Project Management – Fifth Edition, Tata McGraw Hill, New Delhi, 2012
2	Gopalaswamy Ramesh, "Managing Global Software Projects" – McGraw Hill Education (India), Fourteenth Reprint 2013.
Reference (s)	
1	Robert K. Wysocki "Effective Software Project Management" – Wiley Publication,2011.
2	Walker Royce: "Software Project Management"- Addison-Wesley, 1998.

Regulation 2018			Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18ITE032T	Cloud Computing	3	0	0	3

Prerequisite Course (s)

Computer Architecture,Computer Networks

Course Objective (s):

The purpose of learning this course is to:

1	Understand the concept, evolution and issues of cloud computing and appreciate the emergence of cloud as the next generation computing paradigm.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Articulate the main concepts, key technologies, strengths and limitations of cloud computing.
CO2	Learn the key and enabling technologies that help in the development of cloud.
CO3	Develop the ability to understand and use the architecture of compute and storage cloud, service and delivery models.
CO4	Explain the core issues of cloud computing such as resource management and security.
CO5	Evaluate and choose the appropriate technologies, algorithms and approaches for implementation and use of cloud.

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	1	1	1	-	-	-	-	-	-	3	2	2	2
CO2	3	-	2	2	3	-	1	-	2	2	2	3	2	1	2
CO3	3	-	3	2	3	-	1	-	2	2	2	3	2	3	3
CO4	3	3	2	1	3	3	3	1	2	2	2	3	1	2	2
CO5	3	-	3	3	3	3	-	-	3	3	3	3	2	3	3
CO (Avg)	3	3	2.4	1.8	2.6	3	1.67	1	2.25	2.25	2.25	3	1.8	2.2	2.4

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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UNIT I	INTRODUCTION	9
Introduction to Cloud Computing – Definition of Cloud – Evolution of Cloud Computing – Underlying Principles of Parallel and Distributed Computing – Cloud Characteristics – Elasticity in Cloud – On-demand Provisioning.		
UNIT II	**CLOUD ENABLING TECHNOLOGIES**	**10**
Service Oriented Architecture – REST and Systems of Systems – Web Services – Publish-Subscribe Model – Basics of Virtualization – Types of Virtualization – Implementation Levels of Virtualization – Virtualization Structures – Virtualization of CPU – Memory – I/O Devices.		
UNIT III	**CLOUD ARCHITECTURE, SERVICES AND STORAGE**	**8**
Layered Cloud Architecture Design – NIST Cloud Computing Reference Architecture – Public, Private and Hybrid Clouds - IaaS – PaaS – SaaS – Architectural Design Challenges – Cloud Storage – Storage-as-a-Service – Advantages of Cloud Storage – Cloud Storage Providers – S3.		
UNIT IV	**RESOURCE MANAGEMENT AND SECURITY IN CLOUD**	**10**
Inter Cloud Resource Management – Resource Provisioning and Resource Provisioning Methods – Global Exchange of Cloud Resources – Security Overview – Cloud Security Challenges – Software-as-a-Service Security – Security Governance – Virtual Machine Security – IAM – Security Standards.		
UNIT V	**CLOUD TECHNOLOGIES AND ADVANCEMENTS**	**8**
Hadoop – MapReduce – Virtual Box -- Google App Engine – Programming Environment for Google App Engine — Open Stack – Federation in the Cloud – Four Levels of Federation – Federated Services and Applications – Future of Federation.		

Text Book (s)

1	Rittinghouse, John W., and James F. Ransome, "Cloud Computing: Implementation, Management and Security", CRC Press, 2017.
2	Kai Hwang, Geoffrey C. Fox, Jack G. Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.

Reference (s)

1	Rajkumar Buyya, Christian Vecchiola, S. ThamaraiSelvi, "Mastering Cloud Computing", Tata Mcgraw Hill, 2013.
2	Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing - A Practical Approach", Tata Mcgraw Hill, 2009.
3	George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud: Transactional Systems for EC2 and Beyond (Theory in Practice)", O'Reilly, 2009.

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Regulation 2018			Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18ITE033T	Soft Computing	3	0	0	3

Prerequisite Course (s)

Artificial Intelligence

Course Objective (s):

The purpose of learning this course is to:

1	Expose the students to soft computing, various types of soft computing techniques, and applications of soft computing

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Infer soft computing techniques and their applications.
CO2	Outline various neural network architectures.
CO3	Infer fuzzy systems.
CO4	Dramatize the genetic algorithms and their applications.
CO5	Evaluate and choose the appropriate algorithms and approaches for implementation and use of hybrid systems.

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	2	2	-	-	-	-	-	-	3	1	2	-
CO2	3	3	2	2	3	-	1	-	-	-	-	3	2	3	1
CO3	3	3	2	2	3	-	1	-	-	-	-	3	2	3	1
CO4	3	3	2	2	3	-	1	-	-	-	-	3	2	3	1
CO5	3	3	2	2	3	-	1	-	-	-	-	3	2	3	3
CO (Avg)	3	3	1.8	2	2.8	-	1	-	-	-	-	3	1.8	2.8	1.5

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	INTRODUCTION TO SOFT COMPUTING	9
Introduction-Artificial Intelligence-Artificial Neural Networks-Fuzzy Systems-Genetic Algorithm and Evolutionary Programming-Swarm Intelligent Systems-Classification of ANNs-McCulloch and Pitts Neuron Model-Learning Rules: Hebbian and Delta- Perceptron Network-Adaline Network-Madaline Network.		
UNIT II	**ARTIFICIAL 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 –unsupervised learning networks: Kohonen self organizing feature maps, LVQ – CP networks, ART network.		
UNIT III	**FUZZY LOGIC**	**9**
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: An optimization of traveling salesman problem using genetic algorithm approach, soft computing based hybrid fuzzy controllers.		

Text Book (s)

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 (s)

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	George J. Klir, Ute St. Clair, Bo Yuan, "Fuzzy Set Theory: Foundations and Applications" Prentice Hall, 1997.

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Regulation 2018			Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18ITE034T	Computer Forensics	3	0	0	3

Prerequisite Course (s)

-

Course Objective (s):

The purpose of learning this course is to:

1	Learn about various forensic tools for analysing and validating forensic data

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Understand the basics of computer forensics
CO2	Apply a number of different computer forensic tools to a given scenario
CO3	Analyze and validate forensics data
CO4	Identify the vulnerabilities in a given network infrastructure
CO5	Implement real-world hacking techniques to test system security

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	-	-	-	-	-	-	-	3	3	2
CO2	3	3	3	3	3	-	-	-	-	-	-	-	3	2	2
CO3	2	2	2	3	3	-	-	-	-	-	-	-	3	3	2
CO4	3	3	3	3	2	-	-	-	-	-	-	-	3	3	2
CO5	3	3	3	3	3	-	-	-	-	-	-	-	3	3	2
CO (Avg)	**2.8**	**2.8**	**2.8**	**3**	**2.8**	-	-	-	-	-	-	-	**3**	**2.8**	**2**

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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UNIT I	INTRODUCTION TO COMPUTER FORENSICS	9
Introduction to Traditional Computer Crime, Traditional problems associated with Computer Crime. Introduction to Identity Theft & Identity Fraud. Types of CF techniques - Incident and incident response methodology - Forensic duplication and investigation. Preparation for IR: Creating response tool kit and IR team. - Forensics Technology and Systems - Understanding Computer Investigation – Data Acquisition.		
UNIT II	**EVIDENCE COLLECTION AND FORENSICS TOOLS**	**9**
Processing Crime and Incident Scenes – Working with Windows and DOS Systems. Current Computer Forensics Tools: Software/ Hardware Tools.		
UNIT III	**ANALYSIS AND VALIDATION**	**9**
Validating Forensics Data – Data Hiding Techniques – Performing Remote Acquisition – Network Forensics – Email Investigations – Cell Phone and Mobile Devices Forensics		
UNIT IV	**ETHICAL HACKING**	**9**
Introduction to Ethical Hacking - Footprinting and Reconnaissance - Scanning Networks - Enumeration - System Hacking - Malware Threats - Sniffing		
UNIT V	**ETHICAL HACKING IN WEB**	**9**
Social Engineering - Denial of Service - Session Hijacking - Hacking Web servers - Hacking Web Applications – SQL Injection - Hacking Wireless Networks - Hacking Mobile Platforms.		

Text Book (s)

1	Bill Nelson, Amelia Phillips, Frank Enfinger, Christopher Steuart, —Computer Forensics and Investigationsl, Cengage Learning, India Edition, 2016.
2	CEH official Certfied Ethical Hacking Review Guide, Wiley India Edition, 2015.

Reference (s)

1	John R.Vacca, —Computer Forensicsl, Cengage Learning, 2005
2	MarjieT.Britz, —Computer Forensics and Cyber Crimel: An Introductionl, 3rd Edition, Prentice Hall, 2013.
3	AnkitFadia — Ethical Hackingl Second Edition, Macmillan India Ltd, 2006
4	Kenneth C.Brancik —Insider Computer Fraudl Auerbach Publications Taylor & Francis Group–2008.

Regulation 2018			Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18ITE035T	Digital Watermarking and Steganography	3	0	0	3

Prerequisite Course (s)

Digital Image Processing.

Course Objective (s):

The purpose of learning this course is to:

1.	To know about Evolution and origin of Watermarking and Steganography
2.	To learn about the watermarking models and message coding
3.	To learn about Steganography and Perceptual models
4.	To make the students in gaining knowledge on authentication process
5.	To learn the concept of Steganalysis process

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Know the History and importance of watermarking and steganography
CO2	Analyze Applications and properties of watermarking and Steganography
CO3	Demonstrate Models and algorithms of watermarking
CO4	Possess the passion for acquiring knowledge and skill in preserving authentication of Information
CO5	Identify theoretic foundations of Steganography and Steganalysis

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	2	2	-	1	2	2	-	-	1	3	3	3
CO2	3	2	3	2	2	-	1	2	2	-	-	1	3	2	3
CO3	2	2	3	2	2	-	1	2	2	-	-	1	3	2	2
CO4	3	2	2	2	2	-	1	2	2	-	-	1	2	2	3
CO5	2	2	2	2	2	-	1	2	2	-	-	1	2	2	2
CO (Avg)	2.60	2.00	2.00	2.00	2.00	-	1.00	2.00	2.00	-	-	1.00	2.60	2.20	2.60

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	INTRODUCTION	9
Information Hiding, Steganography and Watermarking – History of watermarking – History of Steganography - Importance of digital watermarking – Applications - Watermarking models & message coding: Notation – Communications – Communication based models – Mapping messages into message vectors – Error correction coding		
UNIT II	**WATERMARKING WITH SIDE INFORMATION & ANALYZING ERRORS**	**9**
Informed Embedding – Structured dirty-paper codes - Message errors – False positive errors –False negative errors – ROC curves – Effect of whitening on error rates.		
UNIT III	**PERCEPTUAL MODELS**	**9**
Evaluating perceptual impact – General form of a perceptual model – Examples of perceptual models – Robust watermarking approaches - Redundant Embedding, Spread Spectrum Coding, Embedding in Perceptually significant coefficients		
UNIT IV	**WATERMARK SECURITY & AUTHENTICATION**	**9**
Security requirements – Watermark security and cryptography – Attacks – Exact authentication – Selective authentication – Localization.		
UNIT V	**STEGANOGRAPHY**	**9**
Steganography communication – Notation and terminology – Information theoretic foundations of Steganography – Practical Steganography methods – Minimizing the embedding impact – Steganalysis - Steganalysis Scenarios		

Text Book (s)

1	Ingemar J. Cox, Matthew L. Miller, Jeffrey A. Bloom, Jessica Fridrich, Ton Kalker, "Digital Watermarking and Steganography", Margan Kaufmann Publishers, New York, 2008.
2	Ingemar J. Cox, Matthew L. Miller, Jeffrey A. Bloom, "Digital Watermarking", Margan Kaufmann Publishers, New York, 2003.

Reference (s)

1	Michael Arnold, Martin Schmucker, Stephen D. Wolthusen, "Techniques and Applications of Digital Watermarking and Contest Protection", Artech House, London, 2003
2	Juergen Seits, "Digital Watermarking for Digital Media", IDEA Group Publisher, New York, 2005
3	Peter Wayner, "Disappearing Cryptography – Information Hiding: Steganography & Watermarking", Morgan Kaufmann Publishers, New York, 2002.

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Regulation 2018			Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18ITE036T	Intellectual Property Rights	3	0	0	3

Prerequisite Course (s)

Management Principles for Engineers

Course Objective (s):

The purpose of learning this course is :

1	To give an idea about IPR, registration and its enforcement.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Identify which of the four main different types of intellectual property rights may be presented by an output
CO2	Analyze an innovative or creative output in terms of intellectual property rights generated
CO3	Discuss the appropriateness, or not, of registering an intellectual property right
CO4	Apply the appropriate ownership rules to intellectual property he / she has been involved in creating
CO5	Suggest ways of exploiting intellectual property rights created in his / her own work

CO-PO Mapping

COs	Pos												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	-	-	-	2	3	3	2	-	3	2	-	-	3
CO2	3	1	-	-	-	2	3	3	2	-	3	2	-	-	3
CO3	3	1	-	-	-	2	3	3	2	-	3	2	-	-	3
CO4	3	1	-	-	-	2	3	3	2	-	3	2	-	-	3
CO5	3	1	-	-	-	2	3	3	2	-	3	2	-	-	3
CO (Avg)	3	1	-	-	-	2	3	3	2	-	3	2	-	-	3

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UNIT I	INTRODUCTION	9
Introduction to IPRs, Basic concepts and need for Intellectual Property - Patents, Copyrights, Geographical Indications, IPR in India and Abroad – Genesis and Development – the way from WTO to WIPO –TRIPS, Nature of Intellectual Property, Industrial Property, technological Research, Inventions and Innovations – Important examples of IPR.		
UNIT II	**REGISTRATION OF IPRs**	**9**
Meaning and practical aspects of registration of Copy Rights, Trademarks, Patents, Geographical Indications, Trade Secrets and Industrial Design registration in India and Abroad		
UNIT III	**AGREEMENTS AND LEGISLATIONS**	**9**
International Treaties and Conventions on IPRs, TRIPS Agreement, PCT Agreement, Patent Act of India, Patent Amendment Act, Design Act, Trademark Act, Geographical Indication Act.		
UNIT IV	**DIGITAL PRODUCTS AND LAW**	**9**
Digital Innovations and Developments as Knowledge Assets – IP Laws, Cyber Law and Digital Content Protection – Unfair Competition – Meaning and Relationship between Unfair Competition and IP Laws – Case Studies.		
UNIT V	**ENFORCEMENT OF IPRs**	**9**
nfringement of IPRs, Enforcement Measures, Emerging issues – Case Studies..		

TEXT BOOK(S)	
1	V. Scople Vinod, Managing Intellectual Property, Prentice Hall of India pvt Ltd, 2012
2	S. V. Satakar, —Intellectual Property Rights and Copy Rights, Ess Ess Publications, New Delhi, 2002
REFERENCE(S)	
1	Deborah E. Bouchoux, —Intellectual Property: The Law of Trademarks, Copyrights, Patents and Trade Secretsǁ, Cengage Learning, Third Edition, 2012.
2	Prabuddha Ganguli,ǁIntellectual Property Rights: Unleashing the Knowledge Economyǁ, McGraw Hill Education, 2011.
3	Edited by Derek Bosworth and Elizabeth Webster, The Management of Intellectual Property, Edward Elgar Publishing Ltd., 2013.

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Regulation 2018			Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18ITE037T	IT Security Evaluation And Auditing	3	0	0	3

Prerequisite Course (s)

To facilitate students should understand the concepts relating to Information Security.

Course Objective (s): The purpose of learning this course is to:

1.	To enable students to comprehend general audit, information systems audit and control, IT governance and their applications to the business environment.
2.	To develop students critical understanding of Computer Assisted Audit Tools and Techniques and its business applications for data extraction and analysis.
3.	To enhance students competency towards risk management, information systems audit, assurance.
4.	To make the students getting more interest in innovating new security policies in modern era.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	To Articulate the concepts of general auditing and information systems audit and control
CO2	To Apply the IS audit methodology and formulate information security policy
CO3	To Develop knowledge and skills in Computer assisted audit tools and techniques
CO4	To Evaluate the organization's IT governance, IS control and security architecture
CO5	To Know about the recent trends of IT security

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	2	2	-	-	-	2	1	2	-	3	3	3
CO2	3	-	-	2	2	-	-	-	2	1	2	-	3	2	3
CO3	2	-	-	2	3	-	-	-	2	1	2	-	3	2	2
CO4	3	-	-	2	3	-	-	-	2	1	2	-	2	3	3
CO5	2	-	-	2	3	-	-	-	2	1	2	-	2	3	2
CO (Avg)	2.60	-	-	2.00	2.60	-	-	-	2.00	1.00	2.00	-	2.60	2.60	2.60

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UNIT I	INTRODUCTION TO AUDIT AND REVIEW IN IT	9
Basics of Audit, IT Auditing: What Is IT- The Situation and the Problem, Audit Standards, Importance of Audit Independence, Need for IT Audit Function, Auditor: Knowledge, Skills, and Abilities, Role of the IT Auditor, Types of Auditors and Their Duties, Functions, and Responsibilities		
UNIT II	**AUDIT PROCESS IN IT ENVIRONMENT**	**9**
Audit Universe, Risk Assessment, Audit Plan, Developing an Audit Schedule, Audit Budget, Objective and Context, Using the Plan to Identify Problems, Audit Process, Design Audit Procedures, Fieldwork and Implementing Audit Methodology.		
UNIT III	**AUDITING IT USING COMPUTER ASSISTED TOOLS**	**9**
Auditor Productivity Tools, Using Computer-Assisted Audit Tools in the Audit Process, Flowcharting Techniques, Flowcharting as an Analysis Tool, Appropriateness of Flowcharting Techniques, Computer-Assisted Audit Tools and Techniques for Application Reviews - Computer-Assisted Audit Tools and Techniques for Operational Reviews - Web Analysis Tools, Web Analysis Software as an, Audit Tool, Computer Forensics.		
UNIT IV	**MANAGING IT AUDIT**	**9**
IT Audit career development and Planning- Evaluating IT Audit, IT Audit Quality, Terms of Assessment, IT Audit and Auditor Assessment Form, Criteria for Assessing the Audit, Criteria for Assessing the Auditor, Applying the Concept, Evaluation of IT Audit Performance, Best Practices.		
UNIT V	**IT AUDITING IN MODERN ERA**	**9**
IT Auditing Trends, New Dimension: Information Assurance, IT Audit: The Profession, A Common Body of Knowledge, Certification, Continuing Education, Public Accounting – Private Industry, Management Consultant, Role of the IT Auditor in IT Governance – Educating the Next Generation on IT Audit and Control Opportunities.		
Text Book (s)		
1	Sandra Senft, Frederick Gallegos and Aleksandra Davis, "Information Technology Control and Audit, Fourth Edition", CRC Press, 2013.	
Reference (s)		
1	David L. Cannon, "CISA Certified Information Systems Auditor Study Guide", John Wiley & Sons.	
2	Nelson, Phillips, Enfinger, Steuart, "Computer Forensics and Investigations", Cengage Learning, India Edition, 2008.	
3	Man Young Rhee, "Internet Security: Cryptographic Principles", "Algorithms and Protocols", Wiley Publications, 2003.	

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Regulation 2018			Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18ITE038T	Total Quality Management	3	0	0	3

Prerequisite Course (s)

To facilitate students should understand the concepts relating to Software Quality Assurance.

Course Objective (s): The purpose of learning this course is to:

1.	To facilitate students understand the quality concepts and tools and techniques.
2.	To introduce the main principles of business and social excellence
3.	To generate knowledge and skills of students to use models and quality management methodology
4.	To learn the techniques for the implementation of total quality management in any sphere of business and public sector.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Understand the students in gaining knowledge on evaluation of quality
CO2	Understand the Principles of Total Quality Management
CO3	Summarize the techniques and tools involved in TQM
CO4	Summarize concepts of Six Sigma
CO5	Apply knowledge in assessing the quality in manufacturing sectors

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	-	-	-	-	-	2	1	2	-	3	3	3
CO2	3	2	2	-	-	-	-	-	2	1	2	-	3	2	3
CO3	2	2	3	-	-	-	-	-	2	1	2	-	3	2	2
CO4	3	2	3	-	-	-	-	-	2	1	2	-	2	2	3
CO5	2	2	3	-	-	-	-	-	2	1	2	-	2	2	2
CO (Avg)	2.60	2.00	2.60	-	-	-	-	-	2.00	1.00	2.00	-	2.60	2.20	2.60

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

UNIT I	INTRODUCTION	9
Introduction - Need for Quality – Evaluation of Quality – Definitions of Quality – Dimensions of product and service quality – Basic concepts of TQM –TQM frame work – Contributions of Deming, Juran, and Cross by – Barriers of TQM – Quality statements – Customer focus – Customer orientation, Customer satisfaction, Customer complaints – Customer retention – Costs of Quality.		
UNIT II	**TQM PRINCIPLES**	**9**
Leadership - Strategic quality planning, Quality Councils - Employee involvement - Motivation, Empowerment, Team and Teamwork, Quality circles Recognition and Reward, Performance appraisal - Continuous process improvement PDCA cycle, 5S, Kaizen Supplier partnership - Partnering, Supplier selection, Supplier Rating.		
UNIT III	**TQM TOOLS AND TECHIQUES 1**	**9**
The seven traditional tools of quality - New management tools - Six sigma: Concepts, Methodology, applications to manufacturing, service sector including IT-Bench marking -Reason to bench mark, Bench marking process – FMEA - Stages, Types		
UNIT IV	**TQM TOOLS AND TECHIQUES II**	**9**
Control Charts - Process Capability - Concepts of Six Sigma - Quality Function Development (QFD) - Taguchi quality loss function -TPM - Concepts, improvement needs - Performance measures		
UNIT V	**QUALITY SYSTEMS**	**9**
Need for ISO 9000 - ISO 9001 - 2008 Quality System - Elements, Documentation, Quality Auditing - QS 9000 - ISO 14000 - Concepts, Requirements and Benefits - TQM Implementation in manufacturing and service sectors.		

Text Book (s)

1	Dale H. Besterfiled, et at., "Total quality Management", Pearson Education Asia, Sixth Edition (2006).

Reference (s)

1	Suganthi.L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd., 2006
2	Janakiraman. B and Gopal .R.K., "Total Quality Management - Text and Cases", Prentice Hall (India) Pvt. Ltd., 2006.
3	James R. Evans and William M. Lindsay, "The Management and Control of Quality", 8th Edition, First Indian Edition, Cengage Learning, 2012. www.padeepz.net

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Regulation 2018			Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18ITE039T	Foundation Skills In Product Development	3	0	0	3

Prerequisite Course (s)

Agile Development Methodology, Software Testing

Course Objective (s): The purpose of learning this course is to:

1	Understand and Define, formulate and analyze a problem
2	Able to collect requirements for new product development
3	Gain knowledge of the Innovation & Product Development process in the Business Context
4	Able to work independently as well as in teams
5	Manage a project from start to finish

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Understand the global trends and development methodologies of various types of products and services.
CO2	Understand requirement engineering and know how to collect, analyze and arrive at requirements for new product development and convert them in to design specification.
CO3	Understand about conceptualize, prototype and develop product management plan for a new product based on the type of the new product, system integration, testing and product certificate and documentation.
CO4	Develop documentation, test specifications and coordinate with various teams to validate and sustain up to the EoL (End of Life) support activities for engineering customer.
CO5	Understand industry product development, product development trade off and security configuration.

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	-	-	-	-	-	-	-	-	-	-	2	1
CO2	3	3	3	-	-	-	-	-	-	-	-	-	-	2	1
CO3	3	3	3	-	-	-	-	-	-	-	-	-	-	2	1
CO4	3	3	3	-	-	-	-	-	-	-	-	-	-	2	1
CO5	3	3	3	-	-	-	-	-	-	-	-	-	-	2	1
CO (Avg)	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**1**

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UNIT I	FUNDAMENTALS OF PRODUCT DEVELOPMENT	9
Global Trends Analysis and Product decision – Social Trends – Technical Trends- Economical Trends – Environmental Trends – Political/Policy Trends – Introduction to Product Development Methodologies and Management – Overview of Products and Services – Types of Product Development – Overview of Product Development methodologies – Product Life Cycle – Product Development Planning and Management.		
UNIT II	**REQUIREMENTS AND SYSTEM DESIGN**	**9**
Requirement Engineering – Types of Requirements – Requirement Engineering – traceability Matrix and Analysis – Requirement Management – System Design & Modeling – Introduction to System Modeling – System Optimization – System Specification – Sub-System Design – Interface Design.		
UNIT III	**DESIGN AND TESTING**	**9**
Conceptualization – Industrial Design and User Interface Design – Introduction to Concept generation Techniques – Challenges in Integration of Engineering Disciplines – Concept Screening & Evaluation – Detailed Design – Component Design and Verification – Mechanical, Electronics and Software Subsystems – High Level Design/Low Level Design of S/W Program – Types of Prototypes, S/W Testing- Hardware Schematic, Component design, Layout and Hardware Testing – Prototyping – Introduction to Rapid Prototyping and Rapid Manufacturing – System Integration, Testing, Certification and Documentation.		
UNIT IV	**SUSTENANCE ENGINEERING AND END-OF-LIFE (EOL) SUPPORT**	**9**
Introduction to Product verification processes and stages – Introduction to Product Validation processes and stages – Product Testing Standards and Certification – Product Documentation – Sustenance - Maintenance and Repair – Enhancements – Product EoL – Obsolescence Management – Configuration Management – EoL Disposal		
UNIT V	**BUSINESS DYNAMICS – ENGINEERING SERVICES INDUSTRY**	**9**
The Industry – Engineering Services Industry – Product Development in Industry versus Academia – The IPD Essentials – Introduction to Vertical Specific Product Development processes - Manufacturing/Purchase and Assembly of Systems – Integration of Mechanical, Embedded and Software Systems – Product Development Trade-offs – Intellectual Property Rights and Confidentiality – Security and Configuration Management.		

Text Book (s)

1	Karl T Ulrich and Stephen D Eppinger, "Product Design and Development", Tata McGraw Hill, Fifth Edition, 2012.
2	John W Newstorm and Keith Davis, "Organizational Behavior", Tata McGraw Hill, Thirteenth Edition, 2010.

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Board of Information Technology On
19 OCT 2020
KARUR-639 113.

Reference (s)	
1	Hiriyappa B,- Corporate Strategy Managing the Business, Author House, 2013.
2	Peter F Drucker, People and Performance Butterworth – Heinemann [Elsevier], Oxford, 2004.
3	Vinod Kumar Garg and Venkita Krishnan N K, —Enterprise Resource Planning – Concepts, Second Edition, Prentice Hall, 2003.
4	Mark S Sanders and Ernest J McCormick, "Human Factors in Engineering and Design", McGraw Hill Education, Seventh Edition, 2013

Regulation 2018			Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18ITE040T	Green Computing	3	0	0	3

Prerequisite Course (s)

-

Course Objective (s): The purpose of learning this course is to:

1.	To learn the fundamentals of Green Computing.
2.	To analyze the Green computing Grid Framework.
3.	To understand the issues related with Green compliance.
4.	To study and develop various case studies.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Acquire knowledge to adopt green computing practices to minimize negative impacts on the environment.
CO2	Enhance the skill in energy saving practices in their use of hardware.
CO3	Evaluate technology tools that can reduce paper waste and carbon footprint by the stakeholders.
CO4	Understand the ways to minimize equipment disposal requirements .
CO5	Analyze various case studies on Green Computing

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	-	-	-	-	-	2	1	2	-	3	3	3
CO2	3	2	2	-	-	-	-	-	2	1	2	-	3	2	3
CO3	2	2	3	-	-	-	-	-	2	1	2	-	3	2	2
CO4	3	2	3	-	-	-	-	-	2	1	2	-	2	2	3
CO5	2	2	3	-	-	-	-	-	2	1	2	-	2	2	2
CO (Avg)	2.60	2.00	2.60	-	-	-	-	-	2.00	1.00	2.00	-	2.60	2.20	2.60

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

UNIT I	FUNDAMENTALS	9
Green IT Fundamentals: Business, IT, and the Environment – Green computing: carbon foot print, scoop on power – Green IT Strategies: Drivers, Dimensions, and Goals –Environmentally Responsible Business: Policies, Practices, and Metrics.		
UNIT II	**GREEN ASSETS AND MODELING**	**9**
Green Assets: Buildings, Data Centers, Networks, and Devices – Green Business Process Management: Modeling, Optimization, and Collaboration – Green Enterprise Architecture – Environmental Intelligence – Green Supply Chains – Green Information Systems: Design and Development Models.		
UNIT III	**GRID FRAMEWORK**	**9**
Virtualization of IT systems – Role of electric utilities, Telecommuting, teleconferencing and teleporting – Materials recycling – Best ways for Green PC – Green Data center –Green Grid framework.		
UNIT IV	**GREEN COMPLIANCE**	**9**
Socio-cultural aspects of Green IT – Green Enterprise Transformation Roadmap –Green Compliance: Protocols, Standards, and Audits – Emergent Carbon Issues:Technologies and Future.		
UNIT V	**CASE STUDIES**	**9**
The Environmentally Responsible Business Strategies (ERBS) – Case Study Scenarios for Trial Runs – Case Studies – Applying Green IT Strategies and Applications to a Home, Hospital, Packaging Industry and Telecom Sector.		

TEXT BOOK(S)

1	Bhuvan Unhelkar, "Green IT Strategies and Applications-Using Environmental Intelligence", CRC Press, June 2014.
2	Woody Leonhard, Katherine Murray, "Green Home computing for dummies",August 2012.

REFERENCE(S)

1	Alin Gales, Michael Schaefer, Mike Ebbers, "Green Data Center: steps for the Journey", Shroff/IBM rebook, 2011.
2	John Lamb, "The Greening of IT", Pearson Education, 2009.
3	Jason Harris, "Green Computing and Green IT- Best Practices on regulations & industry", Lulu.com, 2008

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19 OCT 2020
KARUR-639 113.

Reference (s)	
1	Paul Deitel, Harvey Deitel, "Java SE 8 for programmers", 3rdEdition, Pearson, 2015.
2	Steven Holzner, "Java 2 Black book", Dreamtech press, 2011.
3	Timothy Budd, "Understanding Objectoriented programming with Java", Updated Edition, Pearson Education, 2000.

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Board of Information Technology
19 OCT 2020
KARUR-639 113.

Regulation 2018			Total Hours			45
			Hours / Week			C
Category	Course Code	Course Name	L	T	P	
E	18ITE041T	5G Technology	3	0	0	3

Prerequisite Course (s)

-

Course Objective (s): The purpose of learning this course is to:

1.	To gather knowledge about wireless communication networks and 5G mobile networks
2.	To familiar with various cells for wireless networks
3.	To acquire knowledge about 5G architecture
4.	To learn about the 5G radio access methodologies and spectrum

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Understand the concepts of 5G Technology advances and their benefits
CO2	Understand the key requirements of RF, PHY, MAC and air interface changes required to support 5G
CO3	Explain the Transmission and Design Techniques for 5G
CO4	Understand the Device to device communication and millimeter wave communication
CO5	Explain the Implementation options for 5G

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	1	1	1	-	-	-	-	-	-	3	2	2	2
CO2	3	-	2	2	3	-	1	-	2	2	2	3	2	1	2
CO3	3	-	3	2	3	-	1	-	2	2	2	3	2	3	3
CO4	3	3	2	1	3	3	3	1	2	2	2	3	1	2	2
CO5	3	-	3	3	3	3	-	-	3	3	3	3	2	3	3
CO (Avg)	3	3	2.4	1.8	2.6	3	1.67	1	2.25	2.25	2.25	3	1.8	2.2	2.4

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

UNIT I	Overview of 5G Broadband Wireless Communications	9
Evaluation of mobile technologies 1G to 4G (LTE, LTEA, LTEA Pro) , An Overview of 5G requirements, Regulations for 5G,Spectrum Analysis and Sharing for 5G.		
UNIT II	**The 5G wireless Propagation Channels**	**9**
Channel modeling requirements, propagation scenarios and challenges in the 5G modeling, Channel Models for mmWave MIMO Systems.		
UNIT III	**Transmission and Design Techniques for 5G**	**9**
Basic requirements of transmission over 5G, Modulation Techniques – Orthogonal frequency division multiplexing (OFDM), generalized frequency division multiplexing (GFDM), filter bank multi-carriers (FBMC) and universal filtered multi-carrier (UFMC), Multiple Accesses Techniques – orthogonal frequency division multiple accesses (OFDMA), generalized frequency division multiple accesses (GFDMA), nonorthogonal multiple accesses (NOMA).		
UNIT IV	**D2D AND M2M COMMUNICATION**	**9**
Device-to-device (D2D) and machine-to-machine (M2M) type communications – Extension of 4G D2D standardization to 5G, radio resource management for mobile broadband D2D, multihop and multi-operator D2D communications.		
UNIT V	**Millimeter-wave Communications**	**9**
Millimeter-wave Communications – spectrum regulations, deployment scenarios, beamforming, physical layer techniques, interference and mobility management, Massive MIMO propagation channel models, Channel Estimation in Massive MIMO, Massive MIMO with Imperfect CSI, Multi-Cell Massive MIMO, Pilot Contamination, Spatial Modulation (SM).		

TEXT BOOK(S)

1	Martin Sauter "From GSM From GSM to LTE–Advanced Pro and 5G: An Introduction to Mobile Networks and Mobile Broadband", Wiley-Blackwell.
2	Afif Osseiran, Jose.F.Monserrat, Patrick Marsch, "Fundamentals of 5G Mobile Networks" , Cambridge University Press
3	Athanasios G.Kanatos, Konstantina S.Nikita, Panagiotis Mathiopoulos, "New Directions in Wireless Communication Systems from Mobile to 5G", CRC Press
4	Theodore S.Rappaport, Robert W.Heath, Robert C.Danials, James N.Murdock "Millimeter Wave Wireless Communications", Prentice Hall Communications.

REFERENCE(S)

1.	Jonathan Rodriguez, "Fundamentals of 5G Mobile Networks", John Wiley & Sons.
2	Amitabha Ghosh and Rapeepat Ratasuk "Essentials of LTE and LTE-A", Cambridge University Press.

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Regulation 2018			Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18ITE042T	Software Defined Radio	3	0	0	3

Prerequisite Course (s)

-

Course Objective (s): The purpose of learning this course is to:

This course aims in understanding an in-depth knowledge of wireless RF hardware design issues and to evaluate the performances by implementing a testbed using Software defined radio.

Course Outcome (s) (COs):

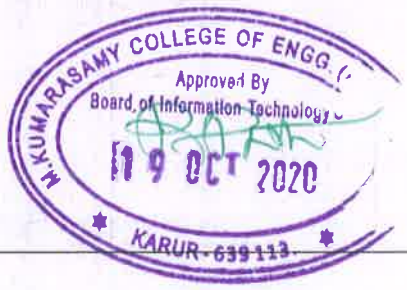
At the end of this course, learners will be able to:

CO1	Understand the basic concepts of Software Defined Radio
CO2	Understand basic design issues of physical RF hardware blocks
CO3	Explain the concepts waveform generation using sdr
CO4	Apply the knowledge of wireless communication systems andsignal processing filters, designs using Software defined radio
CO5	Evaluate the performance parameters of RF testbed using NI-USRP OR Xilinx ZYNQ

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	2	2	1	1	-	2	-	3	-	2	2	-
CO2	2	3	3	2	3	1	1	-	1	-	2	-	2	2	-
CO3	2	3	2	3	3	1	1	-	1	-	2	-	2	2	-
CO4	2	3	3	2	3	1	3	-	1	-	2	-	2	2	-
CO5	2	3	2	2	3	1	2	-	1	2	2	-	2	2	-
CO (Avg)	2.2	2.7	2.4	2.2	2.8	1	1.6	-	1.2	2	2.2	-	2.2	2.2	-

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**



UNIT I	CONCEPTS OF SOFTWARE DEFINED RADIO	9
Definition and need of software defined radio [SDR], benefits, Basic components and architecture of SDR, design issues of RF implementation of wireless system, re-configurability of RF hardware design using SDR.		
UNIT II	**RADIO FREQUENCY DESIGN ISSUES**	**9**
Basic issues in RF designing and Baseband processing of radio frequency design, flexibility of RF chain design using SDR, Transmitter and receiver design of RF wireless system, noise and distortion in RF chain, ADC/DAC in RF chain, overall performance of RF design, characteristics of SDR in terms of RF filter and baseband processing.		
UNIT III	**WAVEFORM GENERATION USING SDR**	**9**
Introduction to wireless communication system parameters – BER, SNR, Transmission power and Noise, spectrum efficiency, SDR design to implement transmitter design using modulation schemes in analog and digital domain, Receiver design including filtering, and demodulation, estimation of Bit error rate for simple structure of BPSK and QPSK.		
UNIT IV	**INTRODUCTION TO DIFFERENT SDR**	**9**
NI USRP SDR hardware kit and Labview Software modelling, TRANSCEIVER DESIGN IN THE RANGE OF 50 MHz to 2.2 GHZ, Xilinx Zynq board and FPGA kit to develop wireless design testbed, RF 2x2 MIMO setup, Smart Antennas and Beamforming techniques, diversity and adaptive space time division multiplexing and signal processing.		
UNIT V	**INFORMAL LAB**	**9**
Informal Lab –Test bed design using hands on session of any one SDR hardware set up using NI USRP SDR/ Xilinx ZYNQ board Waveform Generations, signal processing filters, estimation of wireless system parameters.		

TEXT BOOK(S)

1	Tony J Rouphael, "RF and DSP for SDR," Elsevier Newnes Press, 2008. 2. P. Kenington, "RF and Baseband Techniques for Software Defined Radio," Artech House, 2005.

REFERENCE(S)

1.	P. Kenington, "RF and Baseband Techniques for Software Defined Radio," Artech House, 2005
2	Jeffrey Hugh Reed, "Software Radio: A Modern Approach to Radio Engineering," Prentice Hall Professional, 2002.

Regulation 2018			Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18ITE043T	Block Chain	3	0	0	3

Prerequisite Course (s)

-

Course Objective (s): The purpose of learning this course is to:

1. Understand how blockchain systems (mainly Bitcoin and Ethereum) work
2. To securely interact with them
3. Design, build, and deploy smart contracts and distributed applications
4. Integrate ideas from blockchain technology into their own projects

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Understand the basic concepts of cryptography in Distributed Systems
CO2	Explain the basic concepts of Block Chain
CO3	Explain Nakamoto consensus,proof of work and proof of stake consensus
CO4	Understand the Cryptocurrency systems
CO5	Evaluate security, privacy, and efficiency of a given blockchain system.

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	1	-	-	-	-	-	-	-	-	-	2	1	-
CO2	1	1	1	1	2	1	-	-	-	-	-	-	2	1	-
CO3	1	1	1	1	2	2	-	-	-	-	-	-	2	1	-
CO4	2	1	1	1	2	3	-	-	-	-	-	-	2	1	-
CO5	2	-	1	1	2	2	-	-	-	-	-	-	2	1	-
CO (Avg)	1.8	1	1	1	2	2	-	-	-	-	-	-	2	1	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	Basics	9
Distributed Database, Two General Problem, Byzantine General problem and Fault Tolerance, Hadoop Distributed File System, Distributed Hash Table, ASIC resistance, Turing Complete. Cryptography: Hash function, Digital Signature - ECDSA, Memory Hard Algorithm, Zero Knowledge Proof.		
UNIT II	**Blockchain**	**9**
Introduction, Advantage over conventional distributed database, Blockchain Network, Mining Mechanism, Distributed Consensus, Merkle Patricia Tree, Gas Limit, Transactions and Fee, Anonymity, Reward, Chain Policy, Life of Blockchain application, Soft & Hard Fork, Private and Public blockchain.		
UNIT III	**Distributed Consensus**	**9**
Nakamoto consensus, Proof of Work, Proof of Stake, Proof of Burn, Difficulty Level, Sybil Attack, Energy utilization and alternate.		
UNIT IV	**Cryptocurrency**	**9**
History, Distributed Ledger, Bitcoin protocols - Mining strategy and rewards, Ethereum - Construction, DAO, Smart Contract, GHOST, Vulnerability, Attacks, Sidechain, Namecoin		
UNIT V	**Cryptocurrency Regulation**	**9**
Stakeholders, Roots of Bit coin, Legal Aspects-Crypto currency Exchange, Black Market and Global Economy. Applications: Internet of Things, Medical Record Management System, Domain Name Service and future of Blockchain.		

TEXT BOOK(S)

1	Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, Princeton University Press (July 19, 2016).

REFERENCE(S)

1.	Antonopoulos, Mastering Bitcoin: Unlocking Digital Cryptocurrencies
2	Satoshi Nakamoto, Bitcoin: A Peer-to-Peer Electronic Cash System
3	DR. Gavin Wood, "ETHEREUM: A Secure Decentralized Transaction Ledger,"Yellow paper.2014.
4	Nicola Atzei, Massimo Bartoletti, and Tiziana Cimoli, A survey of attacks on Ethereum smart contracts

Regulation 2018			Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18ITE044T	UNIX INTERNALS	3	0	0	3

Prerequisite Course (s)

-

Course Objective (s): The purpose of learning this course is to:

1.	Get thorough understanding of the kernel.
2.	Understand the file organization and management
3.	Enhance knowledge about various system calls
4.	Have knowledge of process architecture

Course Outcome (s) (COs):
At the end of this course, learners will be able to:

CO1	Explain the basic concepts of UNIX Operating System .
CO2	Explain the operational concepts of Buffer, Inode
CO3	Discuss the various operations of File concepts.
CO4	Describe the various aspects of Process Control.
CO5	Apply various Scheduling techniques for a given situations.

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	-	-	-	-	-	-	-	-	1	2	-
CO2	2	-	-	-	2	-	-	2	-	-	-	-	1	2	-
CO3	2	2	-	-	2	-	-	3	-	2	1	-	1	2	-
CO4	2	2	-	-	2	-	-	3	-	2	1	-	1	2	-
CO5	2	2	-	-	2	-	-	3	-	2	1	-	1	2	-
CO (Avg)	2	2	-	-	2	-	-	2.2	-	2	1	-	1	2	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	Introduction to UNIX	9
History, need of change, Standards The process and the kernel: Mode, space and context, Process abstraction, executing in kernel mode, synchronization by blocking interrupts, process scheduling, signals, process creation, termination, awaiting process termination, zombie processes		
UNIT II	**Buffer and Inode**	**9**
The Buffer Cache-Headers-Buffer Pool-Buffer Retrieval-Reading and Writing Disk Blocks – Advantages and Disadvantages. Internal Representation of Files-InodesStructure-Directories-Path Name to Inode- Super Block-Inode Assignment-Allocation of Disk Blocks –Other File Types..		
UNIT III	**File System Interface and Framework**	**9**
The user interface to files, File systems, Special files, File system framework, The Vnode/Vfs architecture, Implementation Overview, File System dependent objects, Mounting a file system, Operations on files.		
UNIT IV	**Inter Process Communication**	**9**
Process Tracing – System V IPC – Network Communications – Sockets – Messages – Message Data Structures – Message Passing Interface Ports – Name Space – Data Structures – Port Translations – Message Passing Process Scheduling and Time: Process scheduling – System calls for Time – Clock – Scheduler goals – Process priorities – Scheduler Implementation – Run Queue Manipulation – The SVR4 Scheduler; Memory Management Policies: Swapping – Demand Paging – A Hybrid System with swapping and demand paging		
UNIT V	**UNIX Tools and Programming**	**9**
Shell programming – UNIX commands – Text processing – sed and awk utilities – grep utility – Introduction to Lex, Yacc utilities – Introduction to Perl programming.		

TEXT BOOK(S)

1	Maurice J. Bach, "The Design of the Unix Operating System", Pearson Education,2002

REFERENCE(S)

1.	UreshVahalia, "UNIX Internals: The New Frontiers", Prentice Hall, 2000.
2	John Lion, "Lion's Commentary on UNIX", 6 th edition, Peer-to-Peer Communications, 2004
3	Daniel P. Bovet & Marco Cesati, "Understanding the Linux Kernel", O'REILLY, Shroff Publishers &Distributors Pvt. Ltd, 2000.

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Regulation 2018			Total Hours			45
			Hours / Week			C
Category	Course Code	Course Name	L	T	P	
E	18ITE045T	COMPUTER VISION	3	0	0	3

Prerequisite Course (s)

-

Course Objective (s): The purpose of learning this course is to:

1.	To review image processing techniques for computer vision.
2.	To understand shape and region analysis.
3.	To understand Hough Transform and its applications to detect lines, circles, ellipses.
4.	To understand three-dimensional image analysis techniques.
5.	To study some applications of computer vision algorithms.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Implement fundamental image processing techniques required for computer vision.
CO2	Perform shape analysis.
CO3	Apply Hough Transform for line, circle, and ellipse detections
CO4	Apply 3D vision techniques..
CO5	Develop applications using computer vision techniques..

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	3	-	-	2	2	-
CO2	3	3	-	3	-	-	-	-	-	3	-	-	2	2	-
CO3	3	3	-	3	-	-	-	-	-	3	-	-	2	2	-
CO4	3	3	-	3	-	-	-	-	-	3	-	-	2	2	-
CO5	3	3	-	3	-	-	-	-	-	3	-	3	2	2	-
CO (Avg)	3	3	-	3	-	-	-	-	-	3	-	3	2	2	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	IMAGE PROCESSING FOUNDATIONS	9
Review of image processing techniques – classical filtering operations – thresholding techniques – edge detection techniques – corner and interest point detection – mathematical morphology – texture.		
UNIT II	**SHAPES AND REGIONS**	**9**
Binary shape analysis – connectedness – object labeling and counting – size filtering – distance functions – skeletons and thinning – deformable shape analysis – boundary tracking procedures – active contours – shape models and shape recognition – centroidal profiles – handling occlusion – boundary length measures – boundary descriptors – chain codes – Fourier descriptors – region descriptors – moments.		
UNIT III	**HOUGH TRANSFORM**	**9**
Line detection – Hough Transform (HT) for line detection – foot-of-normal method – line localization – line fitting – RANSAC for straight line detection – HT based circular object detection – accurate center location – speed problem – ellipse detection – Case study: Human Iris location – hole detection – generalized Hough Transform (GHT) – spatial matched filtering – GHT for ellipse detection – object location – GHT for feature collation		
UNIT IV	**3D VISION AND MOTION**	**9**
Methods for 3D vision – projection schemes – shape from shading – photometric stereo – shape from texture – shape from focus – active range finding – surface representations – point-based representation – volumetric representations – 3D object recognition – 3D reconstruction – introduction to motion – triangulation – bundle adjustment – translational alignment – parametric motion – spline-based motion – optical flow – layered motion.		
UNIT V	**APPLICATIONS**	**9**
Application: Photo album – Face detection – Face recognition – Eigen faces – Active appearance and 3D shape models of faces Application: Surveillance – foreground-background separation – particle filters – Chamfer matching, tracking, and occlusion – combining views from multiple cameras – human gait analysis Application: In-vehicle vision system: locating roadway – road markings – identifying road signs – locating pedestrians.		

REFERENCE(S)

1.	D. L. Baggio et al., —Mastering OpenCV with Practical Computer Vision Projects‖, Packt Publishing, 2012.
2	E. R. Davies, —Computer & Machine Vision‖, Fourth Edition, Academic Press, 2012.
3	Jan Erik Solem, "Programming Computer Vision with Python: Tools and algorithms for analyzing images", O'Reilly Media, 2012

M.KUMARASAMY COLLEGE OF ENGG. (AUTONOMOUS)
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Regulation 2018			Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
E	18ITE046T	Augmented and Virtual Reality (Recommended by AugRay)	3	0	0	3

Prerequisite Course (s)

Python Programming, Computer Graphics

Course Objective (s):

The purpose of learning this course is to:

1	To make students know the basic concept and understand the framework of virtual
2	To understand principles and multidisciplinary features of virtual reality and apply it in developing applications
3	To know the technology for multimodal user interaction and perception VR, in particular the visual, audial and haptic interface and behavior.
4	To understand and apply technology for managing large scale VR environment in real time.
5	To understand an introduction to the AR system framework and apply AR tools in software development

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Understand the basic concept and the framework of virtual
CO2	Understand the Principles and multidisciplinary features of virtual reality and apply it in developing applications
CO3	Illustrate the multimodal user interaction and perception VR, the visual, audial and haptic interface.
CO4	Understand the managing large scale VR environment in real time.
CO5	Understand the Purpose of AR tools in software development

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	-		-	2	-	-	-	-	-	1	2	-
CO2	3	2	2	-	3	-	-	-	-	-	-	-	1	2	-
CO3	3	2	1	-	2	-	3	-	-	-	-	-	1	2	-
CO4	3	2	1	-	2	2	-	-	-	-	-	-	1	2	-
CO5	3	2	1	-	3	2	1	-	-	-	-	-	1	2	-
CO (Avg)	3	2	1.2	-	2	1	1	-	-	-	-	-	1	2	-

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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UNIT I	VIRTUAL REALITY AND VIRTUAL ENVIRONMENTS	9
The historical development of VR: Scientific landmarks Computer Graphics, Real-time computer graphics, Flight simulation, Virtual environments, Requirements for VR, benefits of Virtual reality.		
UNIT II	**3D USER INTERFACE INPUT HARDWARE**	**9**
Visual Displays Auditory Displays, Haptic Displays, Choosing Output Devices for 3D User Interfaces, Input device characteristics, Desktop input devices, Tracking Devices, 3D Mice, Special Purpose Input Devices, Direct Human Input, Home - Brewed Input Devices, Choosing Input Devices for 3D Interfaces.		
UNIT III	**SOFTWARE TECHNOLOGIES**	**9**
Database - World Space, World Coordinate, World Environment, Objects - Geometry, Position / Orientation, Hierarchy, Bounding Volume, Scripts and other attributes, VR Environment - VR Database, Tessellated Data, LODs, Cullers and Occluders, Lights and Cameras, Scripts, Interaction - Simple, Feedback, Graphical User Interface, Control Panel, 2D Controls, Hardware Controls, Room / Stage / Area Descriptions, World Authoring and Playback, VR toolkits, Available software in the market		
UNIT IV	**3D INTERACTION TECHNIQUES**	**9**
3D Manipulation tasks, Manipulation Techniques and Input Devices, Interaction Techniques for 3D Manipulation, Design Guidelines - 3D Travel Tasks, Travel Techniques, Design Guidelines - Theoretical Foundations of Wayfinding, User Centered Wayfinding Support, Environment Centered Wayfinding Support, Evaluating Wayfinding Aids, Design Guidelines - System Control, Classification, Graphical Menus, Voice Commands, Gestrual Commands, Tools, Mutimodal System Control Techniques, Design Guidelines, Case Study: Mixing System Control Methods, Symbolic Input Tasks, symbolic Input Techniques, Design Guidelines, Beyond Text and Number entry .		
UNIT V	**AUGMENTED AND MIXED REALITY**	**9**
Augmented and Mixed Reality, Taxonomy, technology and features of augmented reality, difference between AR and VR, Challenges with AR, AR systems and functionality, Augmented reality methods, visualization techniques for augmented reality, wireless displays in educational augmented reality applications, mobile projection interfaces, marker-less tracking for augmented reality, enhancing interactivity in AR environments, evaluating AR systems.		

Text Book (s)

1	1. Alan B Craig, William R Sherman and Jeffrey D Will, "Developing Virtual Reality Applications: Foundations of Effective Design", Morgan Kaufmann, 2009.
2	Gerard Jounghyun Kim, "Designing Virtual Systems: The Structured Approach", 2005.
3	Doug A Bowman, Ernest Kuijff, Joseph J LaViola, Jr and Ivan Poupyrev, "3D User Interfaces, Theory and Practice", Addison Wesley, USA, 2005.

Reference (s)

1	Oliver Bimber and Ramesh Raskar, "Spatial Augmented Reality: Meging Real and Virtual Worlds", 2005.
2	Burdea, Grigore C and Philippe Coiffet, "Virtual Reality Technology", Wiley Interscience, India, 2003.
3	John Vince, "Virtual Reality Systems", Addison Wesley, 1995.

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4	Howard Rheingold, "Virtual Reality: The Revolutionary Technology and how it Promises to Transform Society", Simon and Schuster, 1991.
5	William R Sherman and Alan B Craig, "Understanding Virtual Reality: Interface, Application and Design (The Morgan Kaufmann Series in Computer Graphics)". Morgan Kaufmann Publishers, San Francisco, CA, 2002
6	Alan B. Craig, Understanding Augmented Reality, Concepts and Applications, Morgan Kaufmann, 2013.

M.KUMARASAMY COLLEGE OF ENGG. (A)
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Regulation 2018			Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
O	18ITO001J	Problem Solving Techniques Using Python	1	0	4	3

Prerequisite Course (s)

Programming for Problem Solving

Course Objective (s):

The purpose of learning this course is to:

1	Outline the core syntax and semantics of Python programming language.
2	Identify the need for working with the strings and functions.
3	Illustrate the basic operations and methods of python data structures-lists, dictionaries, tuples and sets.
4	Understand the Object-oriented Programming concepts in Python.
5	Infer the applications of data science using python.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Develop algorithmic solutions to simple computational problems.
CO2	Demonstrate programs using simple Python statements and expression
CO3	Explain control flow and functions concept in Python for solving problems
CO4	Use Python data structures – lists, tuples & dictionaries for representing compound data.
CO5	Explain files, exception, modules and packages in Python for solving problems.

CO-PO Mapping

COs	Pos											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	1	3	-	-	-	-	-	-	-
CO2	2	2	2	1	3	-	-	-	-	-	-	-
CO3	3	3	2	2	3	-	-	-	-	-	-	-
CO4	3	3	2	2	3	-	-	-	-	-	-	-
CO5	3	3	2	1	3	-	-	-	-	-	-	-
CO (Avg)	2.8	2.8	2	1.4	3	-	-	-	-	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Unit I	ALGORITHMIC PROBLEM SOLVING	3+6
Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert a card in a list of sorted cards, and guess an integer number in a range, Towers of Hanoi.		
Unit II	**DATA, EXPRESSIONS, STATEMENTS**	**3+6**
Python interpreter and interactive mode; values and types: int, float, boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; modules and functions, function definition and use, flow of execution, parameters and arguments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points		
Unit III	**CONTROL FLOW, FUNCTIONS**	**3+6**
Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values,parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search		
Unit IV	**LISTS, TUPLES, DICTIONARIES**	**3+6**
Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension; Set :Opearations. Illustrative programs: selection sort, insertion sort, mergesort, histogram.		
Unit V	**FILES, MODULES, PACKAGES**	**3+6**
Files and exception: text files, reading and writing files, format operator; command line arguments errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file.		

List of Experiments:
1.Programs on Data Types
2.Programs on Control Statements
3.Programs on Functions
4.Programs on List
5.Programs on Tuples
6.Programs on Dictionary
7.Programs on Strings
8.Program on Files
9.Program on Modules, Packages
10.Programs on Exception Handling

Text Book (s)

1	Gowrishankar S, Veena A, **"Introduction to Python Programming"**, 1st Edition, CRC Press/Taylor & Francis, 2018. ISBN-13: 978-0815394372
2	Jake VanderPlas, **"Python Data Science Handbook: Essential Tools for Working with Data"**, 1st Edition, O'Reilly Media, 2016. ISBN-13: 978-1491912058

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Reference (s)	
1	Aurelien Geron, **Hands-On Machine Learning with Scikit-Learn and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems",** 1st Edition,O'Reilly Media, 2017. ISBN – 13: 978-1491962299
2	Wesley J Chun, **"Core Python Applications Programming",** 3rd Edition, Pearson Education India, 2015. ISBN-13: 978-9332555365
3	Miguel Grinberg, **"Flask Web Development: Developing Web Applications with Python",** 2nd Edition, O'Reilly Media, 2018. ISBN-13: 978-1491991732.

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19 OCT 2020
KARUR - 639 113.

Regulation 2018			Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
O	18ITO002J	Java Programming	1	0	4	3

Prerequisite Course (s)

Programming for problem solving

Course Objective (s):

The purpose of learning this course is to:

1	Understand Object Oriented Programming concepts and basic characteristics of Java
2	Understand the principles of packages, inheritance and interfaces
3	Define exceptions and use I/O streams
4	Develop a java application with threads and generics classes
5	Design and build simple Graphical User Interfaces

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Develop Programs using OOP principles
CO2	Develop Programs with the concepts inheritance and interfaces
CO3	Build Applications using exceptions and I/O streams
CO4	Develop Applications with threads and generics classes
CO5	Develop interactive Java programs

COPO Mapping

COs	POs											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	3	-	-	-	-	-	-	-
CO2	2	2	-	-	2	-	-	-	-	-	-	-
CO3	2	2	-	-	2	-	-	-	-	-	-	2
CO4	2	2	-	-	-	-	-	-	-	-	-	2
CO5	3	3	-	-	-	-	-	-	-	-	-	3
CO (Avg)	2.4	2.2	-	-	2.33	-	-	-	-	-	-	2.33

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	INTRODUCTION TO OOP AND JAVA FUNDAMENTALS	3+6
Object Oriented Programming and Evolution of Java-Program Structures in Java-Datatypes, Variables and Opearators-Control Statements – Classes and Objects – Methods - Arrays.		
UNIT II	**INHERITANCE AND INTERFACES**	**3+6**
Inheritance – Interfaces – Packages and Java Library – String Handling .		
UNIT III	**EXCEPTION HANDLING AND I/O**	**3+6**
Exceptions Handling - Input / Output Basics –Streams –Byte streams and Character streams – Reading and Writing Console –Reading and Writing Files		
UNIT IV	**MULTITHREADING AND GENERIC PROGRAMMING**	**3+6**
Multithread Programming (Differences Between Multithreading and Multitasking, Thread Life Cycle, Creating Threads, Synchronizing Threads, Interthread communication, Daemon threads, Thread groups). Generic Programming –Generic Classes –Generic Methods –Bounded Types – Restrictions and Limitations		
UNIT V	**COLLECTIONS AND EVENT DRIVEN PROGRAMMING**	**3+6**
Collection (Array List, Tree, Set, Map, Stack, Queue) – JDBC:Types of Drivers-Types of Statements-JDBC Connectivity.		

List of Experiments:

1.Programs on Looping statements
2.Programs on Arrays
3. Programs on String Handling
4. Programs on Classes and Objects
5. Programs on Constructors
6. Programs on Inheritance
7. Programs on Interface
8. Programs on Multithreading
9. Programs on Exception Handling
10. Programs on Collection Framework

Text Book (s)

1	Herbert Schildt, "Java The complete reference", 8th Edition, McGraw Hill Education, 2011
2	Cay S. Horstmann, Gary cornell, "Core Java Volume –I Fundamentals", 9th Edition, Prentice Hall, 2013.

Regulation 2018			Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
O	18ITO003J	Game Design and Development	1	0	4	3

Prerequisite Course (s)

HTML,Computer Networks

Course Objective (s):

The purpose of learning this course is to:

1	To understand the components WWW
2	To design and visualize the webpage using HTML
3	To know the web page style methods using CSS
4	To understand the purpose of client side scripting
5	To know the key components of game development using HTML5

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Work on the internals components WWW
CO2	Design and visualize the web page
CO3	Apply different styles in the web page
CO4	Validate the clients data using client side scripting
CO5	Role of HTML 5 in game development

CO-PO Mapping

COs	POs											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	3	-	-	-	-	-	-	-	-	2
CO2	3	1	3	2	-	-	-	-	-	-	-	2
CO3	2	1	3	2	-	-	-	-	-	-	-	2
CO4	2	1	3	2	2	1	-	2	1	-	1	2
CO5	3	1	3	2	2	1	-	2	1	-	2	2
CO (Avg)	**2.6**	**1**	**3**	**2**	**2**	**1**	-	**2**	**1**	-	**1.5**	**2**

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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UNIT I	UNIT I INTRODUCTION TO WWW	3+6
Web Essentials: Clients, Servers, and Communication. The Internet-Basic Internet Protocols -The World Wide Web-HTTP request message-response message-Web Clients Web Servers - Three tier web based architecture		
UNIT II	**INTRODUCTION TO HTML AND INTRODUCTION TO XHTML**	**3+6**
An Introduction to HTML History-Versions - The development process - Html tags and simple HTML forms, web site structure - XHTML -Basic XHTML Syntax and Semantics - Meta tags, Character entities, frames and frame sets, inside browser.		
UNIT III	**CSS**	**3+6**
Need for CSS - introduction to CSS - basic syntax and structure - using CSS - background images, - colors and properties - manipulating texts - using fonts - borders and boxes – margins - padding lists, positioning using CSS - CSS2		
UNIT IV	**CLINT SIDE SCRIPTING**	**3+6**
Client side scripting - what is Javascript, How to develop Javascript - simple Javascript – variables – functions – conditions - loops and repetition		
UNIT V	**GAME DEVELOPMENT USING HTML5**	**3+6**
What exactly is a HTML5 game - Building blocks - Server side - How to distribute a HTML5 game - HTML5 game frameworks – Case Study : - Escaping Square Game and Game Canvas , Components Game Controllers, Game Obstacles, Game Score, Game Images, Game Sound, Game Gravity, Game Bouncing, Game Rotation, Game Movement.		

Text Book (s)	
1	Rashim Mogha, Preetham.V.V., — Java Web Services Programming‖, Wiley Dream tech, New Delhi, 2002.
2	An Introduction to HTML5 Game Development with Phaser.js, by Travis Faas, A K Peters/CRC Press (12 January 2017)
Reference (s)	
1	1. Deitel ,— XML How to Program, first edition, Pearson Education, USA, 2002..
2	2. Bhanu Pradhap, — Understanding Active Server Pages —, Cyber Tech Publications ,New Delhi,2001

M.KUMARASAMY COLLEGE OF ENGG.(AUTONOMOUS)
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KARUR-639113.

Regulation 2018		Semester	Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
OE	18ITO004J	Web Design	2	0	2	3

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

1	Design web pages more effectively
2	Access the elements of the web pages
3	Develop simple dynamic web pages

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Create web pages using HTML
CO2	Select appropriate designs for HTML elements
CO3	Handle the elements in HTML documents using JS
CO4	Design simple Dynamic web pages using PHP
CO5	Connect to Database through PHP

CO-PO Mapping

COs	POs											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	3	-	-	-	-	-	-	-	-	2
CO2	3	1	3	2	-	-	-	-	-	-	-	2
CO3	2	1	3	2	-	-	-	-	-	-	-	2
CO4	2	1	3	2	2	1	-	2	1	-	1	2
CO5	3	1	3	2	2	1	-	2	1	-	2	2
CO (Avg)	**2.6**	**1**	**3**	**2**	**2**	**1**	-	**2**	**1**	-	**1.5**	**2**

1: Slight (Low) **2: Moderate (Medium)** **3: Substantial (High)**

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UNIT I	HTML	6+3
Introduction to www, web browser, web server, three tier web architecture. HTML: Basic structure of an HTML document, Mark up Tags, elements of HTML, Working with Text, Working with Lists, Tables and Frames, Hyperlinks. HTML5: features, working with Images and Multimedia, Working with Forms and controls		
UNIT II	**CSS**	**6+3**
Creating Style Sheet, CSS Properties, CSS Styling(Background, Text Format, Controlling Fonts), Working with block elements and objects, Working with Lists and Tables, CSS Id and Class, Box Model(Introduction, Border properties, Padding Properties, Margin properties), CSS Advanced(Grouping, Dimension, Display, Positioning, Floating, Align,Pseudo class, Navigation Bar, Image Sprites, Attribute sector), CSS Color, Creating page Layout and Site Designs.		
UNIT III	**JAVASCRIPT AND AJAX**	**6+3**
Introduction, Java Script DOM model, Built-in objects, validation, Event Handling, Ajax: AJAX Introduction, AJAX Components, Handling Dynamic HTML with Ajax		
UNIT IV	**PHP**	**6+3**
PHP Introduction, Structure of PHP, Functions, Arrays, built-in variables, sessions and cookies		
UNIT V	**CONNECTING TO DATABASE**	**6+3**
Introduction to DBMS, DDL, DML, basics of SQL, Query processing, Connecting PHP to MYSQL		

LIST OF EXPERIMENTS

1. Creation of simple HTML5 pages with divisions, links, tables, canvas and other tags.
2. Create web page - include Frames and form controls
3. Webpage – CSS3, Style sheet Inclusion Techniques
4. JavaScript for displaying date and comparing two dates.
5. Form validation including text field, radio buttons, checkboxes, list box and other controls
6. Create a simple Ajax code to retrieve data from a TXT file
7. Simple Dynamic web page creation using PHP
8. Simple web application using PHP to access the Database

Reference (s)

1	Kogent Learning Solutions Inc., —Web Technologies: HTML, CSS, Javascript, ASP.NET, Servlets, JSP, PHP, ADO.NET, JDBC and XML‖, Dreamtech Press, New Delhi, 2013
2	Paul Deitel (Author), Harvey Deitel (Author), Abbey Deitel (Author) - Internet and World Wide Web, Fifth Edition, Pearson, 2018
3	Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", Sixth Edition, TataMcGraw Hill, 2010.
4	Jeffrey C Jackson, — Web Technology – A computer Science perspective‖, Persoson Education, 2007.

M.KUMARASAMY COLLEGE OF ENGG. (AUTONOMOUS)
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Board of Information Technology
19 OCT 2020
KARUR-639 113

Regulation 2018			Total Hours			45
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
OE	18ITO005J	Data Structures	2	0	2	3

Prerequisite Course (s)

Programming for problem solving

Course Objective (s):

The purpose of learning this course is to:

1	Implement Linear and Non-Linear Data Structures using Array and Linked List
2	Outline the parameters to measure the running time of an algorithm
3	Understand the problem type and select respective problem solving methodology

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Implement Linear Data Structures such as List, Stack and Queue
CO2	Apply Non-Linear Data Structures such as Trees and Heaps in problem solving
CO3	Illustrate the working of shortest path algorithms
CO4	Illustrate the Searching, Sorting And Hashing Techniques
CO5	Understand the problem solving nature of brute force and divide and conquer techniques

CO-PO Mapping

COs	POs											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	-	-	-	-	-	-	-	2
CO2	3	2	-	-	-	-	-	-	-	-	-	2
CO3	3	2	2	-	-	-	-	-	-	-	-	-
CO4	3	2	2	-	-	-	-	-	-	-	-	-
CO5	3	2	2	-	-	-	-	2	-	-	-	-
CO (Avg)	3	2	1.6	-	-	-	-	2	-	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	Measuring Algorithm efficiency and Linear Data Structure	6+3
ADT - List ADT [Array and Linked List Implementation] - Stack ADT [Implementation] – Applications of Stack [Evaluating arithmetic expressions and Recursion] - Queue ADT [Implementation and Types]		
UNIT II	**Non-Linear Data Structure: Trees**	**6+3**
Tree basic terminologies – Binary Tree – BST [Implementation] – Tree Traversal – AVL Tree – Red Black Tree – B-Tree – Binary Heap.		
UNIT III	**Non-Linear Data Structure: Graphs & Greedy Technique**	**6+3**
Graph basic Terminologies – Topological sort – Depth First Search and Breadth First Search - Unweighted Shortest Paths – Greedy Algorithm: Prim's algorithm - Kruskal's Algorithm - Dijkstra's Algorithm.		
UNIT IV	**Searching, Sorting And Hashing Techniques**	**6+3**
Searching- Linear Search – Binary Search. Sorting – Bubble sort – Selection sort – Insertion sort – Shell sort – Radix sort. Hashing- Hash Functions – Separate Chaining – Open Addressing – Rehashing – Extendible Hashing.		
UNIT V	**Brute force and Divide and Conquer**	**6+3**
Brute Force - Exhaustive Search - Traveling Salesman Problem - Knapsack Problem - Divide and Conquer – Merge, Quick sort - Strassens Matrix Multiplication.		

List of Experiments:

1.List ADT

2.Stack ADT

3.BFS

4.DFS

5.Linear Search and Binary Search

6.Selection sort

7.Quick Sort

Text Book (s)

1	M. A. Weiss, "Data Structures and Algorithm Analysis in C", Second Edition, Pearson Education, 2011.
2	AnanyLevitin, "Introduction to the Design and Analysis of Algorithms", Third Edition, Pearson Education, 2017.

M.KUMARASAMY COLLEGE OF ENGG. (A)
Approved By
Board of Information Technology
11 OCT 2020
KARUR-639113.

Reference (s)	
1	Y.Langsam, M.J.Augeustein and A.M.Tenenbaum, "Data Structures Using C", Pearson Education Asia, 2004.
2	Richard Gilberg, Behrouz A. Forouzan, "Data Structures: A Pseudo code Approach with C", Second edition, India Edition 2005.
3	Aho, J.E. Hopcroft and J.D. Ullman, "Data Structures and Algorithms", Pearson Education, 1983.
4	Ellis Horowitz, SartajSahni, Sanguthevar Rajasekaran, "Fundamentals of Computer Algorithms",Galgotia Publications,2010.
5	Thomas H. Cormen, Charles E.Leiserson, Ronald L.Rivest, Clifford Stein "Introduction to Algorithms", 3rd Edition, The MIT Press 2009.

Regulation 2018			Total Hours			30
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
X	18ITX001L/ 18ITY001L	Web Programming	0	0	2	1

Prerequisite Course (s)

-

Course Objective (s):

The purpose of learning this course is to:

1	Be familiar with Web page design using HTML and style sheets
2	Learn to create static web pages.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Design Web pages using HTML and style sheets
CO2	Design and Implement database applications
CO3	Create static web pages

Topics:

1. Introduction of different Web Technology & Markup Language
2. HTML Elements
3. HTML Attributes
    a. HTML Headings
    b. HTML Paragraphs
    c. HTML Formatting
    d. HTML Fonts
    e. HTML Styles
    f. HTML Links
    g. HTML Images
    h. HTML Tables
    i. HTML Lists
4. HTML Forms
    a. HTML Frames
    b. HTML I frames
    c. HTML Colors
    d. HTML Color names,HTML Color values
    e. HTML Quick List
    f. HTML Layout
    g. HTML Doc types
5. HTML Classes
6. CSS Introduction- CSS Syntax- CSS Id & Class- CSS Styling- Styling Backgrounds
7. Styling Text- Styling Fonts- Styling Links- Styling Lists- Styling Tables- CSS Box
8. Model- CSS Border- CSS Outline- CSS Margin- CSS Padding-CSS Types.
9. Database- Introduction to database connectivity- Developing a Webpage Designing using HTML

M.KUMARASAMY COLLEGE OF ENGG. (AU)
Approved By
Board of Information Technology On
19 OCT 2020
KARUR-639 113.

Regulation 2018			Total Hours			30
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
X	18ITX002L	Application Development Using AR VR	0	0	2	1

Prerequisite Course (s)

Nil

Course Objective (s):

The purpose of learning this course is to:

1	The course aims to expose learners to the basic of AR/VR technology and devices, understanding of various elements and components used in AR/VR Hardware and Software, industrial application of AR/VR technology with hands on experience through more informative and practical exploration.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Design, create, and integrate audio, visual, and interactive elements into a comprehensive immersive experience.
CO2	Develop content for successful delivery across multiple platforms, including PC, mobile devices

Topics:

1. Introduction to AR/VR
2. Types of AR,VR
3. 3D Models
4. Unity 3D Software
5. C#.Net
6. Projects on Marker Based AR
7. Projects on Marker Less AR
8. Embedding Audio/Video in AR/VR Project
9. Mini Project

Regulation 2018			Total Hours			30
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
X	18ITX003L	PHP and MYSQL	0	0	2	1

Prerequisite Course (s)

HTML

Course Objective (s):

The purpose of learning this course is to:

1	Learn how to take a static website and turn it into a dynamic website run from a database using PHP and MySQL.
2	Analyze the basic structure of a PHP web application and be able to install and maintain the web server, compile, and run a simple web application
3	Learn how databases work and how to design one, as well as how to use php MyAdmin to work with MySQL.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	List the major elements of the PHP & MySQL work and explain why PHP is good for web development.
CO2	Create Dynamic Websites

Topics:

1. Introduction to PHP & MYSQL
2. Decisions and loop
3. Functions &Arrays
4. PHP Myadmin
5. Handling HTML form with PHP
6. Working files with dictionaries
7. Session and Cookies
8. Database Connectivity with MySQL
9. Exception Handling
10. Mini Project

Regulation 2018			Total Hours			30
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
X	18ITX004L	DEVOPS Technologies	0	0	2	1

Prerequisite Course (s)

-

Course Objective (s):

The purpose of learning this course is to:

1	This Course will provide you with in-depth knowledge of various DevOps tools including Git, Jenkins, Docker, Ansible, Puppet, Vagrant,Chef.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Understand the differences between conventional and agile approaches
CO2	Estimate in an incremental and iterative fashion using practical techniques
CO3	Understand DevOps for CI/CD using containers, container orchestration and piplelines

Topics:

1. LINUX Basics
2. Introduction to Devops
3. Introduction to Cloud computing
4. GIT: Version Control
5. Chef for configuration managementDevOps and Software Development Life Cycle
    a. Waterfall Model
    b. Agile Model
6. Continuous Integration & Deployment
    a. Jenkins
7. Containers and Virtual Development
    a. Docker
    b. Vagrant
8. Configuration Management Tools
    a. Ansible
    b. Puppet
    c. Chef

Regulation 2018			Total Hours			30
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
X	18ITX005L	Data Analytics Using Python	0	0	2	1

Prerequisite Course (s)

-

Course Objective (s):

The purpose of learning this course is to:

1	This course provides an overview of approaches facilitating data analytics on huge datasets. Different strategies are presented including sampling to make classical analytics tools amenable for big datasets, analytics tools that can be applied in the batch or the speed layer of a lambda architecture, stream analytics, and commercial attempts to make big data manageable in massively distributed or in-memory databases

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Analyze and interpret data using an ethically responsible approach
CO2	Apply computing theory, languages, and algorithms, as well as mathematical and statistical models, and the principles of optimization to appropriately formulate and use data analyses.
CO3	Formulate and use appropriate models of data analysis to solve hidden solutions to business-related challenges

Topics:

1.Basics of Python for Data Analysis
2.Python Libraries
3.Python Data Structures
4.NumPy and Pandas
5.Exploratory Analysis
6.Data Munging
7.Visualization
8.Building a Predictive Model in Python
9.Mini Project

Regulation 2018		Semester IV	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
S	18ITS201J	Data Structures and Object Oriented Programming	3	0	2	4

Prerequisite Course (s)

Programming for problem solving

Course Objective (s):

The purpose of learning this course is to:

1	Understand the basics of various Abstract Data Types with its operations.
2	Understand the data structures and algorithms for trees and graphs.
3	Explain about sorting algorithm, implementation and design of algorithms.
4	Summarize the basics of OOPs, declaration and definition of classes and objects.
5	Illustrate the concept of Inheritance, Polymorphism and Exceptions.

Course Outcome (s) (COs):

At the end of this course, learners will be able to:

CO1	Describe various operation on the Abstract Data types
CO2	Discuss about the various operations performed in tree and graph data structures
CO3	Explain about various sorting methods and algorithm design techniques
CO4	Understand the concept of basics of OOPs , classes and objects
CO5	Explain inheritance, polymorphism and handling of exceptions

CO-PO Mapping

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3		2	3			1	1	1			3	1	
CO2	3	3		2	3			1	1	1			3	1	
CO3	3	3		3	3			3	3	3			3	1	
CO4	3	3		2	3			1	1	1			3	1	
CO5	3	3		3	3			1	1	1			3	1	
CO (Avg)	3	3		2.4	3			1.4	1.4	1.4			3	1	

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT I	LINEAR DATA STRUCTURES	9

Algorithm Analysis - List, Stack and Queue - Priority queues - Binary Heap – Hashing - Hash table with/without linked list.

UNIT II	NON LINEAR DATA STRUCTURES	9

Tree Traversal - Binary trees - Search tree ADT - AVL trees - Graph Algorithms - Shortest path algorithm (Single Source) - Minimum spanning tree

UNIT III	SORTING AND ALGORITHM DESIGN	9

Sorting - Insertion sort - Shell sort - Heap sort - Merge sort - Quick sort - Indirect sorting - Bucket Sort - Introduction to Algorithm Design Techniques – Greedy algorithm (Minimum Spanning Tree) - Dynamic Programming (All pairs Shortest Path Problem).

UNIT IV	CLASS AND OBJECTS	9

Introduction – Tokens – Expressions - Control Structures - Functions in C++ - Classes and Objects- Constructors and Destructors - Operator Overloading

UNIT V	INHERITENCE AND POLYMORPHISM	9

Inheritance - Extending Classes – Pointers - Virtual functions and Polymorphism – Templates - Exception handling

LIST OF EXPERIMENTS	15

1. Implementation of List ADT
2. Implementation of Stack ADT
3. Implementation of Queue ADT
4. Tree Traversal
5. Binary Search Tree
6. Any 2 Sorting Techniques
7. Class and Objects
8. Function Overloading
9. Operator Overloading
10. Inheritance
11. Abstract Class & Constructor

Text Book (s)

1	Deitel and Deitel, "C++, How To Program", Fifth Edition, Pearson Education, 2005.
2	Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", Third Edition, Addison Wesley, 2007

Reference (s)

1	Bhushan Trivedi, "Programming with ANSI C++, A Step-By-Step approach", Oxford University Press, 2010
2	Goodrich, Michael T., Roberto Tamassia, David Mount, "Data Structures and Algorithms in C++", 7th Edition, Wiley. 2004.

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3	Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction to Algorithms", Second Edition, Mc Graw Hill, 2002
4	Bjarne Stroustrup, "The C++ Programming Language", 3rd Edition, Pearson Education, 2007
5	Ellis Horowitz, Sartaj Sahni and Dinesh Mehta, "Fundamentals of Data Structures in C++", Galgotia Publications, 2007.