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
CLR-6	Utilize English language skills along with technical skills in building wider career orientations

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
CO6	Build listening, speaking, reading, writing abilities in English to interact with English speaking people.

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	-	-	-
CO6	1	1	1	3	3	3	1	3	3	3	-	3	-	-	
CO (Avg)	1	2.66	1	3.00	3.00	2.83	1	3.00	3.00	3.00	-	3.00	-	-	-

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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	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	-	-	-

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

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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

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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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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

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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	18MES101J	ENGINEERING GRAPHICS (COMPUTER SCIENCE)	1	0	4	3

Course Objective (s):

1. Construct ellipse, Parabola, hyperbola, cycloid and involutes.
2. Sketch the projection of points, straight lines and plane surfaces.
3. Sketch the Projection of simple solids like prisms, pyramids, cylinder and cone
4. Sketch the sectional solids and developing the lateral surfaces of simple solids
5. 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	PSO2	PS O3
CO1	3	2	2	2	2	-	2	3	2	2	-	3	-	-	-
CO2	3	2	3	2	2	-	1	2	3	2	-	3	2	1	-
CO3	3	2	3	2	3	-	1	2	3	2	-	2	1	1	-
CO4	3	2	3	2	3	-	1	2	3	2	-	2	1	1	-
CO5	3	2	2	2	2	-	1	2	2	2	-	3	1	1	-
CO (Avg)	3	2	2.6	2	2.4	-	1.2	2.2	2.6	2	-	2.6	1.25	1	-

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

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.

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 prisms, pyramids and cylinders by visual ray method.
Isometric to orthographic multi-view.

Text Book (s)	
1	K. V. Natrajan, "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai (2010).
2	K. Venugopal& V. Prabhu Raja, "Engineering Graphics", New Age International (P) Limited, 15th edition (2018).

Reference (s)	
1	1. K. R. Gopalakrishnana, "Engineering Drawing" (Vol.I&II), Subhas Publications, 2010.
2	2. R. L Jhala "Engineering Graphics", Tata McGraw Hill Publishing Company Limited, New Delhi, 2015.
3	3. DhananjayA.Jolhe, "Engineering Drawing with an introduction to AutoCAD" Tata McGraw Hill Publishing Company Limited, 2008.
4	4. Basant Agarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, 2012.
5	5. M.S. Kumar, "Engineering Graphics", D.D. Publications, 2009.

List of Expertiments.

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

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)

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).

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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	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	-	-	-
CO (Avg)	1	3	-	3	2	-	-	-	3	3	1	3	-	-	-

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

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	

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20 APR 2018
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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
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)- Lok Sabha and Rajya Sabha (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

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BOARD OF ARTIFICAL INTELLIGENCE & DATA SCIENCE
27 OCT 2020
KARUR - 639 113

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):

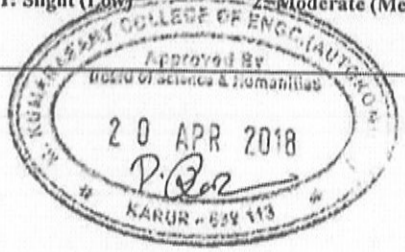
At the end of this course, learners will be able to:

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.,

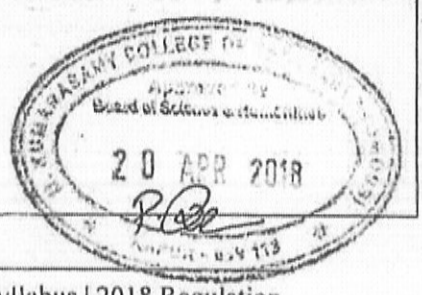
CO-PO Mapping

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)		



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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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)

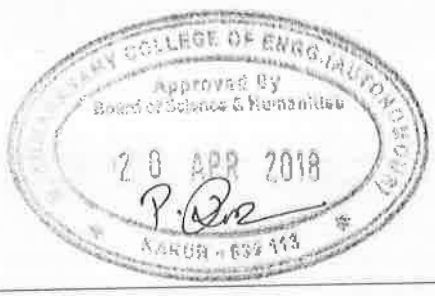
UNIT I	MULTIPLE INTEGRALS	9 + 3
Evaluation of double integration in cartesian and polar Coordinates - Evaluation of double integral by changing of order of integration - Area as a double integral (Cartesian and Polar) - Conversion from Cartesian to Polar in double integrals - Triple integration in Cartesian 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



Regulation 2018		Semester I/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)

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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

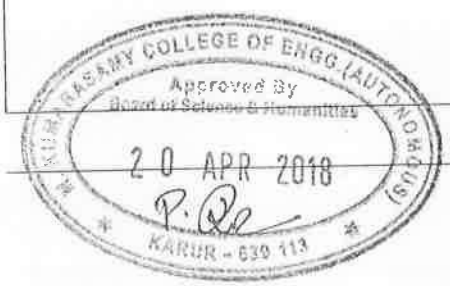
Introduction to Quantum mechanics-Explanation of wave nature of particles-Black body radiation-Compton effect-Solving Problems-Photoelectric effect-de Broglie hypothesis for matter waves - Physical Significance of wave function -Time independent Schrödinger's wave equation -Time dependent Schrödinger's 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.



Regulation 2018		Semester 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

Prerequisite Course (s)

NIL

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

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

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

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	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
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	-	-	-	-	-

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

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	RANSPORTATION 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: components description, 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

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, wire and bar drawing 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

LIST OF EXPERIMENTS	30

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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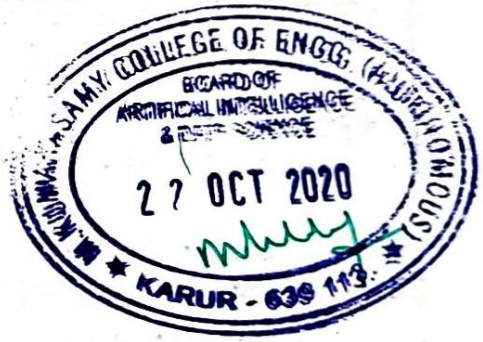
Text Book (s)	
1	Dr.V. Rameshbabu,"Basic of Civil and Mechanical Engineering", VRB Publishers pvt ltd, 2017
Reference (s)	
1	SeropeKalpakjian, Steven Schmid," Manufacturing Processes for Engineering Materials", Pearson, 2016
2	Drbal, Larry F. Boston, Patricia G. Westra, Kayla L. Black, Veatch, "Power 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.



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):

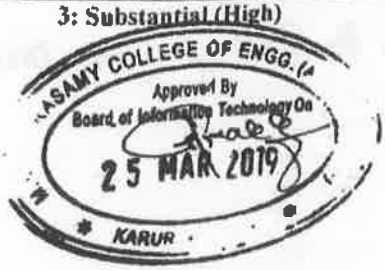
At the end of this course, learners will be able to:

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)



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 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
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)

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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

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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
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)

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).

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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
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"

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Regulation 2018		Semester I / II	Total Hours			30
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
M	18GNM101L	PHYSICAL & MENTAL HEALTH USING YOGA	0	0	2	Nil

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 practical applications of Yoga
CLR-2	Intend that students should get familiar with the Poses if 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
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)

	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 and Functions, Swami Vivekananda Yoga Prakashana, Bangalore.
2	Makar and Madhukar Gore – Anatomy and Physiology of Yogic Practices, motilal Banarsidass, New Delhi, 2007.
3	Anne Waugh, Allison Grant – 1ross and Wilson Anatomy and Physiology in Health & Illness, Churchill Livingstone; 2010.

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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	2.4	1.4	1	-	-	-	-	-	-	-	-	1.6	1.6	-

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

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	18ECS2021	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)

M.KUMARASAMY COLLEGE OF ENGG.(AUTONOMOUS) Approved By Board of Electronics & Comm.Engg 23 MAR 2019 KARUR - 639 113

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.

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.

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)

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 Approachl, 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.

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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)

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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

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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)

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.

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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Thalavapalayam, Karur, Tamilnadu.

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)

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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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Regulation 2018		Semester	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			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)

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.

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29 MAR 2019
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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

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)

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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 Sciencel, Tata McGraw–Hill Pub. Co. Ltd, New Delhi, 2003.
2	Ralph. P. Grimaldi, —Discrete and Combinatorial Mathematics: An Applied Introductionl, 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

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)

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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.

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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.

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.

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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.

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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)

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

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Regulation 2018		Semester IV	Total Hours			30
			Hours / Week			C
Category	Course Code	Course Name	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)

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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

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Regulation 2018		Semester IV	Total Hours			15
			Hours / Week			C
Category	Course Code	Course Name	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- [illegible] period; Caste system and communalism.

UNIT II	LITERATURE AND EDUCATION	4

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.		

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29 MAR 2019
KARUR - 639 113

Regulation 2018			Total Hours			15
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
X	18ITX009L	Internet of Things Using Simulators	0	0	2	1

Prerequisite Course (s)

Embedded Systems

Course Objective (s):

The purpose of learning this course is to:

1	This Course focuses on hands-on IoT concepts such as sensing, actuation and communication. It covers the development of Internet of Things (IoT)prototypes—including devices for sensing, actuation, processing, and communication—to help you develop skills and experiences.

Course Outcome (s) (COs):

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

CO1	Understanding IoT fundamentals,Architecture and Protocols.
CO2	Design Some IoT Based Prototypes for Projects
CO3	Illustrate different sensor technologies for sensing real world entities and identify the Applications of IoT in Industry.

CO-PO Mapping

Cos	Pos												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PS	PSO
CO1	3	2	1	-	-	-	-	-	-	-	-	-	2	2	-
CO2	3	2	1	-	-	-	-	-	-	-	-	-	2	2	-
CO3	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)

Syllabus 15

Introduction to IOT - Sensors Interfacing- Sensor Feature Types of sensors- Reading from Sensors-Interfacing of Arduino with ESP8266-Connect temperature and humidity sensor-Continuously monitor sensor reading through internet-Connections for Home Automation-Arduino Programing for Bluetooth-Home automation using Bluetooth, Arduino, and relay-Develop the module as voice-controlled home automation-Understanding some more Sensors-Update reading and controlling.Mini Project – Real time project.

Text Book (s)

1. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry,"IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things", 1stEdition, Pearson Education (Cisco Press Indian Reprint). (ISBN: 978-9386873743).

Reference (s)

1. Vijay Madisettl and ArshdeepBahga, "Internet of Things (A Hands-on-Approach)", 1st Edition, VPT, 2014. (ISBN: 978-8173719547)
2. Raj Kamal, "Internet of Things: Architecture and Design Principles", 1st Edition, McGraw Hill Education, 2017. (ISBN: 978-9352605224)

Regulation 2018		Semester V	Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			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)

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UNIT I	FINITE AUTOMATA	9
Introduction- Basic Mathematical Notation and techniques- Finite State systems – Basic Definitions –Finite Automaton – DFA & NDFA – Finite Automaton with €- moves – Regular Languages- Regular Expression – Equivalence of NFA and DFA – Equivalence of NDFA's with and without €-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
			Hours / Week			C
Category	Course Code	Course Name	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 metries 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.

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			30
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
C	18ITC303L	Mobile Application Development 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 MobileDevices.

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

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	2	2	-
CO2	3	2	1	-	1	-	-	-	-	-	-	1	2	2	-
CO3	3	2	2	-	1	-	-	-	-	-	-	1	2	2	-
CO4	3	2	2	-	1	-	-	-	-	-	-	1	2	2	-
CO (Avg)	2	2	1.5	-	1	-	-	-	-	-	-	1	2	2	-

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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Regulation 2018			Total Hours			60
Category	Course Code	Course Name	Hours / Week			C
			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)

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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

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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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.

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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)

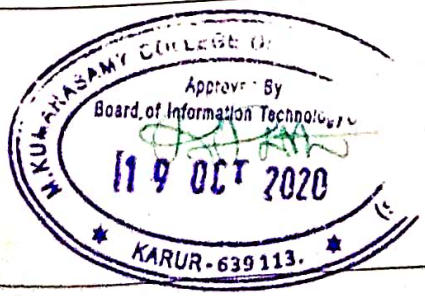
UNIT I	**Basics**	**9**
Distributed Database, Two General Problem, Byzantine General problem and Fault Tolerance, Hadoop Distributed File System, Distributed Hash Table, ASIC resistance, Turing Complete. Cryptography: Hash function, Digital Signature - ECDSA, Memory Hard Algorithm, Zero Knowledge Proof.		
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



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.

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Regulation 2018		Semester V	Total Hours			30
			Hours / Week			
Category	Course Code	Course Name	L	T	P	C
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

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)

Regulation 2018			Total Hours			30
Category	Course Code	Course Name	Hours / Week			C
			L	T	P	
X	18ITX002L	Application Development Using AR and 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.

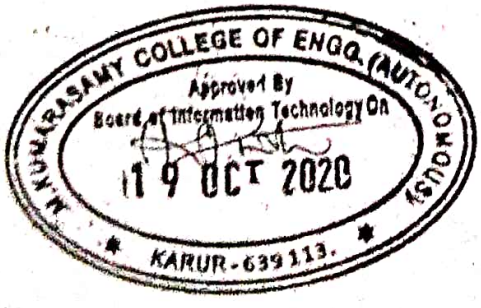
Course Outcome (s) (COs):

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		Semester VI	Total Hours			30
Category	Course Code	Course Name	Hours / Week			C
			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)

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	I.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 XMLI, 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 Programmingl, Wiley Dream tech, New Delhi, 2002.

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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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)

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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

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	3	3	2.8

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

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			Total Hours			60
			Hours / Week			
Category	Course Code	Course Name	L	T	P	C
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)

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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

Regulation 2018						
Category	Course Code	Course Name	Total Hours			60
			Hours / Week			
			L	T	P	C
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

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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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.

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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)

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 establishmen 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.

Regulation 2018		Semester VII	Total Hours			30
Category	Course Code	Course Name	Hours / Week			C
			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)

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	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

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Regulation 2018		Semester VII	Total Hours			30
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

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

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

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)

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 Servletsl - Addison Wesley Longman Inc, New Delhi, 2001.

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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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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

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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	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)

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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.