Sona College of Technology, Salem
(An Autonomous Institution)
Courses of Study for B.E. / B.Tech. Semester III under Regulations 2015 (CBCS)
Branch: Civil Engineering

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit
Theory						
1	U15MAT301A	Transforms and Partial Differential Equations	3	2	0	4
2	U15CHE304	Environmental Science and Engineering	3	0	0	3
3	U15CE301	Mechanics of Solids-I	3	2	0	4
4	U15CE302	Fluid Mechanics	3	2	0	4
5	U15CE303	Construction Materials	3	0	0	3
6	U15GE301	Soft Skills and Aptitude - I	1	0	0	1
Practical						
7	U15CE304	Computer Aided Building Drawing	0	0	4	2
8	U15CE305	Surveying Laboratory	1	2	4	4
					Total Credits	**25**

Approved By

Chairperson, Civil Engineering BoS
Dr.R.Malathy

Member Secretary, Academic Council
Dr.A.C.Kaladevi

Chairperson, Academic Council & Principal
Dr.M.Usha

Copy to:-
HOD/Civil, Third Semester BE Civil Students and Staff, COE

U15MAT301A Transforms and Partial Differential Equations 3 2 0 4

Course Outcomes

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

CO1 Construct Fourier series which is used in solving initial and boundary value problems, compute complex form and harmonics of Fourier Series

CO2 State Fourier Transform pair and Inverse Fourier Transform Pair, Discuss and prove the properties,state and apply convolution theorem and Parseval's Identify to various functions

CO3 Form partial differential equations and solve standard types of first order PDE and linear PDE of second and higher order with constant coefficients

CO4 Classify the quasi linear PDE and solve one dimensional wave equations and two dimensional heat equation

CO5 State Z – transform, Discuss and prove the properties, state and apply convolution theorem to various functions, form and solve the difference equations

Unit – I FourierSeries 9+6

General Fourier series -Dirichlet's conditions, odd and even functions, half range sine and cosine series, Parseval's identity, complex form of Fourier series, harmonic analysis

Unit – II Fourier Transforms 9+6

Fourier integral theorem (without proof) - Fourier transform pair, sine and cosine transforms, properties, transforms of simple functions, convolution theorem (without proof), parseval's identity

Unit – III Partial Differential Equations 9+6

Formation of partial differential equations, Lagrange's linear equation, solutions of standard types of first order partial differential equations, linear partial differential equations of second and higher order with constant coefficients

Unit – IV Boundary value problems 9+6

Classifications of quasi linear PDE, Solutions of one dimensional wave equation; steady state solution of two dimensional equation of heat conduction (Insulated edges excluded)

Unit – V Z -Transformsand Difference Equations 9+6

Z –Transforms - Elementary properties, inverse Z - transform, convolution theorem (without proof), formation of difference equations, solution of difference equations using Z - transform

Total: 75 hours

TEXT BOOK

1. Transforms and Partial Differential Equations – III" by Sonaversity 2011
2. Veerarajan. T., "Enginering Mathematics" (For semester III), 3rd Edition, Tata Mc Graw Hill, 2008

REFERENCES

1. Bali N.P., and Manish Goyal, "A Textbook of Engineering Mathematics", 7th Edition, Laxmi Publications (P) Ltd., 2007.
2. Ramana B.V,"Higher Engineering Mathematics", Tata Mc-GrawHill Publishing Company limited, New Delhi 2007.
3. Glyn James,"Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education 2007.
4. Erwin Kreysizig, "Advanced Engineering Mathematics", 8th edition, Wiley India 2007.
5. Grewal B.S., "Higher Engineering Mathematics", 40th Edition, Khanna Publishers, Delhi 2007.
6. Signals and systems by Anand Kumar
7. Signals and systems by Dr. S. Palani
8. Signals and Systems by Ramesh Babu

U15CHE 304 Environmental Science and Engineering LT P C 300 3 100

Course Outcomes

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

CO1 State the importance of the acute need for environmental awareness and discuss significant aspects of natural resources like forests, water, mineral, food, energy and land resources.

CO2 Explain the concepts of an ecosystem and provide an overview of biodiversity and its conservation.

CO3 Define the various known kinds of environmental pollution and discuss their causes, effects and control measures.

CO4 Give an account of the social issues with regard to the environment.

CO5 Discuss the impact of human population on the environment.

UNIT I Introduction to Environmental Studies and Natural Resources 12

Definition, Scope and Importance – Need for public awareness – Forest Resources:- Use and over - exploitation, deforestation, Case Studies, Timber Extraction, Dams, Benefits and their effects on forests and tribal people - Water Resources:- Use and Over-Utilization of Surface and ground water , Floods, Drought, Conflicts Over Water – Mineral Resources:- Use–Environmental Effects of Extracting and Using Mineral Resources – Food Resources: World Food Problems, Changes caused by Agriculture and Overgrazing, Effects of Modern Agriculture, Fertilizer- Pesticide Problems, Water Logging, salinity – Energy Resources:- Growing Energy Needs, Renewable and Non Renewable Energy Sources, Use of Alternate Energy Sources – Land Resources:- Land as a Resource, Land Degradation, Man Induced Landslides, Soil Erosion and Desertification – Role of an Individual in Conservation of Natural Resources.

UNIT II Ecosystems and Biodiversity 9

Concepts of an Ecosystem – Structure and Function of an Ecosystem – Producers, Consumers and Decomposers – Energy Flow in the Ecosystem – Biogeochemical Processes - Ecological Succession – Food Chains, Food Webs and Ecological Pyramids.

Introduction to Biodiversity – Definition: Genetic, Species and Ecosystem Diversity – Value of Biodiversity: Consumptive Use, Productive Use, Social, Ethical, Aesthetic and Option Values – Biodiversity at Global, National and Local Levels – India as a Mega-Diversity Nation – Hot-Spots of Biodiversity – Threats to Biodiversity: Habitat Loss, Poaching of Wildlife, Man-Wildlife Conflicts – endangered and Endemic Species of India – Conservation of Biodiversity: In-Situ and Ex-Situ conservation of Biodiversity.

UNIT III Environmental Pollution 10

Definition – Causes, Effects and Control Measures of:- (A) Air Pollution - Climate Change, Global Warming, Acid Rain, Ozone Layer Depletion (B) Water Pollution (C) Soil Pollution (D) Marine Pollution (E) Noise Pollution (F) Thermal Pollution (G) Nuclear Hazards – Solid Waste Management:- Causes, Effects and Control Measures of Urban and Industrial Wastes, hazardous wastes and biomedical wastes – Role of an Individual in Prevention of Pollution – Pollution Case Studies – disaster Management:- Floods, Earthquake, Cyclone and Landslides – Waste water treatment methods.

UNIT IV Social issues and the Environment **8**

Sustainable Development – Urban Problems Related To energy – Water conservation, Rain Water Harvesting, Watershed Management – Resettlement and Rehabilitation of People, its Problems and Concerns – Environmental Ethics:- Issues and Possible Solutions –, Nuclear Accidents and Holocaust, Case Studies – Wasteland Reclamation – Environment Production Act – Air (Prevention and Control of Pollution) Act – Water (Prevention and Control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues Involved in enforcement of Environmental Legislation – Public Awareness.

UNIT V Human Population and the Environment **6**

Population Growth, Variation Among Nations – Population Explosion – Family Welfare Programme – environment and Human Health – Human Rights – Value Education – HIV /AIDS – Women and Child Welfare – Role of Information Technology in Environment and Human Health – Case Studies.

Total : 45 Hours

Text Books:

1. K. Karunakaran et al., "Environmental Science" Sonaversity, Sona College of Technology, Salem, 2014.
2. "Environmental Science and Engineering" by Anubha Kaushik and C.P. Kaushik, New Age International Publication, 4th Multicolour Edition, New Delhi, 2014.

Reference Books:

1. Masters, G.M., "Introduction to Environmental Engineering and Science", Pearson Education Pvt., Ltd., 2nd Edition, 2004.
2. Miller, T.G. Jr., "Environmental Science", Wadsworth Pub. Co.
3. Erach, B., "The Biodiversity of India", Mapin Publishing P.Ltd.,Ahmedabad, India.
4. ErachBharucha, "Textbook of Environmental Studies for Undergraduate Courses", 2005, University Grands Commission, Universities Press India Private Limited, Hyderguda, Hyderabad – 500029.

U15CE301 Mechanics of Solids– I LT P C 3 2 0 4 100

Course Outcomes

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

CO1 Explain deformation due to tensile and compressive stress and to study the principal stress

CO2 Analyse and determine the forces in truss members

CO3 Draw the bending moment, shear force diagram and describe the load carrying capacity of beams

CO4 Determine the deflection of beams

CO5 State the type of stresses and deformation in shafts and deflection of springs

nit 1 Stress, Strain and Deformation of Solids, State of Stress 9+6

Rigid bodies and deformable solids – stability, strength, stiffness – tension, compression and shear stresses – strain, elasticity, Hooke's Law, limits of proportionality, modulus of elasticity, stress-strain curve, lateral stain – Thermal stresses – deformation of simple and compound bars – shear modulus, bulk modulus, relationship between elastic constants – biaxial state of stress – stress at a point – stress on inclined plane – principal plane and principal stresses – Mohr's circle of stresses

Unit II Analysis of Plane Trusses /Frame, Thin Cylinders & Shells 9+6

Stability and equilibrium of plane trusses – types of trusses – Analysis of forces in plane truss members – Methods of joint – Method of sections – Method of tension coefficients – Thin cylinders and shells – Deformation under internal pressure

Unit III Transverse Loading on Beams 9+6

Beams – types of supports, simple and fixed – statically determinate and indeterminate beams – transverse loading on beams – concentrated vertical and inclined, uniformly distributed, varying distributed load, combination of above loading – Relationship between bending moment and shear force – Bending moment and shear force diagram for simply supported, cantilever and overhanging beams – Theory of simple bending – Analysis of beams for stresses – Load carrying capacity of beams

Unit IV Deflection of Beams and Shear Stresses 9+6

Double Integration method – Macaulay's method – Area moment method – Conjugate beam method for computation of slopes and deflections in determinate beams – Variation of shear stress – Shear stress distribution in rectangular, I section, solid circular sections, hollow circular sections, angle and channel sections

Unit V Torsion and Springs 9+6

Theory of simple torsion – Stresses and deformation in circular and hollow shafts – stepped shafts – shafts fixed at both ends – Leaf springs – open and closed coiled helical spring – stresses and deflection

Total : 75Hours

TEXT BOOKS

1. Vazirani N., Ratwani M., "Analysis of Structures" Khanna Publishers, New Delhi, 2001
2. Rajput R.K., "Strength of Materials", S Chand & Company Ltd., New Delhi, 2006

REFERENCES

1. Subramanian R., "Strength of Materials", Oxford University Press, New Delhi, 2005
2. Egor P Popov, "Engineering Mechanics of Solids", Prentice Hall of India, New Delhi, 2003
3. Srinath L.S., "Advanced Mechanics of Solids", Tata McGraw-Hill Publishing Co., New Delhi, 2003
4. Damshmgro, "Strength of Materials", CBS Publications, New Delhi

U15CE302 Fluid Mechanics L T P C 3 2 0 4 100

Course Outcomes

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

CO1 Define various terminologies in fluid mechanics.
CO2 State principles of fluid statics, kinematics and dynamics.
CO3 Discuss various losses in pipe network.
CO4 Explain the various applications of similitude and model analysis
CO5 Discuss the laminar flow through pipes and plates

Unit I Definitions and Fluid Properties 5+4

Definitions – Fluid and fluid mechanics – Dimensions and units – Fluid properties – Continuum concept of system and control volume

Unit II Fluid Statics & Kinematics 10+7

Pascal's Law and Hydrostatic equation – Forces on plane and curved surfaces – Buoyancy –Meta centre – Pressure measurement – Fluid mass under relative equilibrium

Fluid Kinematics Stream, streak and path lines – Classification of flows – Continuity equation (one, two and three dimensional forms) – Stream and potential functions – Flow nets – Velocity measurement (Pitot tube, Current meter, Hot wire and hot film anemometer, Float technique, Laser Doppler velocimetry)

Unit III Fluid Dynamics 10+6

Control Volume Approach - Euler and Bernoulli's equations – Application of Bernoulli's equation – Discharge measurement – Laminar flows through pipes and between plates – Hagen Poiseuille equation – Turbulent flow –Darcy-Weisbach formula – Moody diagram – Moment of momentum Principle

Unit IV Boundary Layer and Flow Through Pipes 10+7

Definition of boundary layer – Thickness and classification – Displacement and momentum thickness – Development of laminar and turbulent flows in circular pipes – Major and minor losses of flow in pipes – Pipes in series and in parallel – Pipe network

Unit V Similitude and Model Study 10+6

Dimensional Analysis – Rayleigh's method, Buckingham's Pi-theorem – Similitude and models – Scale effect and distorted models

Total : 75 Hours

TEXT BOOKS

1. Kumar K.L., "Engineering Fluid Mechanics", Eurasia Publishing House (P) Ltd., New Delhi, 1995
2. Modi P.N., & Seth S.M., "Hydraulics & fluid Mechanics", Standard Book House, New Delhi, 2005

REFERENCES

1. Streeter, Victor L., and Wylie, Benjamin E., "Fluid Mechanics", McGraw-Hill Ltd., 1998
2. E. John Finnemore and Joseph B., Franzini, "Fluid Mechanics with Engineering Applications", McGraw-Hill International Edition, 2001
3. Fox, Robert W., and Macdonald, Alan T., "Introduction to Fluid Mechanics", John Wiley & Sons, 1995
4. Bansal R.K., "Fluid Mechanics and Hydraulic Machines", Laxmi Publications (P) Ltd., New Delhi
5. Rajput R.K., "A text book of Fluid Mechanics", S.Chand and Co., New Delhi, 2007

U15CE303 Construction Materials L TP C 3 0 0 3 100

Course Outcomes

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

CO1 Explain the Enginering properties of rocks,selection,test,deterioration and preservation of stone works.

CO2 Discuss the classification, test,properties of Bricks, Concrete blocks and lime.

CO3 Discuss the ingredients for cement, types, tests and properties of aggregate and mortar

CO4 Explain the various roof covering and flooring materials.

CO5 Describe the types, properties of modern construction materials.

Unit I Stones 9

Types of rocks-origin, composition, textures, structures, occurrence, classification, engineering properties and distribution of the Igneous, Sedimentary and Metamorphic rocks- Stone as building material- criteria for selection- tests on stones- deterioration and preservation of stone works.

Unit II Bricks, Concrete blocks and Lime 9

Classification, properties, tests, applications - bricks, fly ash bricks, hollow and solid blocks, interlocking blocks, Light weight concrete blocks- lime.

Unit III Concrete and mortar making materials 9

Cement-ingredients, manufacturing, types and properties- Aggregate (fine aggregate and coarse aggregate)- properties, types and tests- Mortar- types,tests, properties and usage.

Unit IV Flooring and Roofing materials 9

Types, usage and selection of flooring- granite, ceramics, vitrified tiles, mosaic, wooden flooring, synthetic flooring, cement concrete- Types of roof covering materials- asbestos, galvanized sheet, cement concrete weathering titles and alloy sheet.

Unit V Other materials 9

Types, properties and application- geomembranes and geotextiles, paints, varnishes, distempers, wood, glass, aluminum, fiber glass, laminates and veneer

Total:45 Hours

TEXT BOOKS

1. Arora S.P., and Bindra S.P., “Building Construction Planning Techniques and Method of Construction”, Dhanpat Rai and Sons, 1997
2. Punmia B.C., “Building Construction”, Laxmi Publication, New Delhi, Latest Edition

REFERENCES

1. Jha J., and Sinha S.K., “Construction and Foundation Engineering”, Khanna Publishers, 1993
2. Gambhir M.L., “Concrete Technology”, Tata McGraw - Hill Publishing Company Ltd, New Delhi, 2004
3. Shetty M.S., “Concrete Technology Theory and Practice”, S. Chand and Company Ltd., New Delhi, 2005

U15CE304 Computer Aided Building Drawing L T P C 0 0 4 2 100

COURSE OUTCOMES

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

CO1 Draw the plan, elevation and section and furniture layout of load bearing and framed structures
CO2 Draw the plan, elevation and detailing of roof trusses.
CO3 Draw the perspective view of residential building and describe the concept of building information modeling

List of Experiments

1. Buildings with load bearing walls (Flat and sloping roof) – including details of doors and windows
2. Perspective drawing of residential building
3. Industrial buildings – North light roof structures – Trusses
4. RCC framed structures
5. Building Information Modeling (BIM)
6. Furniture Layout

Total: 60 Hours

TEXT BOOKS

1. "Civil Engg., Drawing and House Planning", Varma B.P., Khanna Publishers, Delhi
2. "Building Drawing and Detailing – BalagopalT.S., Prabhu, Spades Publishers, Calicut

REFERENCES

1. "Building Drawing", Shah M.G., Tata McGraw-Hill, 1992
2. "Building Planning and Drawing", Kumaraswamy N., Kameswara Rao A., Charotar Publishing
3. Shah, Kale and Patki, "Building Drawing with Integrated Approach to Built Environment", Tata McGraw-Hill

U15CE305 Surveying Laboratory LTP C 1 2 4 4 100

COURSE OUTCOMES

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

CO1 Determine the distance, angle and area using prismatic compass

CO2 Determine the reduced level , horizontal, vertical angles and setting out the simple curves by theodolite and tachometry survey

CO3 Calculate the area by total station and GPS

List of Experiments

1. Traversing - Measurement of bearing of survey lines by prismatic compass - Local attraction
2. Reduction of levels
   - Height of collimation method
   - Rise and Fall method
3. Theodolite Survey - Measurement of horizontal angles by reiteration and repetition
4. Theodolite Survey - Measurement of vertical angles and determination of height of an object by Single plane method
5. Tacheometry
   - Constants of Tacheometer
   - Tangential Tacheometry
6. Setting out simple circular curve by Long chord method
7. Traversing using Total Station-Calculation of area using Total Station
8. Calculate the area of an enclosed points by latitude- longitude methods using GPS

Total : 90 Hours

U15GE301 **Soft skills and Aptitudes - IL T P C 1 0 0 0 100**

COURSE OUTCOMES

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

CO1	Identify personal SWOT data and individual levels of communication and employability skills and set SMART professional and personal goals
CO2	Explain the importance of soft skills and career planning and describe the steps in transactional analysis and resume writing
CO3	Clarify the need for good time management and stress management and give an account of the importance of intra-personal skills and motivation
CO4	State the benefits of developing good inter-personal skills, teamwork skills and emotional intelligence, and discuss leadership and different leadership styles
CO5	Demonstrate a meditation technique and describe informal methods used to enhance language vocabulary and spoken communication skills

Unit I **6**

Use of diagnostic tests to assess individual levels of communication skills, aptitude and employability skills; SWOT, psychometric test, SWOT analysis and goal setting; Techniques for positive implementation of set goals

Unit II **6**

Soft Skills; Career planning; Transactional analysis; Resume writing

Unit III **7**

Time management; Stress management; Intra-personal skills; Motivation, three types of motivation

Unit IV **7** Interpersonal

Skills; Team work, team work styles; Leadership, leadership styles; Emotional intelligence

Unit V **6** Meditation

technique; Common games that enhance English vocabulary: word building; Role play

Total: 32 hours

Sona College of Technology, Salem
(An Autonomous Institution)
Courses of Study for B.E/B.Tech. Semester III under Regulations 2015 (CBCS)
Branch: Mechanical Engineering

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit
Theory						
1	U15MAT301D	Transforms and Boundary value Problems	3	2	0	4
2	U15ME301	Engineering Thermodynamics	3	2	0	4
3	U15ME302	Strength of Materials	3	0	0	3
4	U15ME303	Fluid Mechanics	3	0	0	3
5	U15EE307	Electrical Machines and Electron Devices	3	0	0	3
6	U15CHE304	Environmental Science and Engineering	3	0	0	3
7	U15GE301	Soft Skills and Aptitude-I	1	0	0	1
Practical						
8	U15ME304	Fluid Mechanics and Strength of Materials Laboratory	0	0	4	2
9	U15EE308	Electrical Machines and Electron Devices Laboratory	0	0	4	2
					Total Credits	**25**

Approved By

Chairperson, Mechanical Engineering BoS — Dr.D.Senthilkumar
Member Secretary, Academic Council — Dr.A.C.Kaladevi
Chairperson, Academic Council & Principal — Dr.M.Usha

Copy to:-
HOD/Mechanical Engineering, Third Semester BE Mechanical Students and Staff, COE

Course Code	**U15MAT301D**	L	T	P	C	
Course Name	**TRANSFORMS AND BOUNDARY VALUE PROBLEMS**	3	2	-	4	

Pre-requisites subject: Vector Calculus, Differential Equations and Complex Analysis

Course Outcomes

Upon completion of this course the students will be able to

CO1 Construct Fourier series which is used in solving initial and boundary value problems, compute complex form and harmonics of Fourier Series

CO2 State Fourier Transform pair and Inverse Fourier Transform Pair, Discuss and prove the properties, state and apply convolution theorem and Parseval's Identify to various functions.

CO3 Form partial differential equations and solve standard types of first order PDE and linear PDE of second and higher order with constant coefficients

CO4 Classify the quasi linear PDE and solve one dimensional wave equations and two dimensional heat equation

CO5 Solve boundary value problems in ODE and PDE, using finite difference approximations

Unit – I **Fourier Series** L 9 T 3

General Fourier series - Dirichlet's conditions, odd and even functions, half range sine and cosine series, complex form of Fourier series, Parseval's identify, harmonic analysis.

Unit – II **Fourier Transforms** L 9 T 3

Fourier integral theorem (without proof) - Fourier transform pair, sine and cosine transforms, properties, transforms of simple functions, convolution theorem, parseval's identity.

Unit – III **Partial Differential Equations** L 9 T 3

Formation of partial differential equations, Lagrange's linear equation, solutions of standard types of first order partial differential equations, linear partial differential equations of second and higher order with constant coefficients

Unit – IV **Boundary value problems** L 9 T 3

Classifications of quasi linear PDE, Solutions of one dimensional wave equation in Cartesian co-ordinates; steady state solution of two dimensional equation of heat conduction in Cartesian co-ordinates (Insulated edges excluded)

Unit – V **Numerical solutions to boundary value problems in Ordinary and Partial Differential Equations** L 9 T 3

Second order ordinary differential equation, finite difference solution of one dimensional heat equation by explicit and implicit methods, one dimensional wave equation and two dimensional Laplace and Poisson equations

Total Number of hours: 60

Learning Resources

Text Books

1. "Transforms and Partial Differential Equations – III" by Sonaversity 2011
2. Ponnusamy S., "Numerical Methods", 1st Edition, Sona Varsity, 2008

Reference Books

1. Bali N.P., and Manish Goyal, "A Textbook of Engineering Mathematics", 7th Edition, Laxmi Publications (P) Ltd., 2007
2. Ramana B.V.,"Higher Engineering Mathematics", Tata Mc-GrawHill Publishing Company limited, New Delhi 2007
3. Glyn James,"Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education 2007
4. Erwin Kreysizig, "Advanced Engineering Mathematics", 8th edition, Wiley India 2007
5. Grewal B.S., "Higher Engineering Mathematics", 40th Edition, Khanna Publishers, Delhi 2007.

Course Code	**U15ME301**	L	T	P	C
Course Name	**ENGINEERING THERMODYNAMICS**	3	2	-	4

Pre-requisite subjects: Engineering Physics and Transforms & Partial differential equations

Course Outcomes

Upon completion of this course the students will be able to

CO1 Describe the thermodynamic properties of system, First Law of Thermodynamics and how to use it to solve engineering problems.

CO2 Explain the Importance of Second law of Thermodynamics and its applications in analysis of entropy.

CO3 Explain the thermodynamic properties of pure substance, steam and PVT Surfaces

CO4 Describe the Concept of ideal and real gases and its thermodynamic relations.

CO5 Explain the Psychrometric terms and the various processes involved in it.

Unit I BASIC CONCEPT AND FIRST LAW L 9 T 3

Basic concepts - concept of continuum, macroscopic approach, Thermodynamic systems - closed, open and isolated. Property, state, path and process, quasi-static process, work, modes of work, Zeroth law of thermodynamics – concept of temperature and heat. Concept of ideal and real gases. First law of thermodynamics – application to closed and open systems, internal energy, specific heat capacities, enthalpy, steady flow process with reference to various thermal equipments.

Unit II SECOND LAW L 9 T 3

Second law of thermodynamics – Kelvin's and Clausius statements of second law. Reversibility and irreversibility. Carnot theorem, Carnot cycle, reversed Carnot cycle, efficiency, COP. Thermodynamic temperature scale, Clausius inequality, concept of entropy, entropy of ideal gas, principle of increase of entropy – available and unavailable energy.

Unit III PROPERTIES OF PURE SUBSTANCE L 9 T 3

Properties of pure substances – Thermodynamic properties of pure substances in solid, liquid and vapour phases, phase rule, P-V, P-T, T-V, T-S, H-S diagrams, PVT surfaces, thermodynamic properties of steam. Calculations of work done and heat transfer in non flow and flow processes. Determination of steam quality.

Unit IV IDEAL AND REAL GASES AND THERMODYNAMIC RELATIONS L 9 T 3

Gas mixtures – properties ideal and real gases, equation of state, Avagadro's Law, Vander Waal's equation of state, compressibility factor, compressibility chart – Dalton's law of partial pressure, exact differentials, T-D relations, Maxwell's relations, Clausius Clapeyron equations, Joule –Thomson coefficient.

Unit V PSYCHROMETRY L 9 T 3

Psychrometry and psychrometric charts, property calculations of air vapour mixtures. Psychrometric process – Sensible heat exchange processes. Latent heat exchange processes. Adiabatic mixing, evaporative cooling

Total Number of hours: 60

Learning Resources

Text Books

1. Chattopadhya,P. Engineering Thermodynamics, Oxford university press, New Delhi,2010
2. Cengel, 'Thermodynamics – An Engineering Approach' Seventh Edition, Tata McGraw Hill, New Delhi, 2010.

Reference Books

1. Nag.P.K., "Engineering Thermodynamics", Tata McGraw-Hill, New Delhi, 2005.
2. Holman.J.P., "Thermodynamics", 3rd Ed. McGraw-Hill, 1995.
3. Michael J Moran, Howard N. Shapiro, Daisie D. Boettner, Margaret B. Baily, "Fundamentals of Engineering Thermodynamics" 8th Edition, John Wiley& sons, 2014
4. Arora C.P, "Thermodynamics", Tata McGraw-Hill, New Delhi, 2003.

		L	T	P	C
Course Code	**U15ME302**				
Course Name	**STRENGTH OF MATERIALS**	3	-	-	3

Course Outcomes

Upon completion of this course the students will be able to

CO1 Develop the understanding on the state of stresses and strains in engineering components as a result of different loading conditions their use in the analysis and design of machine members and structures.

CO2 Gain the ability to analyze the effect of various loading combinations on a mechanical/structural member by determining the principal stresses principal planes and maximum shear stress under various combinations of axial loads on machine and structural parts using Mohr's circle.

CO3 Provide the principles and equations and necessary tools to analyze structural members under axial loads bending shear and torsion.

CO4 Develop an understanding of material behavior under a condition of pure torsion (twisting moment) on circular shafts. Analyze and design structural members subjected to tension, compression , torsion bending and combined stresses using the fundamental concepts of stress strain and elastic behavior of materials.

CO5 Develop an understanding of analytic methods used in connection with the structural design of beams columns long mechanical members under compression and different loading condition. Analyze columns and struts under various loadings.

Unit I Stress, Strain and Deformation of Solids L 9

Simple stress and strain – Stresses and strains due to axial force - Mechanical properties of materials – Stress-strain curve –- Hooke's law - Factor of safety – Stepped shafts – Uniformly varying sections – Stresses in composite sections - Temperature stresses – Poisson's ratio - shear modulus, bulk modulus, relationship between elastic constants.

Unit II Analysis of Stresses in Two Dimensions L 9

State of stresses at a point – Normal and tangential stresses on inclined planes - Principal planes and stresses – Plane of maximum shear stress - Mohr's circle for biaxial stresses –Hoop and longitudinal stresses in thin cylinders and shells – under internal pressure – deformation of thin cylinders and shells.

Unit III Beams - Loads and Stresses L 9

Beams – types of supports – simple and fixed, types of load – concentrated, uniformly distributed, varying distributed load, combination of above loading – relationship between bending moment and shear force – bending moment, shear force diagram for simply supported, cantilever and over hanging beams – Point of contra flexure. Introduction to Theory of simple bending.

Unit IV Torsion in Shafts and springs L 9

Analysis of torsion of circular bars – Shear stress distribution – Bars of Solid and hollow circular section – Stepped shaft – Twist and torsion stiffness – Compound shafts Springs: Classification – Leaf springs, closed coil helical springs - Application of various springs – Maximum shear stress in spring – Deflection of helical coil springs under axial loads.

Unit V Deflection of Beams L 9

Deflection of beams – double integration method – Macaulay's method – slope and deflection using moment area method. Columns: Buckling of long columns due to axial load - Equivalent length of a column – Euler's and Rankine's formulae for columns of different end conditions – Slenderness ratio

Total Number of hours: 45

Learning Resources

Text Books

1. R K Bansal, "A text book of Strength of Materials", Lakshmi Publications (P) Limited, New Delhi, 2007.
2. R K Rajput, "Strength of Materials", S Chand & Co., New Delhi, 2006.

Reference Books

1. Nash W.A, "Theory and problems in Strength of Materials", Schaum Outline Series, McGraw-Hill Book Co, New York, 1995.
2. Singh D.K "Mechanics of Solids" Pearson Education 2002.
3. Ryder G.H, "Strength of Materials", Macmillan India Ltd., Third Edition, 2002.
4. Popov E.P, "Engineering Mechanics of Solids", Prentice-Hall of India, New Delhi, 1997.

Course Code	U15ME303	L	T	P	C
Course Name	FLUID MECHANICS	3	-	-	3

Pre-requisite subjects: Engineering Physics and Transforms & Partial differential equations

Course Outcomes

Upon completion of this course the students will be able to

- **CO1** Apply mathematical knowledge to predict the properties and concept of pressure measurement.
- **CO2** Analyze the fluid flow problems using continuity equation and Bernoulli's equation with their applications
- **CO3** Distinguish laminar and turbulent flow through circular pipes and power transmission through pipes.
- **CO4** Describe the importance of dimensional analysis by using Buckingham's ∏ theorem.
- **CO5** Understand the fundamental concepts of compressible flow and area-velocity relationship.

Unit I FLUID PROPERTIES AND PRESSURE MEASUREMENT L 9

Units & Dimensions. Properties of fluids – mass density, specific weight, specific volume, viscosity, capillarity and surface tension, compressibility, vapor pressure and cavitation. Pressure measurement- Pascal law-measurement of pressure through simple and differential manometers.

Unit II FLUID KINEMATICS AND DYNAMICS L 9

Types of fluid flow- application of continuity equation, Continuity equations in Cartesian coordinates. Euler's equation of motion along streamline, Bernoulli's equation and its applications- Orifice meter, Venturi meter. Pitot tube.

Unit III TURBULENT FLOW THROUGH PIPES L 9

Laminar flow though circular pipes [Hagen-poiseuille equation].Boundary layer concept- Turbulent flow though circular pipes- Darcy Weisbach equation –friction factor- Moody diagram. Flow through pipes: Energy losses, pipes in series and parallel. Power transmission through pipes.

Unit IV DIMENSIONAL ANALYSIS L 9

Need for dimensional analysis – methods of dimensional analysis – Buckingham's π theorem, Dimensionless parameters - application of dimensionless parameters. Models and Similitude - Model laws.

Unit V COMPRESSIBLE FLOW L 9

Introduction - basic equations of compressible flow - speed of sound wave- mach number- propagation of pressure waves - stagnation properties. Area–velocity relationship. Introduction to Rayleigh flow and Fanno flow.

Total Number of hours: 45

Learning Resources

Text Books

1. Sukumar Pati., “Fluid Mechanics and Hydraulics Machines”, Tata McGraw Hill publications (P) Ltd, New Delhi, 2012.
2. C.S.P.Ojha, R.Berndtsson, P.N.Chandramouli., Fluid Mechanics and Machinery, Oxford University Press, New Delhi, 2010.

Reference Books

1. Bansal, R.K., Fluid Mechanics and Hydraulics Machines, (9th edition), Laxmi publications (P) Ltd, New Delhi, 2010.
2. Modi P.N. and Seth, S.M. "Hydraulics and Fluid Mechanics", Standard Book House, New Delhi 2004.
3. Streeter, V. L. and Wylie E. B., "Fluid Mechanics", McGraw Hill Publishing Co. 2010.
4. Kumar K. L., "Engineering Fluid Mechanics", Eurasia Publishing House(p) Ltd., New Delhi 2004.
5. Ramamritham. S, Fluid Mechanics, Hydraulics and Fluid Machines, Dhanpat Rai & Sons, Delhi, 2011.
6. Yahya S.M. Fundamentals of Compressible Flow with Aircraft and Rocket Propulsion. 5th edition New Age international publishers.2016.

Course Code	U15EE307	L	T	P	C
Course Name	ELECTRICAL MACHINES AND ELECTRON DEVICES	3	-	-	3

Course Outcomes

Upon completion of this course the student will be familiar with

- **CO1** The Construction, operation, characteristics and Speed control of DC motors
- **CO2** The Construction, Types, Operation, characteristics and speed control of Induction motor.
- **CO3** The characteristics and operation of PN diode and BJT
- **CO4** Deliberate field effect transistor, UJT, SCR and other power devices.
- **CO5** Identify the features of Intel 8085 Microprocessor and writing simple programs.

Unit I Dc Motors L 9 T 0

Construction, principle of operation, torque-speed characteristics - Starters- Speed control of DC series and shunt motors – Armature and field control, Ward-Leonard control system, Applications.

Unit II Ac Motors L 9 T 0

Three-phase induction motor: Construction- types- principle of operation- torque - slip characteristics - starting methods and speed control- Single phase Induction motor, Applications.

Unit III PN Diode and BJT L 9 T 0

Atomic structure - Types of semiconductor - Theory of PN junction Diode – VI Characteristics of PN junction diode – Applications of PN Diode –Transistor Construction & working principle - Current components in transistor – Configurations of transistor – I/O Characteristics –- Applications of transistor.

Unit IV FET, UJT, SCR, DIAC AND TRIAC L 9 T 0

Construction, operation, VI Characteristics and applications of JFET and MOSFET – Construction, operation, VI characteristics and applications of UJT, SCR, TRIAC and DIAC.

Unit II 8085 Microprocessor L 9 T 0

Intel 8085 Architecture – Intel 8085 Pin Diagram and its functions- Instruction set – Addressing modes – Simple Assembly language Programming – Interrupts.

Total Number of hours: 45

Learning Resources

Text Books

1. D.P. Kothari and I.J. Nagrath, “Electric Machines”, Tata McGraw Hill Publishing Company Ltd, Fourth Edition 2010.
2. S Salivahanan, N Sureshkumar and A Vallavaraj, “Electronic Devices and Circuits”, Tata Mcgraw Hill, 2nd Ed., 2008.
3. Gaonkar, R. S., “Microprocessor Architecture, Programming and application with 8085”, 4th Edition, Prentice Hall, 2000.

REFERENCE BOOKS:

1. Vedam Subramanyan, Electrical Drives concepts and applications, Tata Mc Graw Hill Publications, 2014
2. Robert L.Boylestad, Louis Nashelsky, “Electronic Devices and Circuit Theory”, Pearson Education, Tenth Edition, 2012.
3. Robert T.Paynter , “Introductory Electronic Devices and Circuits”, Pearson Education, Seventh Edition, 2009.

Course Code	**U15CHE304**	L	T	P	C
Course Name	**ENVIRONMENTAL SCIENCE**	3	-	-	3

Pre-requisites subject: Nil

Course Outcomes

Upon completion of this course the students will be able to

- **CO1** State the importance of the acute need for environmental awareness and discuss significant aspects of natural resources like forests, water, mineral, food, energy and land resources
- **CO2** Explain the concepts of an ecosystem and provide an overview of biodiversity and its conservation.
- **CO3** Define the various known kinds of environmental pollution and discuss their causes, effects and control measures.
- **CO4** Give an account of the social issues with regard to the environment.
- **CO5** Discuss the impact of human population on the environment.

Unit I **Introduction To Environmental Studies And Natural Resources** L 10 T 0

Definition, scope and importance –need for public awareness –forest resources: use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their ground water, floods, drought, conflicts over water, dams-benefits and problems –mineral resources: use effects on forests and tribal people –water resources: use and over-utilization of surface and exploitation, environmental effects of extracting and using mineral resources, case studies –food resources: world food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies –energy resources: growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies –land resources: land as a resource, land degradation, man induced landslides, soil erosion and desertification –role of an individual in conservation of natural resources –equitable use of resources for sustainable lifestyles. Field study of local area to document environmental assets –river / forest / grassland / hill / mountain.

Unit II **Ecosystems And Biodiversity** L 14 T 0

Concept of an ecosystem –structure and function of an ecosystem –producers, consumers and decomposers –energy flow in the ecosystem –ecological succession –food chains, food webs and ecological pyramids –introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d)aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) –introduction to biodiversity –definition: genetic, species and ecosystem diversity –biogeographically classification of india –value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values –biodiversity at global, national and local levels –india as a mega-diversity nation –hot-spots of biodiversity –threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts –endangered and endemic species of india –

conservation of biodiversity: in-situ and ex-situ conservation of biodiversity. Field study of common plants, insects, birds Field study of simple ecosystems –pond, river, hill slopes, etc.

Unit III Environmental Pollution L 8 T 0

Definition –causes, effects and control measures of: (a) air pollution (b) water pollution (c) soil pollution (d) marine pollution (e) noise pollution (f) thermal pollution (g) nuclear hazards –solid waste management: causes, effects and control measures of urban and industrial wastes –role of an individual in prevention of pollution –pollution case studies –disaster management: floods, earthquake, cyclone and landslides. Field study of local polluted site –urban / rural / industrial / agricultural.

Unit IV Social Issues And The Environment L 7 T 0

From unsustainable to sustainable development –urban problems related to energy –water conservation, rain water harvesting, watershed management –resettlement and rehabilitation of people; its problems and concerns, case studies –environmental ethics: issues and possible solutions –climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies. –wasteland reclamation –consumerism and waste products –environment protection act –air (prevention and control of pollution) act –water (prevention and control of pollution) act –wildlife protection act –forest conservation act –issues involved in enforcement of environmental legislation –public awareness.

Unit V Human Population And the Environment L 6 T 0

Population growth, variation among nations –population explosion –family welfare programme –environment and human health –human rights –value education –HIV / AIDS–women and child welfare –role of information technology in environment and human health case studies

Total Number of hours: 45

Learning Resources

Text Books

1. Gilbert M.Masters, Introduction to Environmental Engineering and Science, Pearson Education Pvt., Ltd., Second Edition, 2004.
2. Miller T.G. Jr., Environmental Science, Wadsworth Publishing Co.

Reference Books

1. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad, India.
2. Trivedi R.K., Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol. I and II.
3. Cunningham, W.P.Cooper, T.H.Gorhani, Environmental Encyclopedia, Jaico Publ., House, Mumbai, 2001.
4. Wager K.D., Environmental Management, W.B. Saunders Co., Philadelphia, USA, 1998.

Course Code	U15ME304	L	T	P	C
Course Name	FLUID MECHANICS AND STRENGTH OF MATERIALS LABORATORY	-	-	4	2

Pre-requisites subject: Strength of materials.

Course Outcomes

Upon completion of this course the students will be able to

- Understand the working principles of flow measuring instruments and to determine the Coefficient of discharge of orifice/venturi meters.
- Determine the major and minor loss for different size of pipes & pipe fittings
- Understand the working principles of tension testing methods of mild steel and thin wire Engineering components.
- Understand the importance of compression test on various Engineering materials based on concrete cubes and bricks.
- Became proficient in performing Hardness test on various Machines for different materials and to be able to find its strength for material selection.
- Understand the methodology of testing different materials in universal testing machine (UTM) and able to select the material for engineering applications based on the test results.
- Understand the bending moments of different beams under load conditions.

Total Hours 45

PART A

LIST OF EXPERIMENTS

1. Determination of the Coefficient of discharge of given Orifice meter.
2. Determination of the Coefficient of discharge of given Venturi meter.
3. Determination of friction factor for a given set of pipes.
4. Determination of minor losses for a given set of pipes.
5. Determination of velocity of air using pitot tube

List of Equipments (for a batch of 30 students)

1. Orifice meter setup
2. Venturi meter setup
3. Friction loss setup
4. Fitting loss setup
5. Pitot-tube setup

PART - B

LIST OF EXPERIMENTS

1. Tension test on MS rod. 2. Compression test – Bricks
3. Compression test –Concrete cubes.
4. Double shear test in UTM.
5. Tests on spring – Tension
6. Tests on spring – Compression
7. Deflection test – Bench type verification of Maxwell theorem.
8. Hardness test on various machines.
9. Impact test – Charpy
10. Impact test – Izod.

Listof Equipments (for a batch of 30 students)

1. Universal testing machine.
2. Compression testing machine.
3. Torsion testing machine.
4. Tensile testing machine.
5. Deflection testing machine.
6. Rockwell hardness tester.
7. Vicker's hardness tester.
8. Impact testing machine.

Course Code	U15EE308	L	T	P	C
Course Name	ELECTRICAL MACHINES AND ELECTRON DEVICES LABORATORY	-	-	4	2

Part A

1. Load test on DC Shunt motor.
2. Load test on DC Series motor.
3. Speed control of DC shunt motor (Armature, Field control)
4. Load test on three phase squirrel cage Induction motor
5. Load test on single phase Induction Motor.
6. Speed control of three phase slip ring Induction Motor

Part B

1. Characteristics of PN junction diode.
2. Half wave and Full Wave Rectifiers.
3. Characteristics of SCR.
4. Addition of two 8 bit numbers using Intel 8085 Microprocessor (Programming with control instructions)
5. Subtraction of two 8 bit numbers using Intel 8085 Microprocessor (Programming with control instructions)
6. Multiplication of two 8 bit numbers using Intel 8085 Microprocessor (Programming with control instructions)
7. Division of two 8 bit numbers using Intel 8085 Microprocessor (Programming with control instructions)

Total Hours 45

Sona College of Technology, Salem

(An Autonomous Institution)

Courses of Study for B.E/B.Tech. Semester III under Regulations 2015 (CBCS)

Branch: Electrical and Electronics Engineering

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit
Theory						
1	U15MAT301A	Transforms and Partial Differential Equations	3	2	0	4
2	U15EE301	Electronic Devices and Circuits	3	0	0	3
3	U15EE302	Electromagnetic Theory	2	2	0	3
4	U15EE303	Electrical Machines-I	3	0	0	3
5	U15CHE304	Environmental Science and Engineering	3	0	0	3
6	U15EE304	Network Analysis and Synthesis	2	2	0	3
7	U15GE301	Soft Skills and Aptitude – I	1	0	0	1
Practical						
8	U15EE305	Electronic Devices and Circuits Laboratory	0	0	4	2
9	U15EE306	Electrical Machines-I Laboratory	0	0	4	2
					Total Credits	**24**

Approved By

Chairperson, Electrical and Electronics Engineering BoS Dr.S.Padma

Member Secretary, Academic Council Dr.A.C.Kaladevi

Chairperson, Academic Council & Principal Dr.M.Usha

Copy to:-
HOD/Electrical and Electronics Engineering, Third Semester BE EEE Students and Staff, COE

III Semester

U15MAT301A TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS 3 2 0 4

COURSE OUTCOMES

At the end of this course the student will be able to

1. Describe the general form of Fourier series, expand the periodic function and complex form in terms of fourier series and find harmonics of fourier series
2. Describe the complex (or infinite) Fourier transform pairs, sine and cosine transforms pairs and their properties and apply Parseval's identity to evaluate integrals.
3. Form the partial differential equations, solve first order linear and nonlinear partial differential equations of certain type, and solve homogenous and non homogenous linear partial differential equations with constant coefficients of higher order.
4. Classify the second order partial differential equations and solve linear hyperbolic and elliptic partial differential equations using method of separation of variables and Fourier series.
5. State Z transform pairs, solve Z transform of certain functions, form the difference equation and hence solve it by means of Z transforms

Unit – I Fourier Series 15

General Fourier series - Dirichlet's conditions, odd and even functions, half range sine and cosine series, Parseval's identity, complex form of Fourier series, harmonic analysis

Unit – II Fourier Transforms 15

Fourier integral theorem (without proof) - Fourier transform pair, sine and cosine transforms, properties, transforms of simple functions, convolution theorem (without proof), parseval's identity

Unit – III Partial Differential Equations 15

Formation of partial differential equations, Lagrange's linear equation, solutions of standard types of first order partial differential equations, linear partial differential equations of second and higher order with constant coefficients

Unit – IV Boundary value problems 15

Classifications of quasi linear PDE, Solutions of one dimensional wave equation in Cartesian co-ordinates; steady state solution of two dimensional equation of heat conduction in Cartesian co-ordinates (Insulated edges excluded)

Unit – V Z -Transforms and Difference Equations 15

Z –Transforms - Elementary properties, inverse Z - transform, convolution theorem (without proof), formation of difference equations, solution of difference equations using Z - transform

Lecture:45, Tutorial: 30, Total:75 Hrs

TEXT BOOK

1. "Transforms and Partial Differential Equations", by Sonaversity 2011
2. Veerarajan.T., "Engineering Mathematics" (For semester III), 3th Edition, Tata McGraw Hill, 2008

REFERENCES

1. Bali N.P., and Manish Goyal, "A Textbook of Engineering Mathematics", 7th Edition, Laxmi Publications (P) Ltd., 2007
2. Ramana B.V.,"Higher Engineering Mathematics", Tata Mc-GrawHill Publishing Company limited, New Delhi 2007
3. Glyn James,"Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education 2007
4. Erwin Kreysizig, "Advanced Engineering Mathematics", 8th edition, Wiley India 2007
5. Grewal B.S., "Higher Engineering Mathematics", 40th Edition, Khanna Publishers, Delhi 2007
6. Signals and Systems by Anand Kumar, Phi Learning, 3rd Edition, 2013
7. Signals and Systems by Dr. S. Palani, Ane Books Pvt. Ltd. First Edition, 2009 (References 1)
8. Signals and Systems by Ramesh Babu, SciTech Publications, 3rd Edition, 2013

U15EE301 ELECTRONIC DEVICES AND CIRCUITS 3 0 0 3

COURSE OUTCOMES

At the end of this course the student will be able to

1. Describe the properties of various semiconductor devices and various types of diodes.
2. Design the hybrid models of various configurations of BJT and its stability analysis.
3. Discuss the operation of FET, MOSFET,UJT and IJBT.
4. Analyze the performance of differential amplifiers and the concepts of feedback amplifiers and their characteristics.
5. Evaluate the performance characteristics of multistage amplifiers and different types of oscillators.

UNIT I SPECIAL DIODES AND OPTO ELECTRONIC DEVICES 9

Theory and characteristics of schottky diode, PIN diode, photo diode, varactor diode and Tunnel diode - LED, LCD, photo transistor, opto-coupler, CCD.

UNIT II BIPOLAR JUNCTION TRANSISTOR APPLICATIONS 9

Transistor as an amplifier- h–parameters - A_i, R_i, A_v and R_o – BJT small signal model – Analysis of CE, CB, CC amplifiers – RF transistors – Power Transistors – Ebers Moll model – Bias stability – dc load line, ac load line, stability factor, thermal runaway – Methods of transistor biasing – Bias compensation.

UNIT III TRANSISTORS AND ITS CHARACTERISTICS 9

Structure, operation, V-I and switching characteristics of UJT, JFET, MOSFET and IGBT.

UNIT IV LARGE SIGNAL AND FEEDBACK AMPLIFIERS 9

Differential amplifiers – Common mode and Difference mode analysis - analysis of Class A,B,C and AB Power amplifiers – Feedback Amplifiers - Concept of feedback, General characteristics of negative feedback amplifiers - types of negative feedback amplifiers – stability of feedback amplifier.

UNIT V MULTISTAGE AMPLIFIERS AND OSCILLATORS 9

Introduction – different coupling schemes in amplifiers – operation of RC coupled, transformer coupled, cascade, direct coupled and darlington amplifiers - Condition for Oscillations - RC phase shift Oscillators with transistor and FET- Hartley and Colpitts Oscillators- Wein-Bridge Oscillator - Crystal Oscillator.

Lecture: 45, Tutorial: 00, Total:45 Hrs

TEXT BOOKS

1. S Salivahanan, N Sureshkumar and A Vallavaraj, “Electronic Devices and Circuits”, McGraw Hill, 6th reprint 2015.
2. David A Bell, “Electronic Devices and Circuits”, Oxford University Press, Fifth edition, 2010.

REFERENCE BOOKS

1. J Millman, CC Halkias and SathyabrathaJit , “Electronic Devices and Circuits”, McGraw Hill, 2nd Ed, 2007.
2. Ramesh Babu, “Electronic Devices and Circuits”, Scitech Publications 2009,

U15EE302 ELECTROMAGNETIC THEORY 2 2 0 3

COURSE OUTCOMES

At the end of this course the student will be able to

1. Describe various Electromagnetic quantities in spatial distribution by various co-ordinate systems.
2. Construct Electric field intensity and Electric flux density due to various charge distributions and also analyse the applications of Gauss's law.
3. Analyse the concepts of Magneto statics for various charge distribution and boundary condition.
4. Produce Maxwell's Equations in Integral and Differential form from basic concepts of electrodynamic fields.
5. Illustrate the concepts of Electromagnetic wave equation, wave propagation and Poynting Theorem.

.UNIT I FUNDAMENTALS 12

Scalar and Vector Fields - Coordinate Systems - Cartesian, Cylindrical and Spherical Coordinate Systems - Relationship between Coordinate systems -Types of Integral related to EMT –Gradient – Curl - Divergence Theorem - Stokes Theorem.

UNIT II ELECTROSTATICS 12

Coulombs' Law - Electric Field Intensity - Electric Field due to Various Charge Distributions - Electric Field due to Infinite Line Charge, Charged Circular Ring, Infinite Sheet of Charge - Electric Flux Density - Electric Flux Density for Various Charge Distributions - Gauss's law and applications - Electric Potential - Potential due to Various Charge Distributions - Electric Dipole - Boundary Conditions - Poisson's and Laplace's Equations - Capacitance-Series and Parallel Capacitance-Capacitance of Parallel Conductors, Capacitance of an Isolated Sphere, Concentric Sphere and Coaxial Cables

UNIT III MAGNETOSTATICS 12

Lorentz Law of Force - Biot-Savart Law-Amperes Circuital Law - Magnetic Field Intensity -Magnetic Flux Density - B and H due to Finite Length of Conductor at any point along the axis of Circular coil, at any point along the axis of Solenoid, at the centre of Toroidal coil - Magnetic Dipole – Magnetization - Boundary Conditions at the Magnetic Surface -Magnetic Torque - Inductance - Types, Inductance of Solenoids and Toroids, Coaxial Cable, Two Transmission Lines.

UNIT IV ELECTRODYNAMIC FIELDS 12

Faradays Law of Electromagnetic Induction - Coefficient of Coupling - Maxwell's Equation (Differential and Integral Form) - Conduction Current - Displacement Current - Equation of Continuity - Energy Density - Relation between Field Theory and Circuit Theory.

UNIT V ELECTROMAGNETIC WAVES 12

Derivation of Electromagnetic Wave Equations-Wave Propagation in a Conducting Medium, Lossless Medium, Good Dielectrics and Good Conductors-Skin Effect-Brewster Angel-Snell's Law-Poynting Theorem.

Lecture: 30, Tutorial: 30, Total: 60 Hrs.

TEXT BOOKS

1. K.A.Gangadhar, "Field Theory", Khanna Publishers, New Delhi, Latest Edition 2009.
2. W.H.Hayt J.A.Buck and M.Jallel Akhtar, "Engineering Electromagnetics", 8th Edition, McGraw Hill Education (India) Private Limited, Special Indian Edition 2014.

REFERENCE BOOKS

1. Kraus/Fleisch, "Electromagnetics with Applications", 5th Edition, McGraw Hill Education (India) Edition 2010.
2. Matthew N.O. Sadiku, "Principles of Electromagnetics", 4th Edition, International Version, Oxford University Press 2009.
3. S C Mahapatra, Sudipta Mahapatra, "Principles of Electromagnetics", 2nd Edition 2015, Mc Graw Hill Education (India) Private Limited , New Delhi.

U15EE303 ELECTRICAL MACHINES I 3 0 0 3

COURSE OUTCOMES

At the end of this course the student will be able to

1. Explain the fundamentals of energy conversion.
2. Explain the constructional details and principle of operation of DC generator and analyze the performance under various operating conditions.
3. Explain the constructional details and principle of operation of DC generator and analyze the performance under various operating conditions.
4. Derive equivalent circuit of transformer and explain its construction and operation.
5. Discuss various testing methods of DC machines and transformers.

UNIT I FUNDAMENTALS OF ENERGY CONVERSION 9

Principle of Energy conversion - Basic magnetic circuit analysis, Faradays law of electromagnetic induction - singly and doubly Excited magnetic field systems - Torque production in rotating machines - general analysis of electro mechanical system.

UNIT II DC GENERATORS 9

Principle of operation, Constructional details, Armature Windings, EMF equation, Methods of Excitation- Separate, Shunt, Series and Compound excitations – No load and load characteristics – Armature reaction- Commutation- Inter poles, Compensating windings - Applications.

UNIT III DC MOTORS 9

Principle of operation – Torque equation- Electrical and Mechanical characteristics of DC Shunt, Series and Compound motors- Starters – Speed control – Braking -Applications.

UNIT IV TRANSFORMERS 9

Principle of operation – Construction- Classification of Transformers- EMF equation- Transformation ratio- Transformer on no load and load- Phasor diagrams - Equivalent circuit - Voltage regulation- Parallel operation- Auto transformer -Three phase transformers – Types of Connections.

UNIT V TESTING OF DC MACHINES AND TRANSFORMERS 9

Losses and efficiency in DC machines and transformers – Condition for maximum efficiency – Testing of DC machines – Brake test, Swinburne's test and Hopkinson's test – Testing of transformers – Polarity test, load test, – Phasing out test – Sumpner's test – Separation of losses – All day efficiency

Lecture: 45, Tutorial: 00, Total: 45 Hrs

TEXT BOOKS

1. B.L. Theraja and A. K. Theraja, 'A Text Book of Electrical Technology' S.Chand Publisher, Vol 2, 2014.
2. D.P. Kothari and I.J. Nagrath, 'Electric Machines', McGraw Hill Publishing Company Ltd, Fourth Edition, 2011.

REFERENCE BOOK

1. A.E. Fitzgerald, Charles Kingsley, Stephen.D.Umans, 'Electric Machinery', Tata McGraw Hill Publishing Company Ltd, 2003

U15CHE304 ENVIRONMENTAL SCIENCE AND ENGINEERING 3 0 0 3

COURSE OUTCOMES

At the end of this course the student will be able to

1. Create awareness on the various environmental pollution aspects and issues.
2. Give a comprehensive insight into natural resources, ecosystem and biodiversity.
3. Educate the ways and means to protect the environment from various types of pollution.
4. Educate about social issues and the environment.
5. Impart some fundamental knowledge on human welfare measures.

UNIT I INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES 12

Definition, Scope and Importance – Need for public awareness – Forest Resources: – Use and over – exploitation, deforestation, Case Studies, Timber Extraction, Dams, Benefits and their effects on forests and tribal people – Water Resources: – Use and over – Utilization of Surface and ground water, Floods, Drought, Conflicts Over Water – Mineral Resources: – Use – Environmental Effects of Extracting and Using Mineral Resources – Food Resources: – World Food Problems, Changes caused by Agriculture and Overgrazing, Effects of Modern Agriculture, Fertilizer, Pesticide Problems, Water logging, salinity – Energy Resources: – Growing Energy Needs, Renewable and Non Renewable Energy Sources, Use of Alternate Energy sources – Land Resources: – Land as a Resource, Land Degradation, Man Induced Landslides, Soil Erosion and Desertification – Role of an Individual in Conservation of Natural Resources.

UNIT II ECOSYSTEMS AND BIODIVERSITY 10

Concepts of an Ecosystem – Structure and Function of an Ecosystem – producers, Consumers and Decomposers – Energy Flow in the Ecosystem – Ecological Succession – Food Chains, Food Webs and Ecological Pyramids – Introduction to Biodiversity – Definition: Genetic, Species and Ecosystem Diversity – Value of Biodiversity: Consumptive Use, Productive use, social, ethical, Aesthetic and Option values – Biodiversity at Global, National and Local Levels – India as a Mega – Diversity Nation – Hot – spots of Biodiversity – Threats to Biodiversity : Habitat loss, Poaching of Wildlife, Man – wildlife Conflicts – endangered and Endemic Species of India – Conservation of Biodiversity : In – Situ and Ex – Situ conservation of Biodiversity.

UNIT III ENVIRONMENTAL POLLUTION 8

Definition – Causes, Effects and control measures of : – (A) Air pollution (B) Water pollution (C) Soil Pollution (D) Marine pollution (E) Noise pollution (F) Thermal Pollution (G) Nuclear Hazards – solid waste management : – Causes, Effects and Control measures of Urban and Industrial wastes – Rold of an Individual in prevention of pollution – pollution case studies – disaster management: – Floods, Earthquake, Cyclone and Landslides.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT 9

Sustainable Development – Urban problems related to energy – water conservation, Rain water harvesting, Watershed management – Resettlement and Rehabilitation of people, its problems and concerns – Environmental Ethics: – Issues and possible solution – Climate Change, Global warming, Acid Rain, Ozone layer depletion, Nuclear Accidents and Holocaust, Case studies – wasteland Reclamation – Environment Production act – Air(prevention and control of pollution) Act – water(Prevention and control of pollution)Act – Wildlife protection act – Forest conservation Act – Issues involved in enforcement of Environmental Legislation – Public Awareness.

UNIT V HUMAN POPULATION AND THE ENVIRONMENT 6

Population growth, variation among nations – population explosion – Family welfare programme – environment and Human health – human rights – value education – HIV/AIDS – Women and child welfare – role of information technology in environment and human health – Case studies.

Lecture: 45; Tutorial: 0; Total: 45 Hrs

TEXT BOOKS

1. Masters, G.M., "Introdution to Environmental Engineering and Science", Pearson Education Pvt.,Ltd., 2nd Edition, 2004.
2. Miller, T.G.Jr., "Environmental Science", Wadsworth Pub.Co., 14th edition, 2014.

REFERENCE BOOKS

1. Erach, B.,"The Bioversity of India", Mapin Publishing P.Ltd., Ahmedabad, India, 2006.
2. Trivedi, R.K., " Handbook of Environmental Law"s, Rules, Guidelines, Compliances and Standards", Vol – I and II, Envio Media, 2008.
3. Cunningham., Cooper, W.P. and Gorhani, T.H.,"Environmental Encyclopedia", Jaico Publishing House, Mumbai,2001.
4. Wages,K.D., "Environmental Management", W.B.Saunders Co., Philadelphia, USA,1998.
5. "Environmental Science and Engineering" by SONAVERSITY, SCT, Salem,2009.
6. Anubha Kaushik and Kaushik, "Environmental Science and Engineering" by New Age International publication, New Delhi, 2008.

U15EE304 NETWORK ANALYSIS AND SYNTHESIS 2 2 0 3

COURSE OUTCOMES

At the end of this course the student will be able to

1. Analyze the transient response of circuits.
2. Define various network topologies and analyze circuits.
3. Solve and analyze one port and two port networks.
4. Design different types of filters.
5. Synthesise of RL, RC and LC networks.

UNIT I CIRCUIT TRANSIENT ANALYSIS 12

Introduction - Transient Response of RL & RC for step input and sinusoidal input - Transient Response of RLC series circuit for step input using Laplace Transform method – Network Functions – Poles and Zero's – Graphical method for determination of Residue

UNIT II NETWORK TOPOLOGY 12

Introduction – Graph of a network – Definitions associated with graph – Incidence matrix – Loop matrix – Cut set matrix – KVL – KCL – Network equilibrium equations - applications to network solutions.

UNIT III ONE PORT AND TWO PORT NETWORKS 12

Driving point impedance and admittance of one port networks – Z parameters – Y parameters – ABCD parameters – h parameters – Inter relationship between parameters – Interconnection of two port networks - equivalent networks(T & π networks).

UNIT IV FILTERS 12

Characteristics of ideal filters - low pass and high pass filters - attenuation and phase shift constant - Constant k and m - derived filters – Band pass filters.

UNIT V ELEMENTS OF NETWORK SYNTHESIS 12

Introduction - Hurwitz polynomials – Properties of Hurwitz polynomials - PR functions - Necessary and sufficient conditions of PR function - Synthesis of RL, RC and LC functions.

Lecture: 30; Tutorial: 30; Total: 60 Hrs

TEXT BOOKS

1. Ravish R Singh, Electrical Networks, McGraw Hill, 2011
2. ShyamMohan S.P., Sudhakar A, "Circuits and Network Analysis &Synthesis", Tata McGraw Hill, 5th edition, 2015.

REFERENCE BOOKS

1. Arumugam .M and Premkumar .N, Electric circuit theory, Khanna & Publishers, 1989.
2. Soni M.L and Gupta J.C, "Electrical circuit Analysis", Dhanpat Rai and Sons, Delhi, 1990.
3. Kuo F.F.,' Network Analysis and Synthesis', Wiley International Edition, Second Edition, 1996.

U15EE305 ELECTRONIC DEVICES AND CIRCUITS LABORATORY 0 0 4 2

COURSE OUTCOMES

At the end of this course the student will be able to

1. Construct and inspect the different configuration of BJT.
2. Examine the characteristics of JFET, MOSFET and IGBT.
3. Design relaxation oscillator using UJT.
4. Design for various working modes of amplifiers.
5. Design for various types oscillators.

LIST OF EXPRIMENTS

1. Switching characteristics of BJT.
2. Small Signal Model of transistor with CE Configuration.
3. Characteristics of JFET and MOSFET
4. Characteristics of UJT
5. Characteristics of IGBT.
6. Design of RC coupled amplifier.
7. Design of Darlington amplifier.
8. Design of Negative feedback Amplifier.
9. Design of Hartley and Colpitts Oscillator.
10. Design of Phase shift and Wein-bridge Oscillator.

Total: 60 Hrs

U15EE306 ELECTRICAL MACHINES-I LABORATORY 0 0 4 2

COURSE OUTCOMES

At the end of this course the student will be able to

1. Draw the magnetization, internal and external characteristics of DC shunt and compound generator.
2. Determine and draw the mechanical , electrical and performance characteristics of DC shunt, series and compound motor.
3. Control the speed and determine the efficiency of motor using rheostat.
4. Pre-determine the losses on no load and determine the efficiency and regulation of transformer using resistive load.
5. Determine the efficiency and regulation of transformer under no load.

LIST OF EXPRIMENTS

1. Open circuit and load characteristics on separately excited DC shunt generator
2. Load characteristics on D.C. compound generator
3. Load characteristics of D.C. shunt motor
4. Load characteristics of D.C series motor
5. Load characteristics of D.C. compound motor
6. Speed control of D.C shunt motor
7. Swinburne's test and Hopkinson's test on D.C motor – generator set
8. Load test on single-phase transformer.
9. Open circuit and short circuit tests on single phase transformer
10. Sumpner's test on transformers
11. Separation of no-load losses in single phase transformer
12. Load Test on Scott Connected Transformer

Total: 60 Hrs

Sona College of Technology, Salem

(An Autonomous Institution)

Courses of Study for B.E/B.Tech. Semester III under Regulations 2015 (CBCS)-Revised-1

Branch: Electronics and Communication Engineering

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit
Theory						
1	U15MAT301C	Transforms and Linear Algebra	3	2	0	4
2	U15EC301	Electronic Devices	4	0	0	4
3	U15EC302	Network Analysis and Synthesis	4	0	0	4
4	U15EC303	Digital System Design	4	0	0	4
5	U15EC304	Signals and Systems	4	0	0	4
Practical						
6	U15EC305	Electronic Devices Laboratory	0	0	4	2
7	U15EC306	Digital Laboratory	0	0	4	2
8	U15ENG301	English Laboratory	0	0	4	2
					Total Credits	**26**

Approved By

Chairman, Electronics and Communication Engineering BoS	**Member Secretary, Academic Council**	**Chairperson, Academic Council & Principal**
Dr. K.R.Kashwan	Dr.A.C.Kaladvi	Dr. M.Usha

Copy to:-
HOD/Electronics and Communication Engineering, Third Semester BE ECE Students and Staff, COE

U15MAT301C	TRANSFORMS AND LINEAR ALGEBRA	L	T	P	C	Marks
		3	2	0	4	100

COURSE OUTCOMES

At the end of each unit, the students will be able to -

1. Construct the Fourier series to solve the initial and boundary value problems
2. Form partial differential equations and solve standard types of first order PDE and linear PDE of second order with constant coefficients
3. State Z – transform, discuss and prove the properties, state and apply convolution theorem to various functions, form and solve the difference equations.
4. Apply and solve vector spaces for different applications, explain linear independence and dependence of vectors and dimension of vector spaces
5. Describe linear operator and rank nullity transformation theorem and apply the same to solve problems

UNIT I	**FOURIER SERIES AND FOURIER TRANSFORMS** Fourier-Euler Formulae – General Fourier Series – Dirichlet Conditions – Fourier Series for Even and Odd Functions – Fourier Series for Functions of Period 2L – Fourier Cosine and Sine Series – Practical Harmonic Analysis Fourier Integral Theorem – Fourier Transforms – Convolution – Finite Fourier Cosine and Sine Transforms – Parseval's Identity for Fourier Transforms	**15**
UNIT II	**PARTIAL DIFFERENTIAL EQUATIONS** Partial Differential Equations – Partial Differential Equations of First Order – Linear Partial Differential Equations of First Order – Non-Linear Partial Differential Equations of First Order – Homogeneous Linear Partial Differential Equations with Constant Coefficients – Non-Homogeneous Linear Partial Differential Equations with Constant Coefficients – Solution of Second Order Partial Differential Equation	**15**
UNIT III	**LINEAR DIFFERENCE EQUATIONS AND Z-TRANSFORMS** Linear Difference Equations – Homogeneous Equations – Second Order Linear Homogeneous Difference Equations with Constant Coefficients – Non-Homogeneous Equations – Z-Transforms – Inverse Z-Transforms – Properties of Z-Transforms with Worked Out Examples	**15**
UNIT IV	**VECTOR SPACES** Vector Spaces – Linear Combinations – Subspaces – Union of Subspaces – Spans – Equality of Spans – Special Spans – Sums of Subspaces – Distributive Subspaces – Dependence and Independence of Vectors – Basis of a Vector Spaces – Dimensions of Vector Spaces	**15**
UNIT V	**LINEAR TRANSFORMS** Linear Transformations – Domain and Range – Kernel – Composition – Range Inclusion and Factorization – Transformations as Vectors – Invertibility – Determinants: 2x 2 – Determinants: nxn – Zero-One Matrices – Invertible Matrix Bases – Finite-Dimensional Invertibility – Matrices – Diagonal Matrices – Rank Nullity Theorem – Matrix Representation of Linear Operator, Change of Basis Matrix	**15**
		Total: 75

TEXT BOOK

1.	Ramana B. V. *"Higher Engineering Mathematics"*, Mc-Graw Hill Education (India) Pvt. Ltd., New Delhi, 2007
2	Paul R. Halmos, *"Finite Dimensional Vector Spaces"*, Springer-Verlag, New York, 1958

REFERENCE BOOKS

1.	Veerarajan.T., "*Engineering Mathematics*" 3th Edition, Tata McGraw Hill, 2008
2.	Erwin Kreysizig, "*Advanced Engineering Mathematics*", 8th E, Wiley India 2007
3.	Seymour Lipschitz, Marc Lipson, "*Linear Algebra Schaum's Outline Series*", 4th E, 2005
4.	Glyn James, "*Advanced Modern Engineering Mathematics*", 3rd E, Pearson Education 2007

U15EC301	ELECTRONIC DEVICES	L T P C Marks 4 0 0 4 100

COURSE OUTCOMES

At the end of each unit, the students will be able to -

1. Study and analyze the behavior of semiconductor devices.
2. Characterize the current flow of a bipolar transistor in CB, CE and CC configurations.
3. Bias the transistors and FETs for amplifier applications.
4. Study and analyze amplifier circuits using MOSFETs and explain basic fabrication of monolithic ICs.
5. Design BJT amplifiers with h- parameters.

UNIT I	**SEMICONDUCTOR THEORY AND SEMICONDUCTOR DIODES** Energy Band Theory of Crystals – Insulators – Semiconductors – Metals – Mobility and Conductivity – Electrons and Holes in an Intrinsic Semiconductor – Donor and Acceptance Impurities – Charge Densities in a Semiconductor – Electrical Properties of Ge and Si – The Hall Effect – Conductivity Modulation – Generation and Recombination of Charges – Diffusion – The Continuity Equation – Injected Minority-Carrier Charge – The Potential Variation Within a Graded Semiconductor The Open Circuited *PN* Junction – The *PN* Junction as a Rectifier – The Current Components in a *PN* Diode – The Volt–Ampere Characteristic – The Temperature Dependence of the *V/I* Characteristic – Diode Resistance – Space Charge or Transition Capacitance C_T – Charge-Control Description of a Diode – Diffusion Capacitance – Junction Diode Switching Times	**12**
UNIT II	**SPECIAL DIODES AND BJT** Breakdown Diodes – The Tunnel Diode – The Semiconductor Photodiode – The Photovoltaic Effect – Light Emitting Diode – The Junction Transistor – Transistor Current Components – The Transistor as an Amplifier – Transistor Construction – The Common base Configuration – The Common Emitter Configuration – The CE Cut-off Region – The CE Saturation Region – Typical Transistor Junction Voltage Values –Common Emitter Current Gain – The Common Collector Configuration – Analytical Expressions for Transistor Characteristics – Maximum Voltage Rating – The Phototransistor	**12**
UNIT III	**TRANSISTOR BIASING AND THERMAL STABILIZATION** The Operating Point – Bias Stability – Self–Bias or Emitter Bias – Stabilization Against Variations in I_{CO}– V_{BE} and β – General Remarks on Collector Current Stability – Bias Compensation – Biasing Techniques for Linear Integrated Circuits – Thermistor and Sensistor Compensation –Thermal Runaway – Thermal Stability –The Junction Field effect Transistor – The Pinch off Voltage V_P – The JFET Volt–ampere Characteristics –The FET Small signal Model	**12**
UNIT IV	**MOSFET AND INTEGRATED CIRCUITS** The Metal-oxide-semiconductor FET (MOSFET) – The Low–frequency Common Source and Common Drain Amplifiers – Biasing the FET – The FET as a Voltage Variable Resistor (VVR) – The Common Source Amplifier at High Frequencies – The Common Drain Amplifier at High Frequencies – Integrated-Circuit Technology – Basic Monolithic Integrated Circuits – Epitaxial Growth – Masking and Etching – Monolithic Diodes –Integrated Resistors – Integrated Capacitors and Inductors – LSI and MSI – The Metal Semiconductor Contacts	**12**
UNIT V	**LOW AND HIGH FREQUENCY ANALYSIS OF BJT** Graphical Analysis of the CE Configuration – Two–port Devices and the Hybrid Model – Transistor Hybrid Model– The *h* Parameters – Conversion Formulas for the Parameters of the Three Transistor Configurations – Analysis of a Transistor Amplifier Circuit Using *h* Parameters – Linear Analysis of a Transistor Circuit–Miller's Theorem and Its Dual – The Hybrid–pi (p) Common – emitter Transistor Mode – Hybrid–*p* Conductance – The Hybrid–*p* Capacitances – Validity of Hybrid–*pi* Model – Variation of Hybrid–*pi* Parameters – The CE Short circuit Current Gain – Current Gain with Resistive Load – Single stage CE Transistor Amplifier Response – The Gain–bandwidth Product – Emitter Follower at High Frequencies	**12**
		Total: 60

TEXT BOOK

1. Millman and Halkias, "*Integrated Electronics*", 2nd Edition, Tata Mc Graw Hill, 2010

REFERENCE BOOKS

1. Y.N. Bapat, "*Electronic devices and circuits, Discrete and Integrated*", 3rd Edition, Tata Mc Graw Hill, 2011
2. S. Salivahanan, N. Suresh Kumar and A. Vallavaraj, "*Electronic Devices and Circuits*", 2nd Edition, TMH, 2007

U15EC302	NETWORK ANALYSIS AND SYNTHESIS	L	T	P	C	Marks
		4	0	0	4	100

COURSE OUTCOMES

At the end of each unit, the students will be able to –

1. Solve network problems using mesh current and node voltage equations.
2. Formulate and solve network equations using differential equations and thus, to design resonant circuits.
3. Compute responses of first order and second order networks using time domain analysis and Laplace transforms.
4. Analyze circuits using network theorems.
5. Synthesize one port and two port networks using transfer functions.

UNIT I	**NETWORK CONVENTIONS AND NETWORK EQUATIONS** Reference Directions for Current and Voltage – Active Element Conventions – The Dot Convention for Coupled Circuits – Topological Description of Networks — Kirchhoff's Laws – The Number of Network Equations –Source Transformations – Examples of the Formulation of Network Equations – Loop Variable Analysis – Node Variable Analysis – Duality – State Variable Analysis	**12**
UNIT II	**TIME DOMAIN ANALYSIS AND INITIAL CONDITIONS IN NETWORKS** General and Particular Solution using Differential Equations – Time Constants –The Integrating Factor – Initial Conditions in Elements – Geometrical Interpretation of Derivatives – A Procedure for Evaluating Initial Conditions – Initial State of a Network – Second Order Differential Equations for Internal Excitation – Higher Order Differential Equations for Internal Excitation – Networks Excited by External Energy Sources	**12**
UNIT III	**APPLICATIONS OF LAPLACE TRANSFORMS IN CIRCUIT THEORY** The Laplace Transformation –Basic Theorems for the Laplace Transform –Examples of the Solution of Problems using Laplace Transformation – Partial Fraction Expansion – Heaviside's Expansion Theorem –The Shifted Unit Step Function –The Ramp and Impulse Functions – Waveform Synthesis – The Initial and Final Values of *f(t) and F(s)* – The Convolution Integral – Convolution as a Summation	**12**
UNIT IV	**IMPEDANCE FUNCTIONS AND NETWORK THEOREMS** The Concept of Complex Frequency – Transform Impedance and Transform Circuits – Series and Parallel Combinations of Elements – Superposition and Reciprocity Theorem.– Thevenin's and Norton's Theorem – Maximum Power Transfer Theorem – Tellegen's Theorem	**12**
UNIT V	**SYNTHESIS OF ONE PORT AND TWO PORT NETWORKS** Properties of L-C Immittance Functions – Synthesis of L-C Driving-Point Immittances– Properties of R-C Driving Point Impedances – Synthesis of R-C Impedance or R-L Admittances – Properties of R-L Impedances and R-C Admittances – Properties of Transfer Functions – Zeros of Transmission – Synthesis of Admittances and Impedances With a I-Ω Termination – Synthesis of Constant-Resistance Networks	**12**
		Total: 60

TEXT BOOKS

1. M.E.VanValkenberg, "*Network Analysis*", Prentice Hall India, 3rd E, 2002
2. F. F. Kuo, "*Network Analysis and Synthesis*", 2nd E, John Wiley, 2005

REFERENCE BOOKS

1. B. Somanathan Nair, S. R. Deepa, "*Network Analysis and Synthesis*", Reed Elsevier India Pvt. Ltd., 2012
2. Charles A Desoer, Ernest S Kuh, "*Basic Circuit Theory*", McGraw Hill, 1969

U15EC303	DIGITAL SYSTEM DESIGN	L	T	P	C	Marks
		4	0	0	4	100

COURSE OUTCOMES

At the end of each unit, the students will be able to -

1. Explain number systems, logic gates, logic functions and simplify Boolean functions.
2. Design and analyze combinational and sequential logic circuits through HDL models.
3. Optimize combinational and sequential logic circuits.
4. Design and implement shift registers and counters digital circuits.
5. Analyze a memory cell and apply for organizing larger memories.

UNIT I	**BINARY NUMBERS, BOOLEAN ALGEBRA AND LOGIC GATES** Binary Numbers – Number Base Conversions – Octal and Hexadecimal Numbers – Binary Arithmetic – Binary Codes – Boolean Algebra – Basic Theorems and Properties of Boolean Algebra – Boolean Functions – Canonical and Standard Forms – Digital Logic Gates – Integrated Circuits – Map Method – Four Variable K-map – POS Simplification – Don't Care Conditions – NAND and NOR Implementation – XOR Functions – TTL – ECL – CMOS Logic Circuits – Fan-in – Fan-out	**12**
UNIT II	**COMBINATIONAL CIRCUIT DESIGN** Combinational Circuits – Analysis Procedures – Design Procedures – BCD to Excess-3 – Binary Adders and Subtractors – Decimal Adder – Binary Multiplier – Magnitude Comparator – Decoders – Encoders – Multiplexers – Introduction to Verilog – HDL Models for Combinational Circuits	**12**
UNIT III	**SYNCHRONOUS SEQUENTIAL LOGIC** Sequential Circuits – SR Latch – D-Latch – D-JK-T Flip-Flops – Master Slave JK Flip-Flop – Conversion of Flip Flops – Analysis of Clocked Sequential Circuits – State Diagram – State Table – State Reduction and Assignment – Verilog HDL Models for Synchronous Sequential Circuits.	**12**
UNIT IV	**REGISTERS AND COUNTERS** Registers – Shift Registers – SISO – SIPO – PIPO — Synchronous Counters – Up-down Binary Counter – Ring Counter – Johnson Counters – Asynchronous Counters – Asynchronous Design Procedure – Race Free State Assignment – Hazards – Verilog HDL Models for Registers and Counters	**12**
UNIT V	**MEMORY AND PROGRAMMABLE LOGIC** Random Access Memory – Memory Decoding –RAM BJT cell and MOS RAM Cells – Read Only Memory – Programmable Logic Array – Programmable Array Logic – Sequential Programmable Devices –HDL Implementation of Simple Test Bench for 4-bit Binary Adder	**12**
		Total: 60

TEXT BOOK

1. M. Morris Mano and Michael D. Ciletti, "*Digital Design with an Introduction to the Verilog HDL*", 5th E, Pearson Education, 2013.

REFERENCE BOOKS

1. John F Wakerly, "*Digital Design Principles and Practices*", 3rd Edition, Prentice Hall India, 2001.
2. ZviKohavi, "*Switching and Finite Automata Theory*", Princeton University, New Jersey, 3rd E, 2009.
3. Schilling, Herbert Taub and Donald, "*Digital Integrated Electronics*", Tata McGraw-Hill, 2008.
4. JayaramBhasker, "*A Verilog HDL Primer*", 2nd E, BS publications, 2001.

U15EC304	SIGNALS AND SYSTEMS	L	T	P	C	Marks
		4	0	0	4	100

COURSE OUTCOMES

At the end of each unit, the students will be able to -

1. Perform multiple operations on CT and DT signals and analyse the characteristics of continuous and discrete time systems.
2. Analyze linear time invariant CT system.
3. Apply Fourier series and Fourier Transform on CT signals and systems.
4. Analyze the signals and systems usingLaplace Transform.
5. Analyze the signals and systems usingZ- Transform.

UNIT I	**CLASSIFICATION OF SIGNALS AND SYSTEMS** Continuous-Time and Discrete-Time signals – Transforms of the Independent Variable – Exponential and Sinusoidal Signals – The Unit Impulse and Unit Step Functions – Operation of Signals (Time Shifting – Time Reversal – Amplitude Scaling – Time Scaling – Signal Addition – Multiplications) – Continuous-Time and Discrete-Time Systems– Basic System Properties (Systems With and Without Memory – Invertibility and Inverse System – Causality – Stability – Time Invariance – Linearity)	**12**
UNIT II	**LINEAR TIME- INVARIANT SYSTEMS** Discrete-Time LTI system: TheConvolution sum – Continuous-Time LTI Systems: The Convolution Integral – Properties of Linear Time-Invariant Systems – Causal LTI Systems Described by Differential and Difference Equations – Singularity Functions	**12**
UNIT III	**ANALYSIS OF CT SIGNALS USING FOURIER SERIES & FOURIER TRANSFORM** Fourier Series Representation of Continuous-Time Periodic Signals – Properties of Continuous-Time Fourier Series – Representation of Aperiodic Signals: The Continuous-Time Fourier Transform – The Fourier Transform for Periodic Signals – Properties of the Continuous-Time Fourier Transform – The Convolution Property – The Multiplication Property	**12**
UNIT IV	**ANALYSIS OF SIGNALS AND SYSTEMS USING LAPLACE TRANSFORM** The Laplace Transform – The Region of Convergence for Laplace Transforms – The Inverse Laplace Transform – Properties of the Laplace Transform – System Function Algebra and Block Diagram Representations – The Unilateral Laplace Transform	**12**
UNIT V	**ANALYSIS OF SIGNALS AND SYSTEMS USING Z-TRANSFORM** The Z-Transform – The Region of Convergence for the Z-Transform – The Inverse Z-Transform – Properties of the Z-Transform – System Function Algebra and Block Diagram Representations – The Unilateral Z-Transform	**12**
		Total: 60

TEXT BOOK

1. Alan V. Oppenheim, Alan S. Willsky, S. Hamid Nawab, "*Signals and Systems*", Prentice Hall India, 2nd E, 2010

REFERENCE BOOKS

1.	M .J. Roberts, "*Signals & Systems Analysis using Transform Methods & MATLAB*", Tata McGraw Hill, 2007
2.	A. NagoorKani, "*Signals & Systems*", Tata McGraw Hill, 2010
3.	John G. Proakis, Dimitris G. Manolakis, "*Digital Signal Processing, Principles, Algorithms, and Applications*", 4th E, PHI, 2007
4.	Robert A. Gable, Richard A. Roberts, "*Signals & Linear Systems*", 3rd E, John Wiley, 1995
5.	Edward W Kamen& Bonnie's Heck, "*Fundamentals of Signals and Systems*", Pearson Education, 2007

U15EC305	ELECTRONIC DEVICES LABORATORY	L T P C Marks 0 0 4 2 100

COURSE OUTCOMES

At the end of each experiment, the students will be able to -

1. Operate electronic test equipment and hardware tools and to use the same for conducting experiments.
2. Draw and analyze VI characteristics of various diodes.
3. Analyze the input and output characteristics of various transistors and plot the frequency response of amplifier circuits.

List of Experiments:

1.	Study of i. Cathode Ray Oscilloscope and DSO ii. Regulated Power Supply, Single and Dual Mode iii. Sine, Square, and Triangular Waves Function Generator iv. Bread Board – Connection Conventions
2.	To Draw and Analyse V-I Characteristics of given Si and Ge Diodes
3.	To Draw and Analyse V-I Characteristics of Zener Diode and Prove that the output voltage gets regulated after the breakdown voltage for variable input voltage in the range of 0.5 V to 8 V of a given Zener Diode
4.	To Draw and Analyse the Input and Output Characteristics of BJT (NPN)
5.	To Draw and AnalyseFrequency Response of BJT (CE) using Fixed Bias Amplifier Circuit
6.	To Draw and AnalyseFrequency Response of BJT (CE) using Voltage Divider Bias (self-bias) with and without bypassed Emitter Resistor (CE)
7.	To Draw and Analyse the Characteristics of N-channel JFET
8.	To Draw and Analyse the Characteristics of N-channel MOSFET
9.	To Draw and Analyse Characteristics of the following Special Diodes i. Tunnel diode ii. Photo diode iii. Light emitting diode

Total Hours: 60

U15EC306	DIGITAL LABORATORY	L	T	P	C	Marks
		0	0	4	2	100

COURSE OUTCOMES

At the end of each experiment, the students will be able to -

1. Design and implement combinational circuits using logic gates and breadboards
2. Design and develop various functional for sequential and combinational circuits.
3. Develop Verilog HDL code for combinational and sequential circuits.

List of Experiments:

1.	Design and implementation of (a) Half Adder and Full Adder, Half Subtractor and Full Subtractor (b) 4-bit Parallel Adder cum Subtractor (c) 4-bit Comparator
2.	Design and implementation of (a) Code Converters – Binary to Gray and Gray to Binary b) BCD to Excess 3 and Excess 3 to BCD
3.	Design and implementation of (a) 8:1 Multiplexer (b) 3:8 Decoder (c) 8:3 Encoder (d) 8 Bit Parity Generator and Checker
4.	Design and implementation of (a) Asynchronous Counter (b) Synchronous Counter
5.	Design and implementation of (a) Shift Registers – SISO, SIPO and PIPO
6.	Write a Verilog HDL program for combinational circuits (a) Half Adder and Full Adder, Half Subtractor and Full Subtractor (b) 4-bit Parallel Adder cum Subtractor (c) 8-bit Comparator
7.	Write a Verilog HDL program for MSI devices (a) 4 bit Priority Encoder, (b) 2×4 Decoder (c) 4×1 Multiplexer (d) 4×4 Array Multiplier
8.	Write a Verilog HDL program for sequential circuits a)Flip Flops – SR, JK, T and D a) 4 - bit Asynchronous Counter b) 4 - bit Synchronous Counter
9.	Write a Verilog HDL program in structural model for 8-bit Universal Shift Register

Total Hours: 60

U15ENG301	ENGLISH LABORATORY	L	T	P	C	Marks
		0	0	4	2	100

COURSE OUTCOMES

At the end of each experiment, the students will be able to -

1. Demonstrate active listening skills
2. Read fluently and comprehend the given texts.
3. Make power point presentations and perform effectively in interviews and group discussions

List of Experiments:

1. Listening comprehension

   A pre-recorded audio for 7 minutes is to be played twice and a passage with blanks in it is to be given to the students. The students have to fill in the blanks by typing appropriate words based on the audio.

2. Reading comprehension

   Based on a given passage, the students have to read and do the following exercises:

   a. Sentence completion with one word substitution is to be given to students, according to the passage the students have to click the correct option.
   b. Multiple choice questions are to be given and the students have to click the correct option.
   c. Vocabulary in the form of synonyms and antonyms is to be given and the students have to click the correct option

3. Face to face conversations and role play activities

   A situation is to be given and the students have to take up roles and engage in conversations. The students are to be assessed on the following areas -

   a. Justification to the role given
   b. Clarity, audibility and fluency
   c. The contents of the conversation
   d. Body language

4. Making presentations

   Students need to make individual presentation for 5 to 10 minutes approximately by using power point (PPts).

   Marks are to be awarded based on the following criteria:

   a. Body language (facial expression, gestures and posture)
   b. Content (the subject matter, introduction and conclusion)
   c. Language (fluency, grammatical accuracy)
   d. Effective use of the power point (style of designing the slides, space, font size and focus on contents)

5. Job application and covering letter

   Students have to write covering letter and resume. Students are to be assessed based on whether they have included all the following points in letter and application.

   a. The objective (career objective)
   b. Educational qualification (in the reverse order)
   c. Skills and assets
   d. Paper presentations and conferences attended
   e. Personal profile
   f. declaration

6. Group Discussion (GD)

   Students in a group of 4 to 5 are to be given a topic for discussion amongst themselves for about 10 to 15 minutes. The following points are to be assessed.

   a. Initiation
   b. Content
   c. Language
   d. Use of connectives
   e. Team cooperation

	f. Leadership quality g. Use of illustrations h. Conclusion
7.	Project proposals writing Students are asked to write a project proposal on a topic of research/engineering solution within their discipline for funding from outside. The following points are to be assessed. a. Collection, analysis and interpretation of data b. Correlating the particular data to proposal c. Presenting the facts in proper sequence and relevance d. Proposed technical solution to the engineering problem e. Budget preparation and justification f. Time lines of project progress
8.	Technical report writing Students are asked to write a technical report on a given research work recently published in reputed journals (ideally, ieee transaction research paper is to be given to the students for writing a report on it). The following points are to be assessed. a. Interpretation of results of research work b. Critical and significant outcome of the research work c. Presenting the results in concise and focused bulleted points d. Future scope discussion e. One suggestion to improve the research work
9.	Interview skills Interview practices are to be conducted. The students are to be assessed on the following criteria a. Dress code b. Body language c. Confidence level d. Handling stress e. Language quality / content f. Answers / relevant discussion

Total Hours: 60

Sona College of Technology, Salem
(An Autonomous Institution)
Courses of Study for B.E/B.Tech. Semester III under Regulations 2015 (CBCS)
Branch: Computer Science and Engineering

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit
Theory						
1	U15MAT301B	Discrete Mathematics	3	2	0	4
2	U15CS301	Data Structures	3	0	0	3
3	U15EC307	Digital Principles and System Design	3	2	0	4
4	U15CS302	Object Oriented Programming using C++	3	0	0	3
5	U15CS303	Computer Organization and Architecture	3	2	0	4
6	U15GE301	Soft Skills and Aptitude – I	1	0	0	1
Practical						
7	U15CS304	Data Structures Laboratory	0	0	4	2
8	U15CS305	Object Oriented Programming Laboratory	0	0	4	2
9	U15EC308	Digital Laboratory	0	0	4	2
10	U15ENG302	Communication Skills Laboratory	0	0	2	1
					Total Credits	**26**

Approved By

Chairperson, Computer Science and Engineering BoS Dr.M.Usha

Member Secretary, Academic Council Dr.A.C.Kaladevi

Chairperson, Academic Council & Principal Dr.M.Usha

Copy to:-
HOD/Computer Science and Engineering, Third Semester BE CSE Students and Staff, COE

U15MAT301B DISCRETE MATHEMATICS L T P C 3 2 0 4

COURSE OUTCOMES:

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

- Define and explain symbolic logic, construct truth tables and discuss the validity of the arguments
- Acquire the knowledge of predicates and arrive at the conclusions of the complicated logical problems
- Outline the concepts of set theory, relations and use them to understand the concepts of lattices and Boolean algebra
- Explain the concept of a function, types of functions and apply the concepts to solve problem
- Explain the concepts of different algebraic structures in group theory and apply them to solve problems in coding theory

Unit - I Propositional Calculus 12

Propositons: Logical connectives, compound propositions, conditional and biconditional propositions, truth tables, tautologies and contradictions, contrapositive, logical equivalences and implications, Demorgan's laws; Normal forms, principal conjunctive and disjunctive normal form, rules of inference, arguments, validity of arguments

Unit - II Predicate Calculus 12

Predicates: Statement function, variables, free and bound variables, quantifiers, universe of discourse, logical equivalences and implications, implications for quantified statements, theory of inference, the rules of universal specification and generalization, validity of arguments

Unit – III Set Theory 12

Basic concepts: Notations, subset, algebra of sets, the power set, ordered pairs and cartesian product
Relations on sets: Types of relations and their properties, relational matrix and graph of a relation, partitions, Equivalence relations; Partial ordering, poset, Hasse diagram, lattices and their properties; Boolean algebra, homomorphism

Unit – IV Functions 12

Definitions: Classification, types of functions, examples, compositions of functions, inverse functions, binary and n-ary operations, characteristic function of a set, permutation functions

Unit – V Groups and Group Codes 12

Algebraic systems: Definitions, examples, properties, semigroups, monoids, homomorphism, subsemigroups and submonoids; cosets and Lagrange's theorem, normal subgroups, Rings, (Defintion and examples only), codes and group codes, basic notions of error detection and error correction

` **Total: 60 hours**

TEXT BOOK

1. Rahothaman R., Ponnalagu K., "Discrete Mathematics", 5th Edition, Sonaversity, 2011

REFERENCES

1. Tremblay J.P., Manohar R.,"Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw-hill Publishing Co. Ltd., New Delhi, 2003

2. Kenneth H.Rosen, "Discrete Mathematics with Applications", 6th Edition, TataMc-Grawhill, 2006

3. Bernard Kolman, Robert C.Busby, Sharan Cutler Ross, "Discrete Mathematical Structures", 6th Edition, Pearson Education Pvt., Ltd., NewDelhi, 2006

4. Veerarajan.T, "Discrete Mathematics", 1st Edition, Tata McGraw Hill, 2008

U15CS301 DATA STRUCTURES L T P C 3 0 0 3

COURSE OUTCOMES:

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

- Implement binary tree search algorithm to solve problems
- Apply suitable data structures to implement various applications
- Analyze linear and non-linear data structures
- Apply various tree data structures to implement various applications
- Solve the collision problem using hashing techniques

UNIT I NON-LINEAR DATA STRUCTURES 10

Binary tree – Implementation - Types of Binary Trees - Tree traversals - Binary Search Tree - AVL Trees; Threaded binary trees - Red-Black Trees- Splay tree- B-tree- B+ tree – Application of trees

UNIT II HEAPS AND TRIE STRUCTURE 7

Heaps – Implementation - Application of Heaps – Priority Queues; Trie structure.

UNIT III SET AND GRAPHS 10

Disjoint Set ADT - Dynamic Equivalence problem - Smart Union Algorithms - Path Compression - Application of sets; Graphs - Representation – Graph Traversals - Spanning Trees – Shortest path Algorithms –Network Flow problems- Applications of Graphs.

UNIT IV SEARCH TECHNIQUES 9

Hashing - Hash functions – Collision Resolution Techniques – Separate Chaining and Open addressing- Double hashing - Rehashing - Extensible Hashing.

UNIT V ALGORITHM DESIGN AND ANALYSIS 9

Introduction to algorithm design techniques: Greedy Algorithms, Divide and Conquer- Dynamic Programming - Backtracking - Branch and bound , Randomized algorithms.

Total: 45 hours

Text Book:

1. Mark Allen Weiss, “Data structures and Algorithm Analysis in C”, Pearson Education, New Delhi, Second Edition, 2011.

Reference Books:

1. Jean Paul Tremblay and Sorenson, “An Introduction to Data Structures with Applications”, McGraw Hill Publishing Company, New Delhi, Second Edition, 2007.

2. Yedidyah Langsam, Moshe J Augenstein and Aaron M Tanenbaum, “Data Structures using C and C++”, Prentice Hall of India/ Pearson Education, New Delhi, 2006.

3. Sartaj Sahni, “Data Structures, Algorithms, and Applications in C++”, Silicon Press, New Jersey, Second Edition, 2005.

4. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest , Clifford Stein, “Introduction to Algorithms” ,3rd Edition, MIT Press, 2010.

U15EC307 DIGITAL PRINCIPLES AND SYSTEM DESIGN L T P C 3 2 0 4

COURSE OUTCOMES:

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

- Define different methods used for the simplification of Boolean functions
- Design and implement combinational circuits
- Design and implement sequential circuits
- Design and implement synchronous sequential circuits
- Design and implement asynchronous sequential circuits

UNIT I BOOLEAN ALGEBRA AND LOGIC GATES (9)

Boolean postulates and laws-de-Morgan's theorem-principle of duality-Boolean expressions-minimization of Boolean expressions-sop-pos - Karnaugh map minimization-don't care conditions-Quine-McCluskey. Implementation of Boolean function using logic gates.

UNIT II COMBINATIONAL LOGIC (9)

Design procedure-half adder and full adder- half sub tractor and full sub tractor - parallel adder/sub tractor -magnitude comparator-code conversion-BCD to excess 3code, excess 3 to BCD, Binary to Gray, Gray to binary

UNIT III DESIGN WITH MSI DEVICES (9)

Encoder- 8 to 3 line encoder, priority encoder, Decoder -2 to 4 line decoder, 3 to 8 line decoder-Multiplexer/Demultiplexer, Classification of memories-RAM-ROM-PROM-EPROM-EEPROM. Implementation of combinational logic using ROM, Programmable logic devices-PAL and PLA.

UNIT IV SYNCHRONOUS SEQUENTIAL LOGIC (9)

Flip flops -SR, JK, T, D– Characteristic table and equation –Application table. Asynchronous counters – Synchronous counters–Modulo – n counter –Classification of sequential circuits – Moore and Mealy - Design of Synchronous counters: state diagram- State table –State minimization –State assignment- Register – shift registers- SISO, SIPO, PIPO

UNIT V ASYNCHRONOUS SEQUENTIAL CIRCUITS (9)

Analysis and design of asynchronous sequential machines, Race-free state assignment, Hazards, Essential hazards –Hazards elimination.

Total: 60 Hours

Text Book:

1. M.Morris Mano, "Digital Design", 3rd edition, Pearson Education, 2007.

Reference Books:

1. A.P. Godse, D.A.Godse ,"Digital Principles and System Design", Second edition, Technical Publications 2010.
2. Charles H.Roth, Jr. "Fundamentals of Logic Design", 4th Edition, Jaico Publishing House, Cengage Earning, 5th ed, 2005.
3. Donald D.Givone, "Digital Principles and Design", Tata McGraw-Hill, 2007.

U15CS302 OBJECT ORIENTED PROGRAMMING USING C++ L T P C 3 0 0 3

COURSE OUTCOMES:

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

- Write C++ programs using classes, objects and constructors for various applications
- Design programs for real world examples with code reusability through inheritance
- Implement polymorphism by operator overloading and virtual functions
- Write C++ programs for various applications with file handling, exception handling
- Design programs using generic programming

Unit I (10)

PRINCIPLES OF OOP: Programming Paradigms- Basic concepts and benefits of OOP- Structure of C++ program – Applications of C++ - Tokens- Keywords- Identifiers-constants- Data types - Basic, User defined, Derived - Dynamic initialization -Reference variables- Scope resolution operator-Member dereferencing operators- memory management operators- Type casting- Function Prototyping- call by reference, return by reference- Inline function- Default arguments – Function overloading.

Unit II (12)

CLASSES AND OBJECTS: Class specification- Access qualifiers- Static data members and member functions - Array of objects- Objects as function arguments-Friend functions- Returning objects- Local classes - Constructors – Parameterized constructors- Overloaded Constructors- Constructors with default arguments-Copy constructors- Dynamic constructors-Dynamic initialization using constructors-Destructors - Operator Overloading: Operator function – Overloading unary and binary operator-Overloading the operator using friend function-Type Conversion.

Unit III (7)

INHERITANCE: Defining Derived classes- Single Inheritance- Multiple Inheritance- Multi level inheritance- Hierarchical Inheritance- Hybrid Inheritance-Multipath inheritance-Virtual Base Class-Abstract class- Constructors in derived and base class- Pointers- pointers to objects – this pointer - Virtual functions-Pure virtual functions.

Unit IV (8)

STREAMS: Stream classes- Formatted I/O- I/O Manipulators- User defined manipulators- File handling-File pointer and manipulation- Sequential and random access- Error handling.

Unit V (8)

GENERIC PROGRAMMING WITH TEMPLATES: Function templates, overloaded function templates, user defined template arguments, class templates - Exception Handling: Exception handling mechanism, multiple catch, nested try, rethrowing the exception – Namespaces – std namespace- Standard Template Library.

Total : 45 Hours

Text Book:

1. E. Balagurusamy, “Object Oriented Programming with C++”, Tata McGraw Hill, Sixth Edition, 2013.

Reference Books:

1. K. R.Venugopal, Rajkumar, T.Ravishankar, “Mastering C++”, Tata McGraw Hill, 2007.
2. Robert Lafore, “Object Oriented Programming in Turbo C++”, Galgotia Publications, 2006.
3. Bjarne Stroustrup, “The C++ Programming Language”, Pearson Education, Fourth Edition, 2013.
4. B.Trivedi, “Programming with ANSI C++”, Oxford University Press, 2007.
5. K.S. Easwarakumar, “ Object Oriented Data Structures Using C++”, Vikas Publication House Pvt Ltd, First Edition, 200

U15CS303 COMPUTER ORGANIZATION AND ARCHITECTURE LT P C 3 2 0 4

COURSE OUTCOMES:

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

1. Demonstrate the operational concepts of computers and classify instruction set architectures
2. Identify the mechanism of control signals generation in Hardwired control and micro programmed control unit
3. Illustrate processing of pipelined operation; list various types of hazards and methods to overcome hazards
4. Discriminate main memory, Cache memory and Virtual memory concepts
5. Interpret the significance of bus arbitration and Compare the standard i/o interfaces (PCI,SCSI,USB)

UNIT I BASIC STRUCTURE OF COMPUTERS (9)

Functional units – Basic operational concepts – Bus structures – Instructions and instruction sequencing – Hardware – Software Interface – Translation from a high level language to the Hardware language-Instruction set architecture – Styles and features-Addressing modes – RISC – CISC-Amdhal's law- Performance and metrics.

UNIT II BASIC PROCESSING UNIT (9)

Components of the processor-Data path and control- Execution of a complete instruction – Multiple bus organization – Hardwired control – Micro programmed control.

UNIT III ARITHMETIC FOR COMPUTERS (9)

Addition and Subtraction – Fast Adders – Binary Multiplication – Binary Division – Floating Point Numbers – Representation, Arithmetic Operations.

UNIT IV PIPELINING AND CURRENT TRENDS (9)

Basic concepts – Data hazards – Instruction hazards – Influence on instruction sets – Data path and control considerations – Performance considerations – Exception handling-An overview of\Instruction Level Parallelism and Thread Level Parallelism – Current Trends – Multicore Processors – Graphics and Computing GPUs.

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UNIT V MEMORY AND I/O (9)

Need for a hierarchical memory system – Types and characteristics of memories – Cache memories – Improving cache performance – Virtual memory – Memory management techniques – Associative memories – Introduction to Flash and Nano Memories - Accessing I/O devices – Programmed Input/Output – Interrupts – Direct Memory Access – Interface circuits – Need for Standard I/O Interfaces like PCI, SCSI, USB.

TOTAL: 45 hours

TEXT BOOK:

1. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, "Computer Organization", Fifth Edition, Tata McGraw Hill, 2002.

REFERENCES:

1. John L. Hennessey and David A. Patterson, "Computer Architecture – A Quantitative Approach", Morgan Kaufmann / Elsevier Publishers, Fifth Edition, 2012.

2. William Stallings, "Computer Organization and Architecture – Designing for Performance", Sixth Edition, Pearson Education, 2003.

3. John P. Hayes, "Computer Architecture and Organization", Third Edition, Tata McGraw Hill, 1998.

4. Dr.M.Usha, T.S. Srikanth, "Computer System Architecture and Organization", Wiley Publications, 2013.

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

U15CS304 DATA STRUCTURES LABORATORY L T P C 0 0 4 2

COURSE OUTCOMES:

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

- Design and develop simple programs using data structures
- Apply non-linear data structures for various real time applications
- Develop programs using searching techniques
- Design shortest path algorithm for various real life applications
- Write programs to implement algorithm design techniques

List of experiments:

1. Implementation of Binary Tree and Traversal Techniques
2. Implementation of Binary Search Tree
3. Implementation of AVL Tree
4. Implementation of B-trees
5. Implementation of graphs using BFS and DFS.
6. Implementation of Prim‟s algorithm.
7. Implementation of Kruskal algorithm
8. Implementation of Dijkstra's algorithm
9. Implementation of Floyd's algorithm
10. Implementation of Hashing and Collision Resolution Technique.
11. Implementation of Heap
12. Implement the operations on Trie structure
13. Implementation of Merge sort using Divide Conquer Method
14. Implementation of 8 queens problem using Backtracking Method

TOTAL: 45 hours

U15CS305 OBJECT ORIENTED PROGRAMMING LABORATORY L T P C 0 0 4 2

COURSE OUTCOMES:

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

- Design and develop simple programs using basic concepts of C++
- Develop programs using the concept of classes, static members and constructors
- Implement polymorphism using operator overloading and virtual functions.
- Develop programs using inheritance
- Implement file handling and exception handling
- Write programs to implement generic programming

EXPERIMENTS

Develop C++ Program to implement

1. Functions with call by value, call by reference, default arguments and function Overloading

2. Design of classes with static and non static members, friend functions and creating array of objects

3. Classes with default, parameterized, dynamic and copy constructors, destructor.

4. Overloading unary, binary operators using member functions and friend functions.

5. Inheritance and run time polymorphism

6. Sequential and Random accessing of Files.

7. Template functions and template class.

8. Exception Handling Mechanism.

TOTAL: 45 hours

U15EC308 DIGITAL LABORATORY L T P C 0 0 4 2

COURSE OUTCOMES:

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

- Examine the Boolean theorems using digital logic gates.
- Design and implement combinational circuits using basic gates for arbitrary functions.
- Implement parity generator using basic gates and MSI devices.
- Design 4-bit shift registers using RS flip-flop.
- Show the simulation of combinational circuits using VHL.

S.NO	LIST OF EXPERIMENTS
1.	Truth Table Verification of Logic Gates
2.	Verification of Boolean Theorems Using Digital Logic Gates
3.	Design and Implementation of Half Adder, Full Adder and Half Substractor, Full Substractor
4.	Design of Code Converters -Bcd to Excess 3 Code, Binary To Gray, Gray To Binary
5.	Design of Multiplexer/De-Multiplexer
6.	Design of Encoder / Decoder
7.	Design of Parity Checker / Generator
8.	Design of Magnitude Comparator
9.	Design and Implementation of Shift Registers- Siso,Sipo,Pipo
10.	Design and Implementation of 3-Bit Synchronous Counters
11.	Design and Implementation of 3-Bit Asynchronous Counters

Total: 45 Hours

Sona College of Technology, Salem
(An Autonomous Institution)
Courses of Study for B.E/B.Tech. Semester III under Regulations 2015 (CBCS)
Branch: Information Technology

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit
Theory						
1	U15MAT301E	Discrete Mathematics	3	2	0	4
2	U15IT301	Advanced Data Structures	3	0	0	3
3	U15IT302	Digital Logic Design	3	0	0	3
4	U15IT303	Principles of Communication	3	0	0	3
5	U15IT304	Object Oriented Programming in C++	3	0	0	3
6	U15IT305	Computer Architecture	3	0	0	3
7	U15GE301	Soft Skills and Aptitude – I	1	0	0	1
Practical						
8	U15IT306	Data Structures using C++ Laboratory	0	0	4	2
9	U15IT307	Digital Logic Design Laboratory	0	0	2	1
10	U15ENG302	Communications Skills Laboratory	0	0	2	1
					Total Credits	**24**

Approved By

Chairperson, Information Technology BoS Dr.J.Akilandeswari

Member Secretary, Academic Council Dr.A.C.Kaladevi

Chairperson, Academic Council & Principal Dr.M.Usha

Copy to:-
HOD/Information Technology, Third Semester BE IT Students and Staff, COE

U15MAT301E DISCRETE MATHEMATICS 3 2 0 4

COURSE OUTCOMES

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

1. Explain and apply symbolic logic, construct truth tables and discuss the validity of the arguments
2. Apply predicates and arrive at the conclusions of the complicated logical problems
3. Apply the concepts of combinatorics, to solve the real world problems
4. Apply the concept of a lattice and Boolean algebra, in solving the problems
5. Apply different algebraic structures in group theory and coding theory

UNIT I PROPOSITIONAL CALCULUS 9

Propositions – Logical connectives – Compound propositions – Conditional and biconditional propositions – Truth tables – Tautologies and contradictions – Contrapositive – Logical 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

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 COMBINATORICS 9

Counting principle – Sum rule, Product rule - Pigeonhole Principle - Permutations and Combinations - Mathematical Induction – Recurrence relation – Solution of recurrence relation using generating functions.

UNIT IV LATTICES AND BOOLEAN ALGEBRA 9

Introduction – Poset – Hasse diagram – Lattices and their properties – Duality principle- Sublattices – Some special Lattices - Boolean algebra and its properties – Expression of a Boolean function in Canonical form (Truth table method and Algebraic method)

UNIT V GROUP THEORY 9

Algebraic systems – Definitions – Examples – Semigroups – Monoids – Groups and its properties –- Subgroups - Cosets and Lagrange's theorem – Codes and group codes – Basic notions of error correction - Error recovery in group codes.

Tutorial : 30 hours
Total : 75 hours

TEXT BOOKS

1. Rahothaman R., Ponnalagu K., "Discrete Mathematics", 5th Edition, Sonaversity, 2011.
2. Veerarajan T. "Discrete Mathematics with Graph Theory and Combinatorics", Nineteenth reprint, McGraw Hill Education (India) Private Ltd, New Delhi, 2014.

REFERENCES

1. Kenneth H.Rosen, "Discrete Mathematics and its Applications", Seventh Edition, Tata McGraw – Hill Pub. Co. Ltd., New Delhi, 2015.
2. Ralph. P.Grimaldi, "Discrete and Combinatorial Mathematics: An Applied Introduction", Fifth Edition, Pearson Education Asia, Delhi, 2004.
3. Tremblay J. P and Manohar R, "Discrete Mathematical Structures with Applications to Computer Science", 30th Re-print, Tata McGraw–Hill Pub. Co. Ltd, New Delhi, 2007.

U15IT301 ADVANCED DATA STRUCTURES 3 0 0 3

COURSE OUTCOMES

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

1. Analyze simple algorithms
2. Implement Tree ADT and apply it to construct expression trees.
3. Implement variants of different tree data structure.
4. Develop algorithms using sets and hashing.
5. Develop and apply algorithms for real applications using graphs.

UNIT I ALGORITHM ANALYSIS & TREE STRUCTURES 9

Algorithm Analysis – Asymptotic Notations-Time complexity –Space complexity- Preliminaries of Trees - Implementation of Trees – Tree Traversals with an Application - Binary Trees – Implementation - Expression trees

UNIT II TREE VARIANTS 9

Binary Search Tree ADT – Average case Analysis - AVL trees – Splaying- B-trees- B+ trees

UNIT III ADVANCED TREES AND BINARY HEAP 9

Red black Trees - 2-3 Trie - k-d Trees - Priority Queue- Model -Simple Implementations –Binary Heap – Basic Heap Operations – Other Heap Operations - Applications of Priority Queues.

UNIT IV HASHING AND SETS 9

Hashing –General idea - Hash Function- Separate Chaining – Open Addressing – Linear Probing - Quadratic Probing- Double Hashing - Rehashing – Extendible Hashing – Disjoint Set ADT – Equivalence Relations- Dynamic Equivalence Problem – Basic Data structure- Smart Union Algorithms – Path Compression – An Application.

UNIT V GRAPHS 9

Definitions – Representation of Graphs – Traversals – Breadth First Search - Depth-first Search - Topological Sort – Shortest-path Algorithms – Unweighted Shortest Paths - Dijkstra's Algorithm- Minimum Spanning Tree – Prim's and Kruskal's Algorithms – Biconnectivity – Euler circuits

Total : 45 hours

TEXT BOOK

1. M. A. Weiss, "Data Structures and Algorithm Analysis in C++", Fourth Edition, Pearson Education, 2014.

REFERENCES

1. Richard F.Gilberg and Behrouz A.Forouzan, "Data Structures – A Pseudo code Approach with C++", THOMAS ASIA, 2005.
2. Yedidyah Langsan, Moshe J. Augenstein And Aoron M. Tanenbaum," Data Structures using C and C++", Prentice-Hall of India Pvt Ltd, 2004
3. Sartaj Sahni, " Data Structures, Algorithm and Application in C++", 2nd edition, Silicon Press, 2004.
4. Michael T.Goodrich, R.Tamassia and Mount "Data structures and Algorithms in C++", 2nd edition, Wiley , 2011.

U15IT302 DIGITAL LOGIC DESIGN 3 0 0 3

COURSE OUTCOMES

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

1. Apply arithmetic operations in any number system.
2. Simplify the Boolean expression using K-Map and tabulation techniques.
3. Use Boolean simplification techniques to design a combinational circuit.
4. Analysis and Design of a given combinational digital/logic circuits.
5. Analysis and Design of a given sequential digital/logic circuits.
6. Design of programmable logic devices.

UNIT I BOOLEAN ALGEBRA AND LOGIC GATES 9

Review of Number systems – Complements - Digital Logic gates - Basic theorems and properties of Boolean algebra - Boolean functions – Canonical and Standard forms -Simplifications of Boolean functions using Karnaugh map – three variable, Four variable and Five variable – Product of sum simplification- Don't care conditions – Quine McCluskey(QM) method.

UNIT II COMBINATIONAL LOGIC 9

Combinational circuits – Analysis and design procedures - Code conversion – Binary to Gray, Gray to Binary – BCD to Excess - 3, Excess - 3 to BCD- Circuits for arithmetic operations –Half Adder – Full Adder - Binary Adder– Half subtractor – Full subtractor – Binary subtractor- BCD adder- Binary Multiplier – Magnitude comparator.

UNIT III MSI LOGIC CIRCUITS AND PROGRAMMABLE LOGIC 9

Decoders – combinational logic implementation using decoder – Encoders- Priority encoder-Multiplexers- Boolean function Implementation using multiplexer – Demultiplexer - Programmable logic Array – Implementation of Boolean functions with PLA - Programmable Array logic. Implementation of Boolean functions with PAL.

UNIT IV SYNCHRONOUS SEQUENTIAL LOGIC 9

Sequential circuits – Flip flops – RS, JK, D, T - Analysis of clocked sequential circuits –State equations, State Table, State diagram - Analysis with D, JK and T Flip flops – State reduction and state assignment - Design procedures – Synthesis using D, JK and T – Binary Ripple Counters – Binary Synchronous Counters.

UNIT V ASYNCHRONOUS SEQUENTIAL LOGIC 9

Introduction- Analysis procedure – Transition Table – Flow Table – Race condition- Circuit with latches – Design procedure of asynchronous sequential circuit - Reduction of state and flow tables – Race-free state assignment – Hazards –Hazards in Combinational Circuits -Hazards in Sequential Circuits.

Total : 45 hours

TEXT BOOK

1. M.Morris Mano, Michel D. Ciletti, and John F.Walerly "Digital Design", 5th edition, Pearson Education, 2013.

REFERENCES

1. Larry L Kinney and Charles H.Roth Jr, "Fundamentals of Logic Design", 5th edition, Jaico Publishing House, 2015.
2. Donald D.Givone, "Digital Principles and Design", Tata McGraw-Hill, 2007.
3. Donald P.Leach, Albert Paul Malvino and Saha, "Digital Principles and Applications", 8th edition, TMH, 2014.
4. G.K.Kharate, "Digital Electronics", Oxford University press, 2012.
5. John F.Wakerly, "Digital Principles and practices", 4th edition, Pearson Education, 2013.

U15IT303 PRINCIPLES OF COMMUNICATION 3 0 0 3

COURSE OUTCOMES

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

1. Explain and apply various types of modulation and demodulation in analog and digital communication.
2. Describe the concept of digital communication techniques.
3. Describe the concept of various digital transmission techniques.
4. Comprehend the Cellular communication techniques.
5. Explain the concepts of Satellite and Optical communication.

UNIT I FUNDAMENTALS OF ANALOG COMMUNICATION 9

Principles of amplitude modulation - AM envelope - frequency spectrum and bandwidth - modulation index and percent modulation - AM Voltage distribution - AM power distribution - Angle modulation - FM and PM waveforms - phase deviation and modulation index - frequency deviation and percent modulation - Frequency analysis of angle modulated waves - Bandwidth requirements for Angle modulated waves.

UNIT II DIGITAL COMMUNICATION 9

Shannon limit for information capacity - Digital amplitude modulation - Frequency Shift Keying - FSK bit rate and baud - FSK transmitter - BW consideration of FSK - FSK receiver - Phase Shift Keying – BPSK , QPSK ,8-PSK - Quadrature Amplitude modulation – 8-QAM - bandwidth efficiency - Carrier recovery – squaring loop, Costas loop - DPSK.

UNIT III DIGITAL TRANSMISSION 9

Pulse modulation - PCM – PCM sampling - Sampling rate - Signal to Quantization noise rate - Companding- analog and digital - Delta modulation PCM - Adaptive Delta modulation PCM - Differential PCM - Intersymbol interference - Eye patterns.

UNIT IV CELLULAR COMMUNICATION 9

Fundamental concept of Cellular telephone - Frequency reuse, Interference - Co-channel Interference, Adjacent channel Interference - Cell splitting - Cell sectoring - Segmentation and Dualization - Roaming and Handoff.

UNIT V SATELLITE AND OPTICAL COMMUNICATION 9

Kepler's Law - Satellite Orbits - Geo synchronous satellites - satellite system link models -Optical Fiber Communication system - Optical Fiber configurations - Optical Fiber classification Losses in Optical fiber cables - Optical sources - LED , Injection laser diode - Light detector - PIN diodes, Avalanche photo diode.

Total : 45 hours

TEXT BOOK

1. Wayne Tomasi, "Electronic Communication Systems Fundamentals through Advanced", 6th Edition, Pearson Education, 2008.

REFERENCES

1. H.Taub,D L Schilling ,G Saha ,"Principles of Communication", 3rd edition, 2008.
2. B.P.Lathi,"Modern Analog and Digital Communication systems", 6th edition, Oxford University Press, 2008.
3. Blake, "Electronic Communication Systems", Thomson Delmar Publications, 2002.
4. Martin S.Roden, "Analog and Digital Communication System", 3rd edition, PHI, 2002.
5. B.Sklar,"Digital Communication Fundamentals and Applications", 2nd edition, Pearson Education, 2007.
6. Simon Haykin, "Communication Systems", 5th edition, John Wiley & Sons. 2010.

U15IT304 OBJECT ORIENTED PROGRAMMING IN C++ 3 0 0 3

COURSE OUTCOMES

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

1. Explain fundamental programming concepts such as variables, conditional statements, looping constructs, and methods (procedures), inline function, friend function.
2. Describe how the class mechanism supports encapsulation and information hiding
3. Apply the concept of constructors, destructors and operator overloading.
4. Apply templates and inheritance mechanism in applications.
5. Write C++ programs for applications using files and exceptions.

UNIT I OBJECT ORIENTED CONCEPTS 9

Introduction to Object Oriented Programming and C++: Object oriented concepts and its characteristics: abstraction, encapsulation, inheritance, and polymorphism. History of C++ - Structure of C++- Applications of C++- Tokens- Keywords- Identifiers-Basic data types- Derived data types- Symbolic constants- Dynamic initialization -Reference variables- Scope resolution operator-Type modifiers- Type casting.

C++ Operators and control statements- Input and output statements- Function Prototyping-Function components- Passing parameters - call by reference, return by reference- Inline function- Default arguments - Overloaded function- Introduction to friend function.

UNIT II CLASSES AND OBJECTS, CONSTRUCTORS AND DESTRUCTORS 9

Classes and Objects: Class specification- Member function definition- Nested member function- Access qualifiers- Static data members and member functions - Instance creation- Array of objects- Dynamic objects-Static Objects- Objects as arguments- Returning objects.

Constructors and Destructors: Constructors – Parameterized constructors- Overloaded Constructors- Constructors with default arguments-Copy constructors- Dynamic constructors-Dynamic initialization using constructors- Destructors.

UNIT III POLYMORPHISM 9

Operator Overloading: Operator function – Overloading unary and binary operator-Overloading binary operator using friend function - Type Conversion.

Virtual Function: Definition – Runtime Polymorphism – Array of pointers to base class – virtual functions - Pure virtual functions – Virtual Destructors.

UNIT IV INHERITANCE AND TEMPLATES 9

Inheritance: Defining Derived classes- Single Inheritance- Protected Data with private inheritance- Multiple Inheritance- Multi level inheritance- Hierarchical Inheritance- Hybrid Inheritance-Multipath inheritance- Virtual Base Classes- Abstract classes -Constructors in derived class- Member Classes

Generic Programming with Templates: Introduction, class templates – class templates with multiple parameters - Function templates, Function templates with multiple parameters- overloading of function templates, Member function Templates, Non-Type Template Arguments- Inheritance of class template.

UNIT V STREAMS AND EXCEPTION HANDLING 9

Streams: Streams in C++- Stream classes- Formatted and unformatted data- Manipulators- User defined manipulators- File streams-File pointer and manipulation-File open and close- Sequential and random access-Name Space.

Exception Handling: Principle of exception handling-Exception handling mechanism, multiple catch, nested try, rethrowing the exception – specifying exceptions.

Total: 45 hours

TEXT BOOK

1. Robert Lafore, "Object-Oriented Programming in C++" Pearson Education, 4 Edition, 2008.
2. K R Venugopal, Rajkumar Buyya "Mastering C++" Tata McGraw Hill, New Delhi, Second edition 2015.

REFERENCES

1. H. M. Deitel, P. J. Deitel, " C++ How to Program", Fifth Edition, Deitel & Associates, Inc.
2. Nicholas A. Solter, Scott J. Kleper, "Professional C++", 3rd Edition, Wiley Publishing,
3. Ira Pohl, "Object Oriented Programming using C++", Pearson Education, Second Edition Reprint 2004.
4. S. B. Lippman, Josee Lajoie, Barbara E. Moo, "C++ Primer", Fourth Edition, Pearson Education, 2005.
5. B. Stroustrup, "The C++ Programming language", 3rd edition, Pearson Education, 2004.
6. E. Balaguruswamy, "Object-Oriented Programming with C++" Tata McGraw Hill, New Delhi, Sixth edition 2015.

U15IT305 COMPUTER ARCHITECTURE 3 0 0 3

COURSE OUTCOMES:

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

1. Explain the processor design concepts in modern computer architecture.
2. Discuss the operations and instruction sequences in a basic computer.
3. Explain different types of control unit and the concept of pipelining.
4. Describe the hierarchical memory system including cache memory and virtual memory.
5. List and explain different ways of communicating with I/O devices and standard I/O interfaces.

UNIT I BASIC STRUCTURE OF COMPUTERS 9

Functional units – Basic operational concepts – Bus structures – Software – Performance and metrics – Multiprocessors and Multicomputer – Memory Locations and Addresses– Instructions and instruction sequencing – Addressing modes – Fixed point and Floating point representations.

UNIT II BASIC PROCESSING UNIT 9

Fundamental concepts – Execution of a complete instruction – Multiple bus organization – Hardwired control – Micro programmed control: Micro Instructions- Micro Instructions with next address field.

UNIT III PIPELINING 9

Basic concepts – Data hazards – Instruction hazards – Influence on instruction sets –Data path and control considerations – Superscalar operation– Performance considerations.

UNIT IV MEMORY SYSTEM 9

Basic concepts – Semiconductor RAM – ROM – Speed Size and cost – Cache memories – performance consideration – Virtual memory – Memory management requirements – Associative memories – Secondary storage devices.

UNIT V I/O ORGANIZATION 9

I/O devices - Accessing I/O devices – Programmed Input/output – Interrupts – Direct Memory Access – Buses – Interface circuits – Standard I/O Interfaces (PCI, SCSI, USB)– Processor Families.

Total : 45 hours

TEXT BOOK

1. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, "Computer Organization", 5th edition, McGraw Hill Education, 2011.

REFERENCES

1. M. Morris Mano, "Computer System Architecture", 3rd edition, Pearson Education, 2007.
2. David A. Patterson and John L. Hennessy, "Computer Organization and Design: The Hardware/Software interface", 5th edition, Elsevier, 2013.
3. William Stallings, "Computer Organization and Architecture – Designing for Performance", 10th edition, Pearson Education, 2015.
4. B. Govindarajalu, "Computer Architecture and Organization: Design Principles and Applications", 2nd edition, McGraw Hill Education, 2010.

U15IT306 DATA STRUCTURES USING C++ LABORATORY 0 0 4 2

COURSE OUTCOMES

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

1. Understand the importance of Class, Constructor and destructor
2. Implement the basic concept of C++ such as Polymorphism, Inheritance, Friend and virtual Function
3. Realize an expression tree and generate prefix, postfix and infix expressions
4. Implement Binary search tree.
5. Implement Priority queue.
6. Implement Hash tables and resolute collisions.
7. Implement B-Trees.
8. Write program implementing Kruskal's algorithm to determine minimum spanning tree from a give graph.
9. Write programs to traverse the nodes in a given graph using depth-first and breadth first search algorithms.

LIST OF EXPERIMENTS

1. Design C++ classes with static members, methods with default argument
2. Practice of Dynamic memory allocation using constructor, destructor, copy constructor.
3. Practice of C++ concepts such as Polymorphism, Inheritance, Friend and virtual Function.
4. Implementation of an expression tree. Produce its prefix, infix and postfix expressions.
5. Use class template to Implement Binary Search Tree.
6. Implementation of Priority Queue.
7. Implementation of Hashing Techniques.
8. Implementation of Depth first traversal and Breadth first traversal.
9. Implementation of B-Trees.
10. Implementation of Kruskal's Algorithm.

U15IT307 DIGITAL LOGIC DESIGN LABORATORY 0 0 2 1

COURSE OUTCOMES

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

1. Use Boolean simplification techniques to design and construct simple Boolean theorems and functions.
2. Design and implement combinational circuits.
3. Analyze a given digital circuit – Combinational and Sequential.
4. Design the different functional units in a digital computer system.
5. Design and construct sequential circuits.

LIST OF EXPERIMENTS

1. Verification of Boolean theorems using digital logic gates
2. Design and implementation of combinational circuits using basic gates for arbitrary functions.
3. Design and implementation of Binary to Gray and Gray to Binary code converters.
4. Design and implementation of Half adder / Half subtractor, Full adder / Full subtractor using basic gates.
5. Design and implementation of 4-bit binary adder / subtractor using basic gates and MSI devices.
6. Design and implementation of parity generator / checker using basic gates and MSI devices.
7. Design and implementation of magnitude comparator.
8. Design and implementation of Decoders and encoders.
9. Design and implementation of Multiplexers/Demultiplexers.
10. Design and implementation of Shift registers.
11. Design and implementation of Synchronous counters.
12. Design and implementation of Asynchronous counters.

Sona College of Technology, Salem
(An Autonomous Institution)
Courses of Study for B.E/B.Tech. Semester III under Regulations 2015 (CBCS)
Branch : Fashion Technology

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit
Theory						
1	U15MAT301F	Linear Programming and Statistical Methods	3	2	0	4
2	U15GE302	Basics of Mechanical and Electrical Engineering	3	0	0	3
3	U15CHE304	Environmental Science and Engineering	3	0	0	3
4	U15FT301	Technology of Yarn Manufacture	3	0	0	3
5	U15FT302	Fashion Art and Design	3	0	0	3
6	U15FT303	Pattern Engineering	3	0	0	3
7	U15GE301	Soft Skills and Aptitude – I	1	0	0	1
Practical						
8	U15FT304	Pattern Making and Grading Laboratory	0	0	4	2
9	U15FT305	Fashion Illustration Laboratory	0	0	4	2
					Total Credits	**24**

Approved By

Chairman, Fashion Technology BoS	**Member Secretary, Academic Council**	**Chairperson, Academic Council & Principal**
Prof.G.Gunasekaran	Dr.A.C.Kaladevi	Dr.M.Usha

Copy to:-
HOD/Fashion Technology, Third Semester BE FT Students and Staff, COE

U15MAT301F LINEAR PROGRAMMING AND STATISTICAL METHODS 3 2 0 4

COURSE OBJECTIVE

At the end of the course, the students would be able to apply Linear Programming Problems and Statistical Methods in countless real life problems in all areas of Science & Engineering and provide solutions for a number of situations that arise in various industries and in real life.

COURSE OUTCOMES

To enable students to,

1. Formulate the real life problems as LPP, state algorithms of simplex method and Big M method, and solve problems, state duality theory, find optimum solution using dual simplex method .
2. Describe the transportation and assignment models and find optimal solutions to problems
3. Discuss the relationship between two or more variables using correlation technique and hence analyze the results , estimate the value of dependent variable using regression analysis.
4. Explain the basic terminologies used in the testing of hypothesis, test the hypothesis for attributes and variables with large samples.
5. Discuss the applications of t, F (small samples) and χ^2 distributions.

UNIT- I Linear Programming Problems 12

LP Formulation, Graphical solution, slack, surplus and artificial variables, simplex method, classification of simplex problems, simplex problems with only slack variables, Big M method, duality theory, primal, dual problems, application of duality, dual simplex method.

UNIT- II Basic Techniques of Operation Research 12

Transportation model, optimality testing in transportation problem, MODI method, assignment models, procedure for an assignment problem, problems on assignment model, Hungarian method.

UNIT - III Correlation and Regression 12

Correlation (simple and rank correlation) and regression, multiple and partial correlations, partial and multiple regression.

UNIT - IV Tests of Hypothesis 12

Parameter and statistic, null and alternative hypothesis errors in sampling, critical region and level of significance, one tailed and two tailed tests, testing of hypothesis for proportions, means, standard deviations using Z – test.

UNIT -V **Exact Sampling Distributions** **12**

$א^2$ test for independence of attributes, goodness of fit – $א^2$ test for population variance, applications of t and F distributions.

Total : 60 hours

TEXT BOOK

1. **"Linear Programming and Statistical Methods",** by Sonaversity, 2011

REFERENCES

1. Gupta P.K., Hira D.S. , "**Operations Research**", S. Chan & Co 1999
2. Taha H.A., "**Operations Research**" Prentice Hall of India 2002
3. Gupta S.C., Kappor V.K., "**Fundamentals of Mathematical Statistics**"
4. Veerarajan T., "**Probability, Statistics and Random Processes**", Tata Mc. Graw

U15GE302 BASICS OF MECHANICAL AND ELECTRICAL ENGINEERING 3 0 0 3

Course Objective

To impart knowledge on fundamentals of

(i) Conventional power plants, Boilers, Pumps, Refrigerators, Air conditioners and Compressors.
(ii) Basics of Electrical circuits, principles of operation, applications of DC & AC Machines and measurement of electrical parameters.

Course Outcomes:

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

1. Describe the essential features and working principles of conventional power plants, commonly-used pumps and boilers
2. Explain the fundamentals principles of refrigeration and air conditioning
3. State the fundamental laws of electrical circuits and calculate the basic parameters related to DC and AC electrical circuits
4. Explain the constructional features and principles of operation of DC and AC Motors
5. Describe the working principles of electrical measuring instruments.

Unit I Power Plant Engineering 12

Introduction, Classification of power plants-working of steam, gas, diesel, hydro-electric, nuclear power plants; Pumps-working principle of reciprocating and centrifugal pumps. Boilers: types, applications of Cochran, Lamont, Benson, Babcock-Wilcox boilers; Properties of steam; Dryness fraction, latent heat, Total heat of wet steam, Superheated steam; Use of steam tables; Volume of wet steam; Volume of superheated steam; External work of evaporation; Internal energy; Entropy of vapour.

Unit II Refrigeration and Air Conditioning 12

Terminology of refrigeration and air conditioning; Principle of vapour compression and absorption system-window and split type air conditioner

Compressor – Classification, Working of reciprocating and rotary air compressors, Applications

Unit III DC and AC Circuits 12

DC Circuits: Ohm's law, Kirchoff's laws, Series and Parallel circuits, Star – Delta transformation – Simple Problems.

AC Circuits: AC waveform standard terminologies, Single phase RL, RC, RLC series circuits – Simple Problems. Introduction to three phase circuits.

Unit IV DC and AC Motors 15

DC motors: Construction and Principle of operation, Concept of Back EMF, Torque equation, Types, Characteristics. Speed control of DC shunt motor, Ward-Leonard speed control.

Three Phase Induction Motor: Construction, Working principle, Torque Equation, Torque-Slip Characteristics, Speed-Torque Characteristics. V/f speed control and Slip Power Recovery scheme.

Unit V Measurements and Instrumentation 9

Basic principle of indicating instruments - Moving Coil and Moving Iron instruments - Dynamometer type watt meters. Induction type energy meters - Measurement of Power.

Total: 57 hours

TEXT BOOKS :

1. V.K. Mehta and Rohit Mehta, **"Principles of Electrical Engineering and Electronics",** S. Chand publishers, 2011
2. S.K. Bhattacharya, **"Basic Electrical and Electronics Engineering", Pearson publishers,** 2012

REFERENCES BOOKS

1. Sudhakar A and Shyam Mohan SP, **Circuits and Network Analysis and Synthesis**", Tata Mc Graw Hill 2007.
2. D.P. Kothari and I.J. Nagrath, **'Electric Machines'**, Tata McGraw Hill 2002.
3. A.K. Sawhney, "**A Course in Electrical & Electronic Measurements &Instrumentation"**, Dhanpat Rai and Co 2004.
4. B.L. Theraja, "**Fundamentals of Electrical Engineering and Electronics",** S. Chand publishers, 2007
5. S.R.J. Shantha Kumar, "**Basic Mechanical Engineering**", 2nd Edition, Hi-Tech Publications, 2000
6. P.K.Nag, "**Power Plant Engineering**" 3rd Edition, Tata McGraw-Hill Education, 2002

U15CHE304 ENVIRONMENTAL SCIENCE AND ENGINEERING 3 0 0 3

Course Outcomes:

At the end of a study of the unit concerned, the student should be able to

1. State the importance of the acute need for environmental awareness and discuss significant aspects of natural resources like forests, water, mineral, food, energy and land resources
2. Explain the concepts of an ecosystem and provide an overview of biodiversity and its conservation
3. Define the various known kinds of environmental pollution and discuss their causes, effects and control measures
4. Give an account of the social issues with regard to the environment
5. Discuss the impact of human population on the environment

UNIT I INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES 12

Definition, Scope and Importance – Need for public awareness – Forest Resources:- Use and over - exploitation, deforestation, Case Studies, Timber Extraction, Dams, Benefits and their effects on forests and tribal people - Water Resources:- Use and Over-Utilization of Surface and ground water , Floods, Drought, Conflicts Over Water – Mineral Resources:- Use–Environmental Effects of Extracting and Using Mineral Resources – Food Resources: World Food Problems, Changes caused by Agriculture and Overgrazing, Effects of Modern Agriculture, Fertilizer- Pesticide Problems, Water Logging, salinity – Energy Resources:- Growing Energy Needs, Renewable and Non Renewable Energy Sources, Use of Alternate Energy Sources – Land Resources:- Land as a Resource, Land Degradation, Man Induced Landslides, Soil Erosion and Desertification – Role of an Individual in Conservation of Natural Resources.

UNIT II ECOSYSTEMS AND BIODIVERSITY 9

Concepts of an Ecosystem – Structure and Function of an Ecosystem – Producers, Consumers and Decomposers – Energy Flow in the Ecosystem – Biogeochemical Processes - Ecological Succession – Food Chains, Food Webs and Ecological Pyramids.

Introduction to Biodiversity – Definition: Genetic, Species and Ecosystem Diversity – Value of Biodiversity: Consumptive Use, Productive Use, Social, Ethical, Aesthetic and Option Values – Biodiversity at Global, National and Local Levels – India as a Mega-Diversity Nation – Hot-Spots of Biodiversity – Threats to Biodiversity: Habitat Loss, Poaching of Wildlife, Man-Wildlife Conflicts – endangered and Endemic Species of India – Conservation of Biodiversity: In-Situ and Ex-Situ conservation of Biodiversity.

UNIT III ENVIRONMENTAL POLLUTION 10

Definition – Causes, Effects and Control Measures of:- (A) Air Pollution - Climate Change, Global Warming, Acid Rain, Ozone Layer Depletion (B) Water Pollution (C) Soil Pollution (D) Marine Pollution (E) Noise Pollution (F) Thermal Pollution (G) Nuclear Hazards – Solid Waste Management:- Causes, Effects and Control Measures of Urban and Industrial Wastes, hazardous wastes and biomedical wastes – Role of an Individual in Prevention of Pollution – Pollution Case Studies – disaster Management:- Floods, Earthquake, Cyclone and Landslides, Waste water treatment methods, Green chemistry – principles and applications, Industrial safety measures – storage, handling and compatibility methods.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT 8

Sustainable Development – Urban Problems Related To energy – Water conservation, Rain Water Harvesting, Watershed Management – Resettlement and Rehabilitation of People, its Problems and Concerns – Environmental Ethics:- Issues and Possible Solutions –, Nuclear Accidents and Holocaust, Case Studies – Wasteland Reclamation – Environment Production Act – Air (Prevention and Control of Pollution) Act – Water (Prevention and Control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues Involved in enforcement of Environmental Legislation – Public Awareness.

UNIT V HUMAN POPULATION AND THE ENVIRONMENT 6

Population Growth, Variation Among Nations – Population Explosion – Family Welfare Programme – environment and Human Health – Human Rights – Value Education – HIV /AIDS – Women and Child Welfare – Role of Information Technology in Environment and Human Health – Case Studies.

TOTAL : 45 PERIODS

Text Books:

3. K. Karunakaran et al., "Environmental Science" Sonaversity, Sona College of Technology, Salem, 2016.
4. "Environmental Science and Engineering" by Anubha Kaushik and Kaushik, New Age International Publication, 4th Multicolour Edition, New Delhi, 2014.

Reference Books:

5. Masters, G.M., "Introduction to Environmental Engineering and Science", Pearson Education Pvt., Ltd., 2nd Edition, 2004.
6. Miller, T.G. Jr., "Environmental Science", Wadsworth Pub. Co.
7. Erach, B., "The Biodiversity of India", Mapin Publishing P.Ltd.,Ahmedabad, India.
8. Erach Bharucha, "Textbook of Environmental Studies for Undergraduate Courses", 2005, University Grands Commission, Universities Press India Private Limited, Hyderguda, Hyderabad – 500029.

U15FT301 TECHNOLOGY OF YARN MANUFACTURE 3 0 0 3

COURSE OBJECTIVE

To impart knowledge on objectives and principle of various processes and machineries involved in textile yarn manufacture like Ginning, Blow room, Carding, Drawing, Combing, Roving, Spinning, Doubling and details of Sewing thread and its manufacture, Fancy yarns, Special yarns and their applications.

COURSE OUTCOMES

At the end of the study of this course the students will be able to,

1. Describe the ginning, mixing and blending processes and also the machinery involved in blow room process.
2. State the objectives and explain the working and waste% of modern carding and combing machines.
3. List and explain the objectives, material passage, draft and production particulars of drawing and roving processes and the principle and types of auto levellers.
4. State the objectives and describe the working, speed and production particulars of Ring frame and also to explain briefly the Compact spinning, Rotor spinning, Friction spinning, Air-vortex spinning and SIRO spinning; the purpose of doubling process and TFO twister.
5. Discuss the quality requirements and fibres used in the manufacture, types and production process of sewing thread and briefly explain about fancy yarns and other special yarns for their types and end uses.

Unit-I Ginning, Opening and Cleaning 9

Ginning: Introduction, Objectives of ginning, Types of gins, Outline of the principle of knife roller gin.

Mixing and Blending: Purpose of mixing and blending, Differentiation between mixing and blending.

Blow Room: Objectives, Principles of opening and cleaning, , Construction and working of mixing bale opener, multi-mixer, step-cleaner; Brief study of scutcher, Waste percentage in blow room, Modern blow room lines for processing cotton, man-made fibres and their blends.

Unit-II Carding and Drawing 9

Carding: Objectives of carding, Basics of opening and fibre individualisation, Outline of the working of a modern high-production card, Card waste, chute feed system.

Drawing: Objects of draw frame, Basic principles of doubling and drafting, Description and outline of the working of a modern draw frame, Pre-comber and post-comber drawing processes,

Auto-levellers: Principle, Types and applications in carding and drawing.

Unit–III Combing and Roving 9

Combing: Differentiation between carded and combed yarns, , Brief study of comber lap preparation methods, Objectives of combing, Outline of the working of a modern comber, Comber waste percentage, Types of feed and their impact on comber waste percentage.

Roving: Objects of fly frame, Brief study of drafting system, Outline of the working of a modern speed frame, Concept of flyer lead and bobbin lead fly frames, speed and production particulars, roving TPI and hank.

Unit-IV Spinning and Doubling 10

Ring Spinning: Objects of ring frame, Outline of the working of a modern ring frame, Speed and production particulars, Yarn count and TPI

Modern spinning systems: Principle of yarn formation - Compact spinning, Rotor spinning, Friction spinning, Air-jet spinning and SIRO spinning, Properties and end uses of these yarns.

Doubling: Purpose of doubling, Dry and Wet doubling, Doubling twist, Outline of the working of Two-for-one twister, End uses of doubled yarn, Resultant count calculation.

Unit V Sewing Thread and Fancy Yarns 8

Sewing thread: Quality requirements, Fibres used in the manufacture, Types of sewing threads, Important properties, Production process, Selection of sewing thread, Ticket number, Leading brands of sewing threads.

Fancy yarn: Definition, Brief study of Slub yarn, melange yarn, Snarl yarn, , Spotted yarn, End uses of fancy yarn.

Other special yarns: Brief study of Core-spun yarn, metallic yarn, Hollow yarn, , applications of these yarns.

Total: 45 hours

TEXT BOOK

1. Lord P. R., **"Hand book of Yarn Production: Technology, Science and Economics",** The Textile Institute, Manchester, U.K., 2003.

REFERENCES

1. Klein W., "**A Practical Guide to Opening and Carding**", Vol. 2, The Textile Institute, Manchester, 1987.
2. Klein W., "**A Practical Guide to Combing and Drawing**", Vol. 3, The Textile Institute, Manchester, 1987.
3. Klein W., "**A Practical Guide to Ring Spinning**", Vol. 4, The Textile Institute, Manchester, 1987.
4. Klein W., "**New Spinning Systems**", Vol. 5, The Textile Institute, Manchester, 1993
5. Klein W., "**Man Made Fibres and their Processing**", Vol. 6, The Textile Institute, Manchester, 1994.
6. Chattopadhyay R. (Ed), "**Advances in Technology of Yarn Production**", NCUTE, IIT Delhi, 2002.
7. Gowda R.V.M., "**New Spinning Systems**", NCUTE, IIT Delhi, 2003.

U15FT302 FASHION ART AND DESIGN 3 0 0 3

COURSE OBJECTIVE

To enable students to define and discuss the terms related to fashion, art and design, the classification, types and life cycles of fashion, to grasp the colour theory and the portfolio presentation.

COURSE OUTCOMES

At the end of the study of this course the students will be able to,

1. Define and discuss the fashion, art and design related terms and the classification
2. Describe different types of fashion and life cycles of fashion.
3. Explain the elements and principles of the design, with the effects in the apparel.
4. Stretch an account of the various concepts of colour theory and the applications of colours.
5. Bounce out the theme and development of portfolio.

UNIT 1 **9**

INTRODUCTION TO FASHION ART DESIGN: Definition of Fashion, Art, Design, Costume and Clothing; Origin and history of Fashion, Art, Design, Clothing and costumes. Importance of Clothing, Types of clothing, Factors to be considered in the selection of clothing; Evolution of dress from painting, Cutting, Sculpture and wood carvings.

UNIT 2 **9**

CLASSIFICATION AND TYPES OF FASHION: Basics of Nature of Fashion, Environment of Fashion, Movements on Fashion, Business of Fashion, Theories of Fashion, Fashion trends, Chic, Boutique, Haute Couture.

Study of leading Fashion Designers: French, Italian, American, Indian and English; Role of Fashion Designers.

UNIT 3 **9**

ELEMENTS OF DESIGN: Introduction on basic Elements of design ---Line, Size, Shape, Texture, form, Colour and light - effects of elements in the apparel.

PRINCIPLES OF DESIGN: Introduction to principles of designs - Balance, Proportion, Emphasis, Rhythm, Harmony. Illusion effects, Principles on functionality and aesthetics.

UNIT 4 **9**

COLOUR: Colour Theories-- primary, secondary, tertiary, intermediate colors - color scheme - dimensions of colors - warm and cool colors, Tint and Shades, Psychology of colors, Application of colors to different components and in different seasons, Color combinations, colorcontrast, color harmony.

UNIT 5 **9**

DESIGN AND DEVELOPMENT: Designer boards - Mood board, fabric board, colour board, accessory board. Fashion illustration – illustration techniques – strokes, Hatching, shading; Colouring techniques – Medias for colouring. Portfolio presentation – communication, practicalities and style of presentation.

Total: 45 hours

TEXT BOOKS

1. Munslow, Janine, McKelvey, Kathryn “Fashion Design Process Innovation and Practice”, 2nd Edition , wiley , 2012.
2. Nicola White, Ian Griffiths, “The Fashion Business Theory, Practice, Image”, Berg, 2000.

REFERENCE BOOKS

1. Anderson B and Anderson C, “Costume Design”, Harcourt Brace Second Edition, 1990.
2. Caroline Tatham and Julian Seaman, “Fashion Designing and Drawing course” Thames and Hudson Publishers, 2003.
3. HarroldCarr,”Fashion Design and Product Development” John Wiley and Sons Inc. New York, 1992.

U15FT303 **PATTERN ENGINEERING** **3 0 0 3**

COURSE OBJECTIVE

To impart knowledge on work room terms and practices, measurements, Block preparation, Dart manipulation and drafting method for various components and garments, Draping and grading.

COURSE OUTCOMES

At the end of the study of this course the students will be able to,

1. Describe the various pattern making tools in the workroom and the measuring techniques
2. Explain the method of drafting basic body slopers and dart manipulation techniques
3. Describe the pattern drafting for sleeves, collars, yokes and cuffs
4. Draft block patterns for basic men's and women's garments
5. Explain the basic principles of grading and draping

Unit -I Measurements and Workroom Practices 9

Pattern: Definition, Importance, Types: basic pattern, working pattern and production pattern; **Pattern making:** Definition, Techniques: drafting and draping; Pattern making tools and workroom terms and definitions. Industrial and bespoke patterns.

Figure analysis: Head theory: Seven and Half and Eight.

Measuring techniques: Introduction; Standard Measurement charts for male, female and kids, Body measurements: circumference measurement, Vertical measurements and horizontal measurements and measuring the form.

Unit -II Block preparation and Dart manipulation 9

Drafting of basic bodice, Skirt blocks and sleeve

Dart manipulation: Pivotal method, Slash and spread method, Designing with darts, Tucks, Pleats, Flares, Gathers and Style lines, ease allowances, influence of allowances on garment fit.

Unit -III Sleeves and Collars 9

Sleeves: Set–in–sleeves: Plain, Puff, Bell, Bishop, Circular and Leg-o-mutton; Sleeves combined with bodice: Kimono, Dolman and Raglan.

Collars: Convertible, Shirt, Mandarin, Peter pan, Cape, Square, Scalloped, Sailor, Puritan, Shawl, and Notch collar.

Cuff: Shirt cuff, French cuff and Contoured cuff.

Yokes: Preparing patterns for yokes: Partial, Yoke without fullness, Yoke with fullness and Yoke supporting or releasing fullness.

Unit -IV Drafting for Garments 10

Drafting: Basic principles and methodologies used to draft block patterns for the following garments: Shirt, Trouser, Skirt, Blouse and Nightwear.

Pattern alterations: Importance, Principles and pattern alterations for blouse and trouser.

Computer applications in pattern making: Fundamentals of pattern making, grading and marker planning using CAD.

Unit -V Grading and Draping 8

Grading: Principles of pattern grading, Types: Draft grading: Two dimensional and Three dimensional grading, Track grading; Grading of basic back, Basic front, Basic sleeve and Basic collar.

Draping: Introduction, Importance, Preparation of dress forms, Preparation of muslin for draping; Draping for bodice and skirt, Advantages and disadvantages.

Total: 45 hours

TEXT BOOKS

1. Halen Josep Armstrong "Pattern Making for Fashion Design" 5 th Edition, Pretence Hall, New Jercey , 2014.
2. Claire Schaeffer, "**The Complete Book of Sewing Shortcuts**", Sterling Publishing(NY), 2009.

REFERENCE BOOKS

1. Winifred Aldrich, "**Pattern Cutting for Menswear**", 4th edition, Blackwell Science Publisher, USA, 2006.
2. Winifred Aldrich, "**Metric Pattern Cutting**", Om Book Service, 1997.
3. Gerry Cooklin, "**Master Patterns and Grading for Women's Outsize"**, Blackwell Scientific Publications,1995.
4. Gerry Cooklin, "**Master Patterns and Grading for Men's Outsize",** Blackwell Science Publications, 1992.
5. Helen Joseph Armstrong, "**Draping for Apparel Design**" , Fairchild Publications, Newyork, 2000.

COURSE OBJECTIVE

To impart practical knowledge on drafting and grading method for various components and garments

COURSE OUTCOMES

At the end of the study of this course the students will be able to,

1. Develop basic blocks
2. Explain and draft pattern for various components
3. Draft the patterns for various garments
4. Display awareness of grading methods for various garments

List of Experiments

I. Drafting of bodice blocks, Skirt blocks and sleeve block

II. Develop the pattern for the following components

1. **Sleeves:** Set–in–sleeves: Plain, Puff, Bell, Bishop, Circular and Leg-o-mutton; Sleeves combined with bodice: Kimono, Dolman and Raglan
2. **Collars:** Convertible, Shirt, Mandarin, Peter pan, Cape, Square, Scalloped, Sailor, Puritan, Shawl and Notch collar
3. **Cuff:** Shirt cuff, French cuff and Contoured cuff
4. **Necklines**
5. **Yokes:** Plain yoke

III. Develop the pattern and grade for the following garments

1. Baby frock
2. Blouse
3. Skirt and Top
4. Men’s Formal Shirt
5. Men’s Formal Trouser

Total: 45 hours

Pattern Making and Grading Lab
List of equipment required for a batch of 30- students for U.G

. No.	Name of the equipment / software	Quantity Required	Additional tools issued to individual students
1.	Cork Top Tables	15	L - scale
2.	**Dress forms**		Hip curve
3.	Male : 40”chest full	1	Meter Scale
4.	Male : 42”chest full	1	French Curve
5.	Male : adjustable half	1	Tracing wheel
6.	Male : 40”chest half	1	Measuring tape
7.	Female : 32.5” bust half	1	Tailor's Chalk
8.	Female : 32.5” bust full	1	Paper cutting scissors
9.	Female : 34.5” bust full	1	Fabric cutting scissors
10.	Female : 36.5” bust full with hand	1	$1/4^{th}$ Paper Scale
11.	Female : adjustable half	1	
	Mannequins		
12.	i. Baby		
	Boy – 80.5 cm	1	
	Girl – 88.8 cm	1	
	ii. Teenage Girls & Boys		
	Boy – 139 cm	1	
	Girl – 139cm	1	
	iii. Adults		
	Male -186 cm	1	
	Male -182.5 cm	1	
	Female -157.6 cm	1	
	Female -186 cm	1	
	Jewellery bust half head	1	
	Jewellery bust Indian face	1	
	Jewellery hand	2	
Total		**36**	

COURSE OBJECTIVE

To enable students to sketch the various elements and principles of designing, Draw fashion figures and visually communicate apparel design details, colour theory and various colour schemes, Illustrate different styles of garment components and reproduce it to fit fashion figures

COURSE OUTCOMES

At the end of the study of this course the students will be able to,

1. Develop the basic creative and manipulative skills necessary for fashion design through various shading techniques
2. Sketch the various elements and principles of designing
3. Examine the human anatomy, draw fashion figures and visually communicate apparel design details
4. Demonstrate an understanding of the colour theory using various colour schemes
5. Illustrate different styles of garment components and reproduce it to fit fashion figures

LIST OF EXPERIMENTS

1. Illustration of lines and strokes using pencil shading techniques; lettering and numbering styles
2. Illustration of elements of design
3. Illustration of principles of design
4. Illustration of human anatomy
5. Illustration of different postures of human head, hand, leg and feet
6. Illustration of different hair styles
7. Sketching of lay figure using head theory
8. Preparation of Prang's colour wheel
9. Preparation of different colour schemes
10. Rendering different fabric textures
11. Illustration of sleeves, cuffs, and necklines
12. Illustration of skirts, pockets, trousers, and skirt tops

Total: 45 hours