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

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit
Theory						
1	U15MAT301AR	Transforms and Partial Differential Equations	3	2	0	4
2	U15CE301R	Construction Materials and Practices	3	0	0	3
3	U15CE302R	Mechanics of Solids	3	2	0	4
4	U15CE303R	Surveying	3	0	0	3
5	U15CE304R	Fluid Mechanics	3	0	0	3
Practical						
6	U15CE305R	Computer Aided Building Drawing Laboratory	0	0	4	2
7	U15CE306R	Survey Laboratory	0	0	4	2
8	U15ENG301R	Communication Skills Laboratory	0	0	2	1
9	U15GE301R	Soft Skills and Aptitude-I	0	0	2	1
					Total Credits	**23**

Approved By

Chairperson, Civil Engineering BoS
Dr.R.Malathy

Member Secretary, Academic Council
Dr.R.Shivakumar

Chairperson, Academic Council & Principal
Dr.S.R.R.Senthil Kumar

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

U15MAT301AR	TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS	L	T	P	C
		3	2	0	4

COURSE OUTCOMES (On completion of the course, the students 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 pair, solve Z transform of certain functions, form the difference equation andhence 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 and solution of difference equations using Z-transform.

TOTAL (L:45+T:30): 75 PERIODS

TEXT BOOKS:

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. Anand Kumar ,Signals and Systems, Phi Learning, 3rd Edition, 2013
7. S. Palani, Signals and Systems by Ane Books Pvt. Ltd. First Edition, 2009
8. Ramesh Babu,Signals and Systems,SciTech Publications, 3rd Edition, 2013

		L	T	P	C
U15CE301R	**CONSTRUCTION MATERIALS AND PRACTICES**	**3**	**0**	**0**	**3**

COURSE OUTCOMES (On completion of the course, the students will be able to):

1. Familiarize the Building components and its function.
2. Select suitable type of concrete making materials.
3. Choose effective brick, timber, roofing materials in the field.
4. Practice various construction techniques in the field.
5. Understand the Function and location of doors, windows and stair case.

UNIT-I INTRODUCTION TO BUILDING CONSTRUCTION 9

General: Definition of Civil Engineering-Function of Civil Engineer-Division of Civil Engineering- Types of structure - Components of building and its function. Site planning: Precaution in selection of sites- Situations and surrounding of site for various types of building-Procedure for site analysis. Sub structure: Functional requirement of a foundation- Bearing capacity of soil- Types of foundation and their construction-Suitability. Super structures: Masonry structures-Framed structures: Components of building and its function.

UNIT-II CONCRETE MAKING MATERIALS 9

Aggregate: Classification: Fine aggregate-Bulking of sand-Fineness modulus-Types-Properties-Coarse aggregate-Properties-Testing. Binding material: Cement-Manufacturing process-Types and grade-Testing-Storage of cement.

UNIT-III MISCELLANEOUS MATERIALS 9

Bricks: Brick earth-Composition-Manufacturing process-Classification-Testing. Timber: Market forms and Industrial products-Properties-Seasoning and Preservative treatment. Ferrous materials: Iron and steel-Composition -Manufacturing process-Market forms: Reinforcing: Grades and Sizes-Applications; Structural steel-Shapes-Applications. Flooring and roofing: Materials-Suitability-Types. Pipes: Types-Sizes-Application.

UNIT-IV CONSTRUCTION PRACTICES 9

Specifications -Construction co-ordination -Site clearance and marking -Setting out foundation plan on ground - Damp proofing-Masonry: Bonds - Brick masonry-Stone masonry-Plastering and Pointing- Flooring: Joints; Form works: Centering and shuttering - Scaffoldings, shoring and underpinning.

UNIT-V MISCELLANEOUS CONSTRUCTION PRACTICES 9

Lintel: Functions of lintel and sunshade-Types of lintel; Arches: Construction-Elements-Classification. Doors and Windows: Technical terms-Types and their suitability. Stair and stair cases:Terminology-Location and classification of stairs-Requirement of good stair.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Rajput R K., “Engineering Materials”, S Chand and Company Ltd, 2014.
2. Arora S.P and Bindra S.P, “Building Construction”, Dhanpat Rai Publications (P) Ltd, 2015.

REFERENCES:

1. Shetty M.S, “Concrete Technology Theory and Practice”, S. Chand and Company Ltd, New Delhi, 2014.
2. Punmia B.C, “Building Construction”, Laxmi Publication, New Delhi, 2016.
3. Sahu G.C., Joygopal Jena., “Building Materials and Construction”, Mc Graw Hill Education (India) Private Limited, New Delhi, 2015.

U15CE302R	MECHANICS OF SOLIDS	L	T	P	C
		3	2	0	4

COURSE OUTCOMES (On completion of the course, the students will be able to):

1. Learn the internal stress acting in the system and understand the behavior of the system under all the types of forces.
2. Comprehend the state of stresses and strains in various structural components under all types of forces.
3. Draw the Shear force and bending moment diagrams for beams subjected to all the types of loading.
4. Familiarize the behavior of beam under flexure and shear.
5. Ideas of torsional stresses and how to evaluate it in circular sections and its applications in spring analysis.

UNIT-I STRESS AND STRAIN AT A POINT 15

Introduction-Assumption made in strength of materials-Classification of materials-Stress and strain: Types; Elastic limit-Hooke's law; Stress strain curves: Brittle material-Ductile material: Mild steel- High strength steel-Determination of yield stress and Young's modulus; Elastic constants and its relation-Volumetric strain.

UNIT-II ANALYSIS OF SIMPLE SYSTEMS AND STRAIN ENERGY 15

Analysis of bars of varying sections; Principles of superposition; Analysis of bars of composite sections subjected to normal and thermal stress. Strain energy and strain energy density-Strain energy due to: Axial load-Suddenly applied load-Impact load.

UNIT-III SHEAR FORCE AND BENDING MOMENT 15

Beams: Types of supports and its reaction-Types of beams-Types of loads-Shear force and bending moment: Statically determinate beams subjected to transverse loading (point load and uniformly distributed load)-Shear force diagram-Bending moment diagram: Point of contra flexure.

UNIT-IV BENDING AND SHEAR STRESSES IN BEAMS 15

Theory of simple bending-Assumptions and derivation of simple bending equation-Flexural rigidity- Bending and shear stress distribution diagram: Rectangle-Circle-Symmetric I section.

UNIT-V TORSION IN A CIRCULAR SHAFT AND SPRINGS 15

Theory of simple torsion-Assumptions and derivation of torsion equation - Torsion rigidity - Polar modulus - Torsion in solid and hollow circular shafts-Power transmitted by a shaft. Closed coiled helical springs under axial load and axial twist-Laminated springs.

TOTAL (L:45+T:30): 75 PERIODS

TEXT BOOKS:

1. Rajput R.K, "Strength of Materials", S.Chand and Co, New Delhi, 2014.
2. Bansal R.K, "Strength of Materials", Laxmi Publications, New Delhi, 2017.

REFERENCES:

1. Chandramouli P.N, "Fundamentals of Strength of Materials", PHI Learning Private Limited, New Delhi, 2013.
2. Subramanian R, "Strength of Materials", Oxford University Press, New Delhi, 2010.

U15CE303R	SURVEYING	L	T	P	C
		3	0	0	3

COURSE OUTCOMES (On completion of the course, the students will be able to):

1. Conduct linear and angular measurement survey with the help of chain, tape and compass.
2. Determine the horizontal and vertical distance by traversing using theodolite and measure difference in elevation and produce reduced level of the given points.
3. Describe the methods of setting out curves in the field and to determine the area and volume of structures.
4. Handle total station instrument for making the horizontal and vertical measurements
5. Conduct the global positioning system for determining geographical location of the site.

UNIT-I CHAIN AND COMPASS SURVEYING 9

Principles and Concepts: Chaining and Ranging - Compass - Prismatic compass - Surveyor's Compass - Bearing systems and Conversions - Traversing - Local attraction - Magnetic Declination and Dip.

UNIT-II LEVELLING 9

Leveling: Types of instruments-Bench marks - Temporary and permanent adjustments-Types of Levelling- Methods of Leveling. Contours: Contouring - Methods - Characteristics and uses of contours -Calculation of Areas and Volumes by Trapezoidal and Simpson's rule.

UNIT-III THEODOLITE AND TACHEOMETRIC SURVEY 9

Theodolite - Description and uses - Horizontal angles - Heights and distances –Traversing. Tachometric systems - Tangential and stadia systems - Horizontal and inclined sights - Vertical and normal staff - Stadia constants- Anallatic lens.

UNIT-IV CONTROL AND ENGINEERING SURVEY 9

Horizontal and vertical control points-Triangulation-Signal-Instrument and Accessories - Well-conditioned triangles. Curves: Horizontal and vertical curves-Types and uses of curves.

UNIT-V DIGITAL SURVEY 9

Total station - Basic principle-Electro-optical system: Measuring principle - Working principle- Sources of error- Care and maintenance. EDM-Types of EDM instruments -Measuring and working principle. Basic concepts-Different segments-Space, Control and user segments-Satellite configuration- Anti spoofing and selective availability.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Punmia B.C, "Surveying, Vol. I and II", Laxmi Publications, 2016.
2. Basak N.N, "Surveying and Levelling", Tata Mc Graw Hill Publishing Company Ltd., New Delhi, 2014.

REFERENCES:

1. Arora K. R, "Surveying Vol. I and II", Standard Book House, 2015.
2. Duggal S.K, "Surveying Vol. I and II", Tata McGraw Hill, New Delhi, 2013.
3. Kanetkar T.P, "Surveying and Levelling Vols. I and II", United Book Corporation, Pune, 2014.

U15CE304R	FLUID MECHANICS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES(On completion of the course, the students will be able to):

1. Measure the basic properties of fluid.
2. Understand the concepts of statics and dynamics of fluid flow.
3. Compute the major and minor losses occurring in pipe flow.
4. Understand the concepts of boundary layer problem.
5. Physical laws in addressing problems in hydraulics

UNIT-I DEFINITION AND FLUID PROPERTIES 9

Definitions-Fluid and fluid mechanics-Dimensions and units-Fluid properties: Density, specific weight, specific volume, specific gravity, temperature, viscosity, compressibility, vapour pressure, capillarity and surface tension-Continuum concept of system and control volume.

UNIT-II FLUID STATICS & KINEMATICS 9

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 9

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 9

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 analysis.

UNIT-V SIMILITUDE AND MODEL STUDY 9

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

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Bansal R.K., "Fluid Mechanics and Hydraulic Machines", Laxmi Publications, New Delhi, 2017.
2. Rajput R.K., "Fluid Mechanics and Hydraulic Machines", S. Chand Publishing Ltd, New Delhi, 2013.

REFERENCES:

1. Kumar K.L, "Engineering Fluid Mechanics", Eurasia Publishing House Pvt. Ltd, New Delhi, 1995.
2. Modi P.N and Seth, "Hydraulics and Fluid Mechanics including Hydraulic Machines", Standard Book House New Delhi. 2004.
3. Subramanya K, "Fluid Mechanics and Hydraulic Machines-Problems and Solutions", Tata McGraw Hill Education, New Delhi, 2010.

U15CE305R	COMPUTER AIDED BUILDING DRAWING LABORATORY	L	T	P	C
		0	0	4	2

COURSE OUTCOMES (On completion of the course, the students will be able to):

1. Apply the principles of planning and bylaws used for building planning.
2. Draw plan, elevation and section for various structures.
3. Apply the technical concepts and ways to solve engineering problems by conducting experiments.

COURSE CONTENT S

Industrial Lectures:

Introduction to Building Planning: Types of buildings-Building regulations as per Indian standards-Provisions of national building code-Building bye-laws-Open area-Setbacks -Principles of planning-Orientation-Ventilation and lighting. Minimumstandard dimensions of building elements: Area limitation- Floor area ratio- Floor space index- Setback distances-Open spaces.

Preparation of building plan: Site plan-Line plan-Detailed plan-Sectional view and elevation-Preparation of blue print-Contents of plan-Signing authority-Procedure for approval of plan. Introduction to Vastu sastra- Technical back ground.

Laboratory

Preparation of line sketches in accordance with functional requirements and building rules for the following types of building as per National Building Code:

Symbols of materials and sign convention
Preparation of plan for stair case room
Detailing of rain water harvesting and septic Tank
Flat roof residential building
Pitched roof residential building
Multi-storied building
Industrial Building
Sectional view for sub and super structures: Masonry and framed structures

Detailed Drawings (Plan, Elevation and section for the following) by using software:

Preparation of site plan, line plan and detailed plan
Flat roof building with load bearing wall
Framed structures
Elevation of flat and sloping roof
Preparation of working drawing: Plumbing and electric work

Three Dimensional: Introduction to three dimensional drawing (3D) - Isometric drawings-Wire-frame Models-Surfaces - Regions-Creation of 3D model of a simple residential building.

TOTAL: 60 PERIODS

U15CE306R	SURVEY LABORATORY	L	T	P	C
		0	0	4	2

COURSE OUTCOMES (On completion of the course, the students will be able to):

1. Use conventional surveying tools such as chain/tape, compass, dumpy level, theodolite in the field of civil engineering applications such as structural plotting and highway profiling.
2. Use modern surveying instruments like total station and GPS.
3. Apply the technical concepts and ways to solve engineering problems by conducting experiments.

COURSE CONTENT S

1. Measurement of given area using chain and cross staff survey.
2. Measurement of bearings and calculation of included angles using prismatic and surveyors compass.
3. Reduction of levels - height of collimation and rise and fall method.
4. Measurement of horizontal and vertical angle using theodolite.
5. Measurement of height and distance by single plane method.
6. Measurement of height and distance using stadia and tangential system of tachometry.
7. Setting out of a simple curve using linear method.
8. Setting out of foundation for a given building.
9. Calculation of latitude and longitude using GPS.
10. Measurement of angles, height and area using total station.

TOTAL: 60 PERIODS

U15ENG301R	COMMUNICATION SKILLS LABORATORY (Lab / Practical Course)	L 0	T 0	P 2	C 1

COURSE OUTCOMES (On completion of the course, the students will be able to):

1. Communicate confidently and effectively
2. Demonstrate active listening skills
3. Practice soft skills and interpersonal skills to excel in their jobs.
4. Use language efficiently to face interviews, participate in group discussions and present speeches.

COURSE CONTENT S

1. Listening Comprehension: Listening and typing – listening and sequencing of sentences – Filling in the blanks – Listening and answering questions.
2. Reading Comprehension: Filling in the blanks – Cloze exercises – Vocabulary building – Reading and answering questions.
3. Speaking: Phonetics: Intonation – Ear training – Correct Pronunciation – Sound recognition exercises – Common errors in English.
4. Conversations: Face to Face Conversation – Telephone conversation – Role play activities (Students take on roles and engage in conversation)
5. Making presentations: introducing oneself – introducing a topic – answering questions – individual presentation practice
6. Creating effective PPTs – presenting the visuals effectively
7. Using appropriate body language in professional contexts – gestures, facial expressions, etc.
8. Preparing job applications - writing covering letter and résumé
9. Applying for jobs online - email etiquette
10. Participating in group discussions – understanding group dynamics - brainstorming the topic – mock GD
11. Training in soft skills - persuasive skills – people skills - questioning and clarifying skills
12. Writing Project proposals: collecting, analyzing and interpreting data / drafting the final report
13. Attending job interviews – answering questions confidently
14. Interview etiquette – dress code – body language – mock interview

TOTAL: 30 PERIODS

REFERENCE BOOKS:

1. Dhanavel, S.P. 2010. English and Soft Skills. Hyderabad: Orient BlackSwan Ltd.
2. Corneilssen, Joep. How to Prepare for Group Discussion and Interview. New Delhi: Tata-McGraw-Hill, 2009.
3. D'Abreo, Desmond A. Group Discussion and Team Building. Mumbai: Better Yourself Books, 2004.
4. Ramesh, Gopalswamy, and Mahadevan Ramesh. The ACE of Soft Skills. New Delhi: Pearson, 2010.
5. Gulati, Sarvesh. Corporate Soft Skills. New Delhi: Rupa and Co. 2006.
6. Van Emden, Joan, and Lucinda Becker. Presentation Skills for Students. New York: Palgrave Macmillan, 2004.
7. Turton, N.D and Heaton, J.B. Dictionary of Common Errors, Addision Wesley Longman Ltd., Indian reprint1998.

EXTENSIVE READING

1. Covey, Stephen R. The 7 Habits of Highly Effective People. New York: Free Press, 1989.
2. Bagchi, Subroto. The Professional. New Delhi: Penguin Books India, 2009.

TOTAL: 30 PERIODS

Semester-III	U15GE301R:SOFT SKILLS AND APTITUDE – I	L	T	P	C	Marks
		0	0	2	1	100

Course Outcomes

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

1. Demonstrate capabilities in specific soft-skill areas using hands-on and/or case-study approaches
2. Solve problems of greater intricacy than those in BA-I and II in stated areas of quantitative aptitude and logical reasoning
3. Demonstrate higher than BA-I and II levels of verbal aptitude skills in English with regard to specific topics

1.Soft Skills	**Demonstrating soft-skill capabilities with reference to the following topics**: a. Attitude building b. Dealing with criticism c. Innovation and creativity d. Problem solving and decision making **e.** Public speaking **f.** Group discussions
2. Quantitative Aptitude and Logical Reasoning	**Solving problems with reference to the following topics:** a. Numbers: Finding units digit, Power rule b. Base system – Progressions: Arithmetic, geometric and harmonic c. HCF and LCM d. Averages e. Percentages f. Ratio and proportion g. Ages h. Partnership i. Profit and loss j. Mensuration: Area, perimeter, volume and Surface area k. Coding and Decoding: Numbers, alphabet, alphanumeric coding and Artificial language l. Direction Sense m. Symbols and series: Numbers, alphabet, symbols, pictures and alphanumeric n. Seating arrangement
3. Verbal Aptitude	**Demonstrating English language skills with reference to the following topics:** a. Verbal analogy b. Tenses c. Prepositions d. Reading comprehension e. Choosing correct / incorrect sentences f. Describing pictures

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

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit
Theory						
1	U15MAT301DR	Transforms and Boundary value problems	3	2	0	4
2	U15ME301R	Engineering Thermodynamics	3	0	0	3
3	U15ME302R	Strength of Materials	3	0	0	3
4	U15ME303R	Fluid Mechanics	3	0	0	3
5	U15ME304R	Manufacturing Technology-II	3	0	0	3
6	U15CHE304R	Environmental Science and Engineering	3	0	0	3
Practical						
7	U15ME305R	Strength of Materials Laboratory	0	0	2	1
8	U15ME306R	Fluid Mechanics Laboratory	0	0	2	1
9	U15ME307R	Manufacturing Technology Laboratory-II	0	0	4	2
10	U15GE301R	Soft Skills and Aptitude-I	0	0	2	1
					Total Credits	**24**

Approved By

Chairperson, Mechanical Engineering BoS **Member Secretary, Academic Council** **Chairperson, Academic Council & Principal**
Dr.D.Senthilkumar **Dr.R.Shivakumar** **Dr.S.R.R.Senthil Kumar**

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

Course Code	**U15MAT301DR**	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 6

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 6

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 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** L 9 T 6

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 6

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: 75

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	**U15ME301R**	L	T	P	C
Course Name	**ENGINEERING THERMODYNAMICS**	3	0	-	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 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

Basic concepts -thermodynamics concept of continuum, macroscopic approach, Thermodynamic systems and control volume. Properties, state, path process and cycles, quasi-static process, work, modes of work, Zeroth law of thermodynamics – concept of temperature and heat. Concept of ideal and real gases. First law, internal energy, specific heat capacities, enthalpy, steady flow process with reference to various thermal equipments-applied to flow and non-flow processes (Problems only on single processes).

Unit II SECOND LAW OF THERMODYNAMICS AND ENTROPY L 9

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

Unit III PROPERTIES OF PURE SUBSTANCE L 9

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 (Problems only on single processes). Determination of steam quality.

Unit IV GAS MIXTURES AND THERMODYNAMIC RELATIONS L 9

Gas mixtures – 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

Psychrometry, properties of atmospheric air and psychrometric charts, air conditioning processes- Sensible heating and cooling, humidification and dehumidification, heating and humidification, cooling and dehumidification, exchange processes. Adiabatic mixing, evaporative cooling.

Total Number of hours: 45

Learning Resources

Text Books

1. Chattopadhya,P. Engineering Thermodynamics, Oxford university press, New Delhi,2016.
2. Cengel, 'Thermodynamics – An Engineering Approach' eighth Edition, Tata McGraw Hill, New Delhi, 2014.

Reference Books

1. Nag.P.K., "Engineering Thermodynamics", Tata McGraw-Hill, New Delhi, 2015.
2. Holman.J.P., "Thermodynamics", 4th Ed. McGraw-Hill, 2008.
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, 2004.

Course Code	**U15ME302R**	L	T	P	C
Course Name	**STRENGTH OF MATERIALS**	3	-	-	3

Pre-requisite subjects: Engineering Physics, Engineering Mechanics

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 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 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, Sixth Edition, 2017.
2. SS Rattan, '' Strength of Materials'', McGraw Hill Education (India) Private Limited. Chennai, Third Edition, 2017

Reference Books

1. Robert L Mott and Joseph A. Untener, ''Applied Strength of Materials'', CRC Press, Sixth Edition , 2016.
2. Popov E.P, "Engineering Mechanics of Solids", Prentice-Hall of India, New Delhi , Second Edition 2012.
3. R K Rajput, "Strength of Materials", S Chand & Co., New Delhi, Sixth Edition 2015.
4. Nash W.A, "Theory and problems in Strength of Materials", Schaum Outline Series, McGraw-Hill Book Co, New York, 1995.
5. Singh D.K "Mechanics of Solids" Pearson Education 2002.
6. Ryder G.H, "Strength of Materials", Macmillan India Ltd., Third Edition, 2002.

Course Code	U15ME303R	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 Discuss the fundamental concepts of compressible flow and derive 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, Venturimeter. Pitot tube.

Unit III 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: 45Learning 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, 2017.
2. Modi P.N. and Seth, S.M. "Hydraulics and Fluid Mechanics", Standard Book House 20th edition, New Delhi 2015.
3. Streeter, V. L. and Wylie E. B., "Fluid Mechanics", McGraw Hill Publishing Co. 2010.9th edition.
4. Kumar K. L., "Engineering Fluid Mechanics", Eurasia Publishing House(p) Ltd., New Delhi 2004.
5. Ramamritham. S, Hydraulics, Fluid Mechanics and Fluid Machines, Dhanpat Rai & Sons, Delhi, edition 2012.
6. Yahya S.M. Fundamentals of Compressible Flow with Aircraft and Rocket Propulsion. 5th edition New Age international publishers, 6th edition 2018.

		L	T	P	C
Course Code	**U15ME304R**				
Course Name	**MANUFACTURING TECHNOLOGY - II**	3	-	-	3

Pre-requisites subject: Manufacturing technology-I

Course Outcomes

Upon completion of this course the students will be able to

CO1 Explain the major concepts of material removal process and characterization of tool wear and its types.

CO2 Make clear the cutting tool materials and its specific purpose and explain about lathe details, main dissimilarity of capstan and turret lathes.

CO3 Acquire knowledge about principle of reciprocating machine tools and its operating mechanisms.

CO4 Explain the working principle of abrasive processes and grinding process.

CO5 Acquire knowledge about principles of surface coating treatments.

Unit I THEORY OF METAL CUTTING L 9 T 0

Introduction: material removal processes, classification of machine tools – nomenclature of single point cutting tool- chip formation, orthogonal cutting, oblique cutting- shear angle in orthogonal cutting- cutting tool materials, tool wear and its types, Taylors tool life, factors affecting tool life - surface finish, cutting fluids.

Unit II CENTRE LATHE AND SPECIAL PURPOSE LATHES L 9 T 0

Centre lathe: constructional features- various operations, tool and work holding devices- taper turning methods, thread cutting, special attachments. Special Purpose Lathe: Capstan and turret lathes – automats – single spindle- Swiss type- automatic screw type, multi spindle - geneva mechanism, Bar feed mechanism.

Unit III SPECIAL MACHINE TOOLS L 9 T 0

Construction, Types, Operations and mechanisms of Shaper, Planner and Slotter. Hole making : drilling –Reaming, Boring- Tapping- operations. Broaching machines: broach construction – push, pull, surface and continuous broaching machines.

Unit IV MILLING AND GEAR PROCESS L 10 T 0

Milling operations-types of milling cutter. Gear cutting – forming and generation principle and construction of gear milling, hobbing and gear shaping processes –finishing of gears. Grinding: types of grinding process- types of grinding wheel – Abrasives - cylindrical grinding, surface grinding, Centre less grinding – honing, lapping and buffing.

Unit V SURFACE PROCESSING L 8 T 0

Chemical Cleaning-Mechanical Cleaning-Surface-treatment, Organic coating Electroplating-Electro less Plating-Electro forming- Hot dipping-chemical conversion coating- anodizing of metals -Physical vapour deposition-chemical vapour deposition- - Application.

Total Number of hours: 45

Learning Resources

Text Books

1. Mikell P Groover, “Principles of Modern Manufacturing” Wiley India Pvt Ltd. 2014.
2. Hajra Choudry, “Elements of Work Shop Technology – Vol. II”, Media Promoters & Publishers pvt ltd .2010

Reference Books

1. P.N. Rao, “Manufacturing Technology: Metal Cutting and Machine Tools, Volume 2”
2. Published by Tata McGraw-Hill Education Pvt. Ltd (2013)
3. B.L. Juneja,G.S. Sekhon, Nitin Seth, “Fundamentals of Metal Cutting and Machine Tools” Published by New Age International (P) Limited (2014)
4. P.C. Sharma, “A Text Book of Production Engineering”, S. Chand and Company Ltd, revised edition, 2011.
5. Milton C.Shaw, ‘Metal Cutting Principles’, Oxford University Press, Second Edition, 2005.
6. Rajput R.K, ‘A text book of Manufacturing Technology’, Lakshmi Publications, 2007.
7. HMT – “Production Technology”, Tata McGraw-Hill, 2003.

Course Code	**U15CHE304R**	L T P C
Course Name	**ENVIRONMENTAL SCIENCE AND ENGINEERING**	3 - - 3

Pre-requisites subject: Nil
Course Objectives:

At the end of a study of the unit concerned, the student should 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 and to describe the safe disposal of hazardous wastes and waste water treatment.
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 (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

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 –- 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.

TOTAL : 45 PERIODS

Text Books:

1. S. Radjarejesri et al., "Environmental Science" Sonaversity, Sona College of Technology, Salem, 2018.
2. Anubha Kaushik and Kaushik, "Environmental Science and Engineering" 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. Erach Bharucha, "Textbook of Environmental Studies for Undergraduate Courses", 2005, University Grands Commission, Universities Press India Private Limited, Hyderguda, Hyderabad – 500029.

		L	T	P	C
Course Code	**U15ME305R**				
Course Name	**STRENGTH OF MATERIALS LABORATORY**	-	-	2	1

Course Outcomes

Upon completion of this course the students will be able to

CO1 Demonstrate the working principles of tension testing methods of mild steel and thin wire Engineering components, compression test.

CO2 Explain 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.

CO3 Discuss the bending moments of different beams under load conditions.

Total Hours 25

LIST OF EXPERIMENTS

1. Tension test on MS rod.
2. Compression test – Bricks & Concrete cubes.
3. Double shear test in UTM.
4. Deflection test – Cantilever & Simply supported beam
5. Impact test – Charpy & Izod
6. Hardness test on various materials (Rockwell & Brinell)
7. Tests on spring – Tension & Compression

List of Equipment's (for a batch of 30 students)

1. Universal testing machine.
2. Compression testing machine.
3. Shear testing machine.
4. Deflection testing machine.
5. Rockwell hardness tester.
6. Brinell hardness tester.
7. Impact testing machine.
8. Compression and tension test on spring machine.

		L	T	P	C
Course Code	**U15ME306R**				
Course Name	**FLUID MECHANICS LABORATORY**	-	-	2	1

Course Outcomes

Upon completion of this course the students will be able to

- Understand the working principles of flow measuring instruments
- Determine the Coefficient of discharge of orifice/venturi meters.
- Analyze the energy losses in flow through pipes.

Total Hours 25

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 Equipment's (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

Course Code	U15ME307R	L	T	P	C
Course Name	MANUFACTURING TECHNOLOGY LABORATORY-II	-	-	4	2

Pre-requisites subject: Manufacturing technology Laboratory

Course Outcomes

Upon completion of this course the students will be able to

CO1 Give practical hands on exposure to students in the various metal cutting operations using commonly used machine tools.

LIST OF EXPERIMENTS **Total Hours 45**

1. Exercises on Horizontal milling machine –gear generating.
2. Exercises on Vertical milling machine –key way generating.
3. Grinding of flat surface using surface grinder machine.
4. Grinding of cylindrical surfaces using cylindrical grinding machine.
5. Shaping operations- two or more Exercises (Round to square, Hexagonal Shape and dovetail)
6. Internal key way slotting in slotting machine.
7. Exercises on capstan or turret lathe and study of bar feed mechanism in automatic lathe
8. Tool and Cutter grinding machine- grinding various angles on single point tool.
9. Cutting Force measurement using dynamometer.
10. Tool wear measurement using tool maker's microscope.
11. Planner and gear hobbing machine – Demonstration.

List of Equipment's: (for a batch of 30 students)

1.	Turret and Capstan Lathes	-	1 No
2.	Horizontal Milling Machine	-	1 No
3.	Vertical Milling Machine	-	1 No
4.	Surface Grinding Machine	-	1 No
5.	Cylindrical Grinding Machine	-	1 No
6.	Shaper	-	2 Nos.
7.	Slotter	-	1 No
8.	Radial Drilling Machine	-	1 No
9.	Tool Dynamometer	-	1 No
10.	Tool Makers Microscope	-	1 No

Semester-III	U15GE301R:SOFT SKILLS AND APTITUDE – I	L T P C Marks 0 0 2 1 100

Course Outcomes

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

4. Demonstrate capabilities in specific soft-skill areas using hands-on and/or case-study approaches
5. Solve problems of greater intricacy than those in BA-I and II in stated areas of quantitative aptitude and logical reasoning
6. Demonstrate higher than BA-I and II levels of verbal aptitude skills in English with regard to specific topics

1.Soft Skills	**Demonstrating soft-skill capabilities with reference to the following topics**: g. Attitude building h. Dealing with criticism i. Innovation and creativity j. Problem solving and decision making **k.** Public speaking **l.** Group discussions
2. Quantitative Aptitude and Logical Reasoning	**Solving problems with reference to the following topics:** o. Numbers: Finding units digit, Power rule p. Base system – Progressions: Arithmetic, geometric and harmonic q. HCF and LCM r. Averages s. Percentages t. Ratio and proportion u. Ages v. Partnership w. Profit and loss x. Mensuration: Area, perimeter, volume and Surface area y. Coding and Decoding: Numbers, alphabet, alphanumeric coding and Artificial language z. Direction Sense aa. Symbols and series: Numbers, alphabet, symbols, pictures and alphanumeric bb. Seating arrangement
3. Verbal Aptitude	**Demonstrating English language skills with reference to the following topics:** g. Verbal analogy h. Tenses i. Prepositions j. Reading comprehension k. Choosing correct / incorrect sentences l. Describing pictures

Sona College of Technology, Salem

(An Autonomous Institution)

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

Branch: Electrical and Electronics Engineering

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit
Theory						
1	U15MAT301AR	Transforms and Partial Differential Equations	3	2	0	4
2	U15EE301R	Electronic Devices and Circuits	3	0	0	3
3	U15EE302R	Electromagnetic Theory	2	2	0	3
4	U15EE303R	Electrical Machines – I	3	0	0	3
5	U15EE304R	Network Analysis and Synthesis	2	2	0	3
6	U15CHE304R	Environmental Science and Engineering	3	0	0	3
Practical						
7	U15EE305R	Electronic Devices and Circuits Laboratory	0	0	4	2
8	U15EE306R	Electrical Machines Laboratory –I	0	0	4	2
9	U15GE301R	Soft Skills and Aptitude – I	0	0	2	1
					Total Credits	**24**

Approved By

Chairperson, Electrical and Electronics Engineering BoS **Member Secretary, Academic Council** **Chairperson, Academic Council & Principal**

Dr.S.Padma **Dr.R.Shivakumar** **Dr.S.R.R.Senthil Kumar**

Copy to:-

HOD/Electrical and Electronics Engineering, Third Semester BE EEE Students and Staff, COE

U15MAT301AR TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS 3 2 04

COURSE OUTCOMES

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

- 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.
- Describe the complex (or infinite) Fourier transform pairs, sine and cosine transforms pairs and their properties and apply Parseval's identity to evaluate integrals.
- 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.
- 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.
- 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 Hours

TEXT BOOKS:

1. "Transforms and Partial Differential Equations", Sonaversity, 2011.
2. Veerarajan.T, "Engineering Mathematics (For semester III)", 3rd Ed., 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 McGrawHill, 2007.
3. Glyn James, "Advanced Modern Engineering Mathematics", 3rd Ed., Pearson Education 2007.
4. Erwin Kreysizig, "Advanced Engineering Mathematics", 8th edition, Wiley India, 2007.

U15EE301R ELECTRONIC DEVICES AND CIRCUITS 3003

COURSE OUTCOMES:

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

- Describe the properties of semiconductor devices and various types of diodes.
- Design the hybrid models of configurations of BJT and its stability analysis.
- Discuss the operation of FET, MOSFET,UJT and IJBT.
- Analyze the performance of differential amplifiers and the concepts of feedback amplifiers and their characteristics.
- 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, photo transistor, opto-coupler.

UNIT II BIPOLAR JUNCTION TRANSISTOR ANALYSIS 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 – 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.

UNIT V MULTISTAGE AMPLIFIERS AND OSCILLATORS 9

Different coupling schemes in amplifiers – operation of RC coupled, transformer coupled and direct coupled amplifiers – conditions for oscillation – RC phase shift oscillator using transistor and FET- Hartley and Colpitts oscillators – Wein-Bridge oscillator – crystal oscillator.

Lecture: 45, Tutorial: 00, Total:45 Hours

TEXTBOOKS:

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, 5th edition, 2010.

REFERENCES:

1. Jacob Millman, CC Halkias and SathyabrathaJit, "Electronic Devices and Circuits", McGraw Hill, 2nd Edition, 2015.
2. Ramesh Babu, "Electronic Devices and Circuits", Scitech Publications**,** 2009.
3. Robert L.Boylestad, "Electronic devices and circuit theory", 2002.
4. 5. Robert B. Northrop, "Analysis and Application of Analog Electronic Circuits to Biomedical Instrumentation", CRC Press, 2004.

U15EE302R ELECTROMAGNETIC THEORY 2203

COURSE OUTCOMES:

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

- Describe various electromagnetic quantities in spatial distribution by various co-ordinate systems.
- Explain aboutelectric field intensity and electric flux density due to various charge distributions and also analyse the applications of Gauss's law.
- Analyse the concepts of magneto-statics for charge distributions and boundary conditions.
- Write the Maxwell's Equations in integral and differential form from basic concepts of electro-dynamic fields.
- Illustrate the concepts of electro-magnetic wave equation, wave propagation and poyntingtheorem.

UNITI 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.

UNITII 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 – series and parallel capacitance – capacitance of parallel conductors, capacitance of an isolated sphere, concentric sphere and coaxial cables.

UNITIII MAGNETOSTATICS 12

Lorentz law of force –Biot-Savart law – Amperes circuit 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 solenoid and toroid, coaxial cable, two transmission lines.

UNITIV 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.

UNITV ELECTROMAGNETIC WAVES 12

Derivation of electromagnetic wave equations – wave propagation in a conducting medium, lossless medium, good dielectrics and good conductors – skin effect – Brewster angle – Snell's law – Poynting theorem.

Lecture: 30; Tutorial: 30; Total: 60 Hours

TEXTBOOKS:

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

REFERENCES:

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, SudiptaMahapatra, "Principles of Electromagnetics", McGraw Hill Education (India) Private Limited,2nd Edition, 2015.
4. Joseph. A.Edminister, 'Schaum's Outline of Electromagnetics, Third Edition (Schaum'sOutlineSeries), Tata McGraw Hill, 2010

U15EE303R ELECTRICAL MACHINES – I 3 0 0 3

COURSE OUTCOMES

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

- Explain the fundamentals of energy conversion and single-phase transformer.
- Classify different types of polyphase connections and construction of polyphase transformer.
- Explain the constructional details and principle of operation of DC generator and analyse the performance under various operating conditions.
- Explain the constructional details and principle of operation of DC generator and analyse the performance under various operating conditions.
- Discuss various testing methods of DC machines and transformers.

UNIT I MAGNETIC CIRCUITS AND TRANSFORMER 9

Principle of energy conversion – basic magnetic circuit analysis, Faraday's law of electromagnetic induction – 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 – applications – simple problems.

UNIT II POLYPHASE TRANSFORMER 9

Three-phase transformers – principle – construction –polyphase connections – star, zig-zag, open-delta, Scott connection, Leblanc connection – three-phase to single-phase conversion – on-load tap changing – special transformers – variable frequency transformer, pulse transformer, high frequency transformer.

UNIT III 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 – simple problems.

UNIT IV DC MOTORS 9

Principle of operation – torque equation – electrical and mechanical characteristics of DC shunt, series and compound motors – power flow – starters – speed control – braking –applications – simple problems.

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 – simple problems.

Lecture: 45, Tutorial: 0, Total: 45 Hours

TEXTBOOKS:

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.

REFERENCES:

1. A.E. Fitzgerald, Charles Kingsley, Stephen.D.Umans, "Electric Machinery", Tata McGraw Hill Publishing Company Ltd, 2003.
2. SamarajitGhosh, "Electrical Machines", Pearson Education, second edition, 2008.
3. Stephen J Chapman, "Electric Machinery Fundamentals", Tata McGraw-Hill Education Private Ltd, Fifth Edition, 2012.
4. R.K.Rajput, "Direct current Machines", Laxmi Publications, 2007.

U15EE304R NETWORK ANALYSIS AND SYNTHESIS 2203

COURSE OUTCOMES:

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

- Analyse the transient response of circuits.
- Define various network topologies and analyse circuits.
- Solve and analyse one port and two port networks.
- Design of different types of filters.
- Synthesize 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 zeros – 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 Hours

TEXTBOOKS:

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.

REFERENCES:

1. Arumugam .M and Premkumar, “N, Electric Circuit Theory”, Khanna& Publishers, 1989.
2. Soni M.L and Gupta J.C, “Electrical circuit Analysis”, DhanpatRai and Sons, Delhi, 1990.
3. KuoF.F.,“Network Analysis and Synthesis”, Wiley International Edition, Second Edition, 1996.
4. BehrouzPeikari, “Fundamentals of Network Analysis & synthesis”, Jaico Publishing House, 2006

U15CHE304R 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

- 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.
- Explain the concepts of an ecosystem and provide an overview of biodiversity and its conservation.
- Define the various known kinds of environmental pollution and discuss their causes, effects and control measures and to describe the safe disposal of hazardous wastes and waste water treatment.
- Give an account of the social issues with regard to the environment.
- 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(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

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 –- 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: 00; Total: 45 Hours

TEXTBOOKS:

1. S. Radjarejesri et al., "Environmental Science" Sonaversity, Sona College of Technology, Salem, 2018.
2. AnubhaKaushik and Kaushik, "Environmental Science and Engineering" New Age International Publication, 4thMulticolour Edition, New Delhi, 2014.

REFERENCES:

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. ErachBharucha, "Textbook of Environmental Studies for Undergraduate Courses", 2005, University Grands Commission, Universities Press India Private Limited, Hyderguda, Hyderabad – 500029.

U15EE305R ELECTRONIC DEVICES AND CIRCUITS LABORATORY 0 0 4 2

COURSE OUTCOMES:

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

- Design h-model for the different configurations of BJT.
- Examine the characteristics of JFET, MOSFET, IGBT and UJT.
- Design for different modes of amplifiers and oscillators.

LIST OF EXPRIMENTS

1. Design of h-model of transistor with CE configuration.
2. Design of h-model of transistor with CB configuration.
3. Design of h-model of transistor with CC configuration.
4. Verify the characteristics of JFET and MOSFET.
5. Verify the characteristics of UJT
6. Verify the characteristics of IGBT.
7. Design of RC coupled 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 Hours

U15EE306R ELECTRICAL MACHINES LABORATORY – I 0 0 4 2

COURSE OUTCOMES

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

- Analyse the magnetization, internal and external characteristics of DC shunt and compound generator.
- Determine and draw the mechanical, electrical and performance characteristics of DC shunt, series and compound motor.
- Pre-determine the losses on no-load and determine the efficiency and regulation of transformer.

LIST OF EXPRIMENTS:

1. Analyse the open circuit and load characteristics on separately excited DC shunt generator.
2. Analyse the load characteristics on DC compound generator.
3. Analyse the load characteristics of DC shunt motor.
4. Analyse the load characteristics of DC series motor.
5. Analyse the load characteristics of DC compound motor.
6. Analyse the speed control on a DC shunt motor by field and armature control method.
7. Predetermine the efficiency of Swinburne's test and Hopkinson's test on DC motor-generator set.
8. Determine the efficiency on single-phase transformer.
9. Predetermine the efficiency of transformer by Sumpner's test and open circuit and short circuit tests on transformers.
10. Analyse the no-load losses in single-phase transformer by separation method.
11. Determine the efficiency of Scott connected transformer using load test.

Total: 60 Hours

Semester-III	U15GE301R:SOFT SKILLS AND APTITUDE – I	L	T	P	C	Marks
		0	0	2	1	100

Course Outcomes

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

7. Demonstrate capabilities in specific soft-skill areas using hands-on and/or case-study approaches
8. Solve problems of greater intricacy than those in BA-I and II in stated areas of quantitative aptitude and logical reasoning
9. Demonstrate higher than BA-I and II levels of verbal aptitude skills in English with regard to specific topics

1.Soft Skills	**Demonstrating soft-skill capabilities with reference to the following topics**: m. Attitude building n. Dealing with criticism o. Innovation and creativity p. Problem solving and decision making **q.** Public speaking **r.** Group discussions
2. Quantitative Aptitude and Logical Reasoning	**Solving problems with reference to the following topics:** cc. Numbers: Finding units digit, Power rule dd. Base system – Progressions: Arithmetic, geometric and harmonic ee. HCF and LCM ff. Averages gg. Percentages hh. Ratio and proportion ii. Ages jj. Partnership kk. Profit and loss ll. Mensuration: Area, perimeter, volume and Surface area mm. Coding and Decoding: Numbers, alphabet, alphanumeric coding and Artificial language nn. Direction Sense oo. Symbols and series: Numbers, alphabet, symbols, pictures and alphanumeric pp. Seating arrangement
3. Verbal Aptitude	**Demonstrating English language skills with reference to the following topics:** m. Verbal analogy n. Tenses o. Prepositions p. Reading comprehension q. Choosing correct / incorrect sentences r. Describing pictures

Sona College of Technology, Salem

(An Autonomous Institution)

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

Branch: Electronics and Communication Engineering

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit
Theory						
1	U15MAT301CR	Transforms and Linear Algebra	3	2	0	4
2	U15EC301R	Electronic Devices	3	0	0	3
3	U15EC302R	Network Analysis and Synthesis	3	2	0	4
4	U15EC303R	Digital System Design	3	0	0	3
5	U15EC304R	Signals and Systems	3	2	0	4
Practical						
6	U15EC305R	Electronic Devices Laboratory	0	0	2	1
7	U15EC306R	Digital Laboratory	0	0	2	1
8	U15ENG302R	English Laboratory	0	0	4	2
9	U15GE301R	Soft Skills and Aptitude - I	0	0	2	1
					Total Credits	**23**

Approved By

Chairman, Electronics and Communication Engineering BoS
Dr.R.S.Sabeenian

Member Secretary, Academic Council
Dr.R.Shivakumar

Chairperson, Academic Council & Principal
Dr.S.R.R.Senthil Kumar

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

U15MAT301CR	TRANSFORMS AND LINEAR ALGEBRA	L T P C 3 2 0 4

COURSE OUTCOMES

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

1. Explain the concepts of Fourier series and generation of Fourier series for different mathematical functions
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 its properties, state and apply convolution theorem of Z-transform to various functions, form and solve the difference equations.
4. Define and explain vector spaces, linear independence and dependence of vectors and dimension of vector spaces
5. Describe linear operator, state rank-nullity theorem and apply the same to solve problems

UNIT I	**FOURIER SERIES** Dirichlet's Conditions – General Fourier Series – Fourier Series of Odd and Even Functions – Fourier Series for Functions of Period 2L – Half Range Sine and Cosine Series – Practical Harmonic Analysis.	**15**
UNIT II	**PARTIAL DIFFERENTIAL EQUATIONS** Formation of 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 - Sums of Subspaces - Distributive Subspaces – Spans - Equality of Spans - Special Spans – Dependence and Independence of Vectors – Basis of a Vector Spaces – Dimensions of Vector Spaces	**15**
UNIT V	**LINEAR TRANSFORMATIONS** Linear Transformations - Domain and Range - Kernel - Composition - Range Inclusion and Factorization – Transformations as Vectors – Invertibility – Determinants-2x2 - 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 BOOKS

1. Ramana B.V, "*Higher Engineering Mathematics*", McGraw Hill Education (India) Pvt., Ltd., New Delhi, 2007
2. Seymour Lipschitz, Marc Lipson, "*Linear Algebra Schaum's outline series*", 4th Edition, 2005

REFERENCE BOOKS

1. Veerarajan.T., "*Engineering Mathematics*" 3rd Edition, Tata McGraw Hill, 2008
2. Erwin Kreysizig, "*Advanced Engineering Mathematics*", John Wiley and Sons, 10 e, 2010
3. Sharma J.N., Vasistha, "*Linear Algebra*", 11th Edition, Krishna Prakashan Media Pvt., Ltd., 2010
4. Paul R. Halmos, "*Finite Dimensional Vector Spaces*", Springer-Verlag, New York, 1958

U15EC301R	ELECTRONIC DEVICES	L T P C 3 0 0 3

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
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 –The Hall Effect – Diffusion & Drift Current – The Continuity Equation–PNJunction –Forward and Reverse Bias of PN Diode – 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.	**9**
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 – Common Emitter Current Gain – The Common Collector Configuration – Analytical Expressions for Transistor Characteristics –The Phototransistor.	**9**
UNIT III	**TRANSISTOR BIASING AND THERMAL STABILIZATION** The Operating Point – Bias Stability – Fixed Bias – Collector to Base Bias and Voltage Divider Bias – Stability Factor– Stabilization Against Variations in I_{CO}– V_{BE} and β –Bias Compensation — 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.	**9**
UNIT IV	**MOSFET AND SPECIAL DEVICES** 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 - Construction & Characteristics of UJT- SCR-TRIAC- DIAC.	**9**
UNIT V	**LOW AND HIGH FREQUENCY ANALYSIS OF BJT** 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–Single stage CE Transistor Amplifier Response – The Gain–bandwidth Product – Emitter Follower at High Frequencies.	**9**
	Total	**45**

TEXT BOOKS

1	Millman and Halkias, "*Integrated Electronics*", 2nd Edition, Tata Mc Graw Hill, 2010.
2	Anil K. Maini and Varsha Agrawal, "*Electronics Devices and Circuits*", First Edition, Wiley Publications, 2009.

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.

U15EC302R	NETWORK ANALYSIS AND SYNTHESIS	L T P C 3 2 0 4

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 the 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 – Source Transformations – Loop Variable in DC Analysis – Node Variable in DC Analysis –Star to Delta and Delta to Star Transformations- Duality – State Variable Analysis.	**15**
UNIT II	**TIME DOMAIN DC 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.	**15**
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.	**15**
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.	**15**
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.	**15**
	Total	**75**

TEXT BOOKS

1. M.E.VanValkenberg, "*Network Analysis*", Prentice Hall India, 3rd E, 2002
2. A. Sudhakar, Shyammohan S Palli, *"Circuits and networks Analysis &Synthesi"*, 4nd E,Tata McGraw Hill, 2010.

REFERENCE BOOKS

1. B. Somanathan Nair, S. R. Deepa, "*Network Analysis and Synthesis*", Reed Elsevier India Pvt. Ltd., 2012
2. F. F. Kuo, "*Network Analysis and Synthesis*", 2nd E, John Wiley, 2005
3. Charles A Desoer, Ernest S Kuh, "*Basic Circuit Theory*", McGraw Hill, 1969

U15EC303R	DIGITAL SYSTEM DESIGN	L T P C 3 0 0 3

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. Design and Implement a memory cell and programmable logic devices

UNIT I	**NUMBER SYSTEM, BOOLEAN ALGEBRA AND LOGIC GATES** Review of Number Systems – 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 – Tabulation method - NAND and NOR Implementation – XOR Functions – TTL – ECL – CMOS Logic Circuits – Fan-in – Fan-out.	**9**
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 – Demultiplexers -Introduction to Verilog – HDL Models for Combinational Circuits.	**9**
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.	**9**
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.	**9**
UNIT V	**MEMORY AND PROGRAMMABLE LOGIC** Classification of memories: RAM-ROM-PROM-EPROM-EEPROM - Memory Decoding – Implementation of combinational logic using PROM - Programmable Logic Array – Programmable Array Logic – HDL Implementation of Simple Test Bench for 4-bit Binary Adder .	**9**
	Total	**45**

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

U15EC304R	SIGNALS AND SYSTEMS	L T P C 3 2 0 4

COURSE OUTCOMES

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

1. Classify the signals as continuous time and discrete time signals and classify systems based on their properties
2. Determine the response of LTI system using convolution sum for DT system and Convolution Integral for CT system
3. Apply Fourier series and Fourier Transform for periodic Signals
4. Analyze system using Laplace transform and realize the structure for CT system
5. Analyze system using Z transform and realize the structure for DT system

UNIT I	**CLASSIFICATION OF SIGNALS AND SYSTEMS** Continuous-Time and Discrete-Time signals–The Unit Impulse Unit Step, Unit Ramp Signals and other Basic Signals – 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 – Causality – Stability – Time Invariance – Linearity.	**15**
UNIT II	**LINEAR TIME- INVARIANT SYSTEMS** Discrete-Time LTI system: TheConvolution sum-tabulation method-matrix multiplication method-graphical and analytical approach – Solution of Difference Equations. Continuous-Time LTI Systems: The Convolution Integral - graphical and analytical approach – Properties of Linear Time-Invariant Systems – Solution of Differential Equations.	**15**
UNIT III	**ANALYSIS OF CT SIGNALS USING FOURIER SERIES & FOURIER TRANSFORM** Fourier Series Representation(Trigonometric and Exponential) 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	**15**
UNIT IV	**ANALYSIS OF SIGNALS AND SYSTEMS USING LAPLACE TRANSFORM** The Laplace Transform – The Region of Convergence for Laplace Transform– The Inverse Laplace Transform using Partial fraction– Properties of the Laplace Transform–System Function and Block Diagram Representations-Direct Form I and Direct Form II.	**15**
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 using Partial fraction and Long division method– Properties of the Z-Transform – System Function and Block Diagram Representations-Direct Form I and Direct Form II.	**15**
	Total	**75**

TEXT BOOKS

1.	Alan V. Oppenheim, Alan S. Willsky, S. Hamid Nawab, "*Signals and Systems*", 2nd E, Prentice Hall India, 2010
2.	A.Anand Kumar, "*Signals and Systems*", 3rd Edition, Prentice Hall India,2013

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

U15EC305R	ELECTRONIC DEVICES LABORATORY	L T P C 0 0 2 1

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.

Exp.No.	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 analyze V-I Characteristics of given Si and Ge Diodes
3.	To draw and analyze 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 analyze the Input and Output Characteristics of BJT (NPN)
5.	To draw and AnalyzeFrequency Response of BJT (CE) using Fixed Bias Amplifier Circuit
6.	To draw and analyze Frequency Response of BJT (CE) using Voltage Divider Bias (self-bias) with and without bypassed Emitter Resistor (CE)
7.	To draw and analyze the Characteristics of N-channel JFET
8.	To draw and analyze the Characteristics of N-channel MOSFET
9.	To draw and analyze Characteristics of the following Special Diodes i. Tunnel diode ii. Photo diode iii. Light emitting diode

Total Hours: 30

U15EC306R	DIGITAL LABORATORY	L T P C 0 0 2 1

COURSE OUTCOMES

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

1. Design and implement combinational circuits using logic gates and breadboards
2. Design and implement sequential circuits using logic gates and breadboards
3. Write programs in Verilog HDL for structural, behavioral and data flow models for combinational and sequential circuits

Exp. No.	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) Magnitude 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) Multiplexer and Demultiplexer (b) Decoder (c) Encoder (d) 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) Basic gates – AND, OR, NOT, NAND, NOR, EXOR (b) Half Adder and Full Adder, Half Subtractor and Full Subtractor (c) Magnitude Comparator
7.	Write a Verilog HDL program for sequential circuits a) Flip Flops – SR, JK, T and D b) Asynchronous Counter c) Synchronous Counter

Total Hours: 30

U15ENG302R	ENGLISH LABORATORY	L T P C 0 0 4 2

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

Semester-III	U15GE301R:SOFT SKILLS AND APTITUDE – I	L	T	P	C	Marks
		0	0	2	1	100

Course Outcomes

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

10. Demonstrate capabilities in specific soft-skill areas using hands-on and/or case-study approaches
11. Solve problems of greater intricacy than those in BA-I and II in stated areas of quantitative aptitude and logical reasoning
12. Demonstrate higher than BA-I and II levels of verbal aptitude skills in English with regard to specific topics

1.Soft Skills	**Demonstrating soft-skill capabilities with reference to the following topics**: s. Attitude building t. Dealing with criticism u. Innovation and creativity v. Problem solving and decision making **w.** Public speaking **x.** Group discussions
2. Quantitative Aptitude and Logical Reasoning	**Solving problems with reference to the following topics:** qq. Numbers: Finding units digit, Power rule rr. Base system – Progressions: Arithmetic, geometric and harmonic ss. HCF and LCM tt. Averages uu. Percentages vv. Ratio and proportion ww. Ages xx. Partnership yy. Profit and loss zz. Mensuration: Area, perimeter, volume and Surface area aaa. Coding and Decoding: Numbers, alphabet, alphanumeric coding and Artificial language bbb. Direction Sense ccc. Symbols and series: Numbers, alphabet, symbols, pictures and alphanumeric ddd. Seating arrangement
3. Verbal Aptitude	**Demonstrating English language skills with reference to the following topics:** s. Verbal analogy t. Tenses u. Prepositions v. Reading comprehension w. Choosing correct / incorrect sentences x. Describing pictures

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

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit
Theory						
1	U15MAT301BR	Discrete Mathematics	3	2	0	4
2	U15CS301R	Data Structures	3	0	0	3
3	U15CS302R	Digital Principles and System Design	3	0	0	3
4	U15CS303R	Object Oriented Programming using C++	3	0	0	3
5	U15CS304R	Computer Organization and Architecture	3	2	0	4
6	U15CS305R	Data Structures and Object Oriented Programming Laboratory	0	0	4	2
7	U15CS306R	Digital Laboratory	0	0	4	2
8	U15GE301R	Soft Skills and Aptitude – I	0	0	2	1
9	U15ENG301R	Communication Skills Laboratory	0	0	2	1
					Total Credits	**23**

Approved By

Chairperson, Computer Science and Engineering BoS **Member Secretary, Academic Council** **Chairperson, Academic Council & Principal**
Dr.B.Sathiyabhama **Dr.R.Shivakumar** **Dr.S.R.R.Senthil Kumar**

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

U15MAT301BR DISCRETE MATHEMATICS 3 2 0 4

COURSE OUTCOMES:

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

- Construct truth tables and discuss the validity of the arguments
- Solve complicatedlogical problems
- Solve problems using lattices and Boolean algebra
- Apply the concept of functions to solve problems
- Apply the concepts of group theory and coding theory to solve problems

Unit - I Propositional Calculus 15

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 form, rules of inference, arguments, validity of arguments

Unit - II Predicate Calculus 15

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 15

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 15

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 15

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

Total: 75 hours

TEXT BOOK

1. Veerarajan T, "Discrete Mathematics" 1st Edition,Tata McGraw Hill,2008
2. 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

U15CS301R DATA STRUCTURES 3 0 0 3

COURSE OUTCOMES

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

- Apply various non-linear tree data structures in real time applications and projects
- Solve the collision problem using hashing techniques
- Implement and solve problems using heaps
- Design algorithms to solve common graph problems
- Identify the algorithms that are used to solve various problems

UNIT-I TREE STRUCTURE 9

Tree: Types of Trees - Binary Tree - Representation–Tree Traversals – Expression Trees - Threaded Binary Tree - Application of Trees- Set representation – Union and Find operations.

UNIT-II SEARCH STRUCTURES AND INDEXING 10

Binary Search Tree- AVL Tree - Red-Black Tree- Splay Tree - B-tree - B+ tree - Hashing - Hash functions – Collision resolution techniques: Separate chaining and open addressing.

UNIT-III HEAPS 9

Heap – Binary Heap – Application of Heaps: Binomial Heap - Fibonacci Heap – TRIE structure.

UNIT-IV GRAPHS 9

Graphs: Representation – Graph traversals – Minimum spanning trees: Prim's algorithm, Kruskal's algorithm – Shortest path algorithms: Dijkstra's algorithm, Floyd Warshall algorithm – Applications of Graphs: Topological sort.

UNIT-V INTRODUCTION TO ALGORITHM DESIGN TECHNIQUES[*] 8

Overview: Greedy Method - Divide and conquer - Dynamic Programming - Backtracking - Branch and bound.

Total: 45 hours

[*]Only introductory concepts need to be taught, problem solving will be done during IV semester Design and Analysis of Algorithms course

TEXT BOOK:

1. Ellis Horowitz, SartajSahni, Susan Anderson-Freed, “Fundamentals of Data Structures in C”, Silicon Press, New Jersey, Second Edition, 2005.

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. YedidyahLangsam, Moshe J Augenstein and Aaron M Tanenbaum, “Data Structures using C and C++”, Prentice Hall of India/ Pearson Education, New Delhi, 2006.
3. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C”, Pearson Education, New Delhi, Second Edition, 2012.
4. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, “Introduction to Algorithms”, 3rd Edition, MIT Press, 2010.

U15CS302R DIGITAL PRINCIPLES AND SYSTEM DESIGN 3 0 0 3

COURSE OUTCOMES

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

- Illustrate different methods used for the simplification of Boolean functions
- Design combinational and sequential logic circuits
- Design and implement shift registers and counters
- Analyze memory cells and apply this organization for larger memories
- Design synchronous and asynchronous sequential circuits

UNIT-I BOOLEAN ALGEBRA AND LOGIC GATES 9

Review of Binary Number Systems-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 SEQUENTIAL LOGIC 9

Flip flops -SR, JK, T, D– Characteristic table and equation –Application table - counters and its types– Modulo – n counter Register – shift registers- SISO, SIPO, PIPO.

UNIT V SYNCHRONOUS ANDASYNCHRONOUS SEQUENTIAL CIRCUITS 9

Design of Synchronous counters: state diagram- State table –State minimization –State assignment, Design of asynchronous sequential machines, Race-free state assignment, Hazards, Essential hazards –Hazards elimination.

Total: 45 Hours

TEXT BOOK:

1. M.Morris Mano, "Digital Design", 5th edition, Pearson Education, 2013.

REFERENCES

1. Albert Paul Malvino, Donald P. Leach,"Digital principles and applications, Seventh edition, Tata McGraw-Hill,2011.
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.

U15CS303R OBJECT ORIENTED PROGRAMMING USING C++ 3 0 0 3

COURSE OUTCOMES

At the end of the course, students 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 PRINCIPLES OF OOP 10

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 CLASSES AND OBJECTS 12

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 INHERITANCE 7

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 STREAMS 8

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 GENERIC PROGRAMMING WITH TEMPLATES 8

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.

REFERENCES

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

U15CS304R COMPUTER ORGANIZATION AND ARCHITECTURE 3 2 0 4

COURSE OUTCOMES:

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

- Demonstrate the operational concepts of computers and classify instruction set architectures
- Identify the mechanism of control signals generation in Hardwired control and micro programmed control unit
- Apply the various arithmetic operations and discuss the design of ALU
- Evaluate the performance of a pipelined processor
- Design the memory and I/O system requirements for any commercial processor.

UNIT-I BASIC STRUCTURE OF COMPUTERS 15

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 15

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 15

Signed and Unsigned number representations - Arithmetic operations: Addition and Subtraction – Fast Adders – Binary Multiplication – Booth algorithm-Binary Division – Floating Point Numbers – Representation and operations.

UNIT IV PIPELINING 15

Basic concepts – Data hazards – Instruction hazards – Influence on instruction sets – Data path and control considerations – Performance considerations – Exception handling-Introduction to Instruction Level Parallelism

UNIT V MEMORY AND I/O 15

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

TOTAL: 75 hours

TEXT BOOK:

1. Carl Hamacher, ZvonkoVranesic and SafwatZaky, "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

U15CS305R DATA STRUCTURES AND OBJECT ORIENTED PROGRAMMING LABORATORY 0 0 4 2

COURSE OUTCOMES

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

- Design programs using object oriented programming concepts in C++
- Implement recursive programs using trees, Heaps and graphs in C++
- Implement non-linear data structures for various real time applications in C++

List of experiments based on the following topics:

1. Classes and objects, friend functions and function overloading
2. Classes with default, parameterized, dynamic and copy constructors, destructor.
3. Overloading unary, binary operators using member functions
4. Inheritance and run time polymorphism
5. Sequential and random accessing of files.
6. Template functions and template class.
7. Exception handling mechanism.
8. Binary tree and traversal techniques.
9. Binary search tree.
10. Heaps structures.
11. Prim's and kruskal algorithm.
12. Dijkstra's algorithm
13. Hashing and collision resolution technique

TOTAL: 60 hours

U15CS306R DIGITAL LABORATORY 0 0 4 2

COURSE OUTCOMES

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

- Design and implement combinational circuits using basic gates
- Design shift register using flip flop
- Design and implement synchronous and asynchronous counter

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 ofEncoder / 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: 60 Hours

U15GE301R	SOFT SKILLS AND APTITUDE – I	0 0 2 1

COURSE OUTCOMES

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

13. Demonstrate capabilities in specific soft-skill areas using hands-on and/or case-study approaches
14. Solve problems of greater intricacy than those in BA-I and II in stated areas of quantitative aptitude and logical reasoning
15. Demonstrate higher than BA-I and II levels of verbal aptitude skills in English with regard to specific topics

1.Soft Skills	**Demonstrating soft-skill capabilities with reference to the following topics**: y. Attitude building z. Dealing with criticism aa. Innovation and creativity bb. Problem solving and decision making **cc.** Public speaking **dd.** Group discussions
2. Quantitative AptitudeandLogical Reasoning	**Solving problems with reference to the following topics:** eee. Numbers: Finding units digit, Power rule fff. Base system – Progressions: Arithmetic, geometric and harmonic ggg. HCF and LCM hhh. Averages iii. Percentages jjj. Ratio and proportion kkk. Ages lll. Partnership mmm. Profit and loss nnn. Mensuration: Area, perimeter, volume and Surface area ooo. Coding and Decoding: Numbers, alphabet, alphanumeric coding and Artificial language ppp. Direction Sense qqq. Symbols and series: Numbers, alphabet, symbols, pictures and alphanumeric **rrr.** Seating arrangement
3. Verbal Aptitude	**Demonstrating English language skills with reference to the following topics:** y. Verbal analogy z. Tenses aa. Prepositions bb. Reading comprehension cc. Choosing correct / incorrect sentences dd. Describing pictures

U15ENG301R COMMUNICATION SKILLS LABORATORY 0 0 2 1

COURSE OUTCOMES:

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

Communicate confidently and effectively

- Demonstrate active listening skills
- Practice soft skills and interpersonal skills to excel in their jobs.
- Use language efficiently to face interviews, participate in group discussions and present speeches.

1. **Listening Comprehension**: Listening and typing – listening and sequencing of sentences – Filling in the blanks – Listening and answering questions.

2. **Reading Comprehension**: Filling in the blanks – Cloze exercises – Vocabulary building – Reading and answering questions.

3. **Speaking: Phonetics**: Intonation – Ear training – Correct Pronunciation – Sound recognition exercises – Common errors in English.

Conversations: Face to Face Conversation – Telephone conversation – Role play activities (Students take on roles and engage in conversation)

4. Making presentations: introducing oneself – introducing a topic – answering questions – individual presentation practice

5. Creating effective PPTs – presenting the visuals effectively

6. Using appropriate body language in professional contexts – gestures, facial expressions, etc.

7. Preparing job applications - writing covering letter and résumé

8. Applying for jobs online - email etiquette

9. Participating in group discussions – understanding group dynamics - brainstorming the topic – mock GD

10. Training in soft skills - persuasive skills – people skills - questioning and clarifying skills

11. Writing Project proposals: collecting, analyzing and interpreting data / drafting the final report

12. Attending job interviews – answering questions confidently

13. Interview etiquette – dress code – body language – mock interview

TOTAL: 30 HOURS

REFERENCE BOOKS:

1. Dhanavel, S.P. 2010. English and Soft Skills. Hyderabad: Orient BlackSwan Ltd.

2. Corneilssen, Joep. How to Prepare for Group Discussion and Interview. New Delhi: Tata-McGraw-Hill, 2009.

3. D'Abreo, Desmond A. Group Discussion and Team Building. Mumbai: Better Yourself Books, 2004.

4. Ramesh, Gopalswamy, and Mahadevan Ramesh. The ACE of Soft Skills. New Delhi: Pearson, 2010.

5. Gulati, Sarvesh. Corporate Soft Skills. New Delhi: Rupa and Co. 2006.

6. Van Emden, Joan, and Lucinda Becker. Presentation Skills for Students. New York: Palgrave Macmillan, 2004.

7. Turton, N.D and Heaton, J.B. Dictionary of Common Errors, Addision Wesley Longman Ltd., Indian reprint 1998.

EXTENSIVE READING

1. Covey, Stephen R. The 7 Habits of Highly Effective People. New York: Free Press,

1989.

2. Bagchi, Subroto. The Professional. New Delhi: Penguin Books India, 2009.

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

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit
Theory						
1	U15MAT301ER	Discrete Mathematics	3	2	0	4
2	U15IT301R	Advanced Data Structures	3	0	0	3
3	U15IT302R	Digital Logic Design	3	0	0	3
4	U15IT303R	Principles of Communication	3	0	0	3
5	U15IT304R	Object Oriented Programming in C++	3	0	0	3
6	U15IT305R	Computer Architecture	3	0	0	3
Practical						
7	U15IT306R	Data Structures using C++ Laboratory	0	0	4	2
8	U15IT307R	Digital Logic Design Laboratory	0	0	2	1
9	U15ENG301R	Communications Skills Laboratory	0	0	2	1
10	U15GE301R	Soft Skills and Aptitude - I	0	0	2	1
					Total Credits	**24**

Approved By

Chairperson, Information Technology BoS
Dr.J.Akilandeswari

Member Secretary, Academic Council
Dr.R.Shivakumar

Chairperson, Academic Council & Principal
Dr.S.R.R.Senthil Kumar

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

U15MAT301ER 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 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. Outline the concepts of relations and functions and use them to solve problems.
5. Apply the concept of lattices and Boolean algebra to solve problems.

UNIT I PROPOSITIONAL CALCULUS 15

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 15

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 15

Counting principle – sum rule, product rule – pigeonhole principle – permutations and pombinations – mathematical induction – recurrence relation – solution of recurrence relation using generating functions.

UNIT IV RELATIONS AND FUNCTIONS 15

Relations - types of relations and their properties - relational matrix and graph of a relation - partitions – equivalence relations

Functions – classification – types of functions and examples – composition of functions – inverse functions – characteristic function of a set

UNIT V LATTICES AND BOOLEAN ALGEBRA 15

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)

Lecture: 45, Tutorial: 30 hours

Total: 75 hours

Text Book:

1. Kenneth H.Rosen, "Discrete Mathematics and its Applications", Seventh Edition, Tata McGraw – Hill Pub. Co. Ltd., New Delhi, 2015.
2. Trembly J. P and Manohar R, "Discrete Mathematical Structures with Applications to Computer Science", 30th Re-print, Tata McGraw–HillPub. Co. Ltd, New Delhi, 2007

References:

1. Veerarajan T. “Discrete Mathematics with Graph Theory and Combinatorics”, Nineteenth reprint, McGraw Hill Education (India) Private Ltd, New Delhi, 2014.
2. Rahothaman.R., Ponnalagu.K., Shakthivel.R., “Discrete Mathematics” 6th Edition, Sonaversity, 2011.
3. Ralph. P.Grimaldi, “Discrete and Combinatorial Mathematics: An Applied Introduction”, Fifth Edition, Pearson Education Asia, Delhi, 2004.

U15IT301R 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 and implement Tree ADT and apply it to construct expression trees.
2. Implement variants of different tree data structure.
3. Apply and implement heap
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 –AVL trees – Splaying- B+ trees.

UNIT III BINARY HEAP 9

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.

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.

U15IT302R DIGITAL LOGIC DESIGN 3 0 0 3

COURSE OUTCOMES

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

1. Simplify the Boolean expression using K-Map and tabulation techniques.
2. Use Boolean simplification techniques to design a combinational circuit.
3. Analysis and Design of a given combinational digital/logic circuits.
4. Analysis and Design of a given sequential digital/logic circuits.
5. 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.

U15IT303R 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.

U15IT304R 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.

U15IT305R 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.

U15IT306R DATA STRUCTURES USING C++ LABORATORY 0 0 4 2

COURSE OUTCOMES

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

1. Implement the basic concept of C++ such as Polymorphism, Inheritance, Friend and virtual Function
2. Implement operations of tree data structure.
3. Implement Hash tables and implement Kruskal's algorithm, depth-first and breadth first search algorithms in graph data structure.

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.

Total: 60 hours

U15IT307R 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 and sequential circuits.
3. Design the different functional units in a digital computer system.

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.

Total: 30 hours

Semester-III	U15GE301R:SOFT SKILLS AND APTITUDE – I	L	T	P	C	Marks
		0	0	2	1	100

Course Outcomes

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

16. Demonstrate capabilities in specific soft-skill areas using hands-on and/or case-study approaches
17. Solve problems of greater intricacy than those in BA-I and II in stated areas of quantitative aptitude and logical reasoning
18. Demonstrate higher than BA-I and II levels of verbal aptitude skills in English with regard to specific topics

1.Soft Skills	**Demonstrating soft-skill capabilities with reference to the following topics**: a. Attitude building a. Dealing with criticism b. Innovation and creativity c. Problem solving and decision making **d.** Public speaking **e.** Group discussions
2. Quantitative Aptitude and Logical Reasoning	**Solving problems with reference to the following topics:** sss. Numbers: Finding units digit, Power rule ttt. Base system – Progressions: Arithmetic, geometric and harmonic a. HCF and LCM b. Averages c. Percentages d. Ratio and proportion e. Ages f. Partnership g. Profit and loss h. Mensuration: Area, perimeter, volume and Surface area i. Coding and Decoding: Numbers, alphabet, alphanumeric coding and Artificial language j. Direction Sense k. Symbols and series: Numbers, alphabet, symbols, pictures and alphanumeric l. Seating arrangement
3. Verbal Aptitude	**Demonstrating English language skills with reference to the following topics:** a. Verbal analogy b. Tenses c. Prepositions d. Reading comprehension e. Choosing correct / incorrect sentences f. Describing pictures

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

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit
Theory						
1	U15MAT301FR	Probability and Statistical Quality Control	3	2	0	4
2	U15GE302R	Basics of Mechanical and Electrical Engineering	3	0	0	3
3	U15CHE304R	Environmental Science and Engineering	3	0	0	3
4	U15FT301R	Technology of Yarn Manufacture	3	0	0	3
5	U15FT302R	Fashion Art and Design	3	0	0	3
6	U15FT303R	Pattern Engineering	3	0	0	3
Practical						
7	U15FT304R	Pattern Making and Grading Laboratory	0	0	4	2
8	U15FT305R	Fashion Illustration Laboratory	0	0	2	1
9	U15GE301R	Soft Skills and Aptitude - I	0	0	2	1
					Total Credits	**23**

Approved By

Chairman, Fashion Technology BoS	**Member Secretary, Academic Council**	**Chairperson, Academic Council & Principal**
Dr.G.Gunasekaran	**Dr.R.Shivakumar**	**Dr.S.R.R.Senthil Kumar**

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

U15MAT301FR PROBABILITY AND STATISTICAL QUALITY CONTROL 3 2 0 4

COURSE OBJECTIVE

At the end of the course, the students would acquire skills in handling situations involving more than one random variables and functions of random variables, handle various designs of experiments and control charts.

COURSE OUTCOMES

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

1. Explain the concept of random variables and functions of random variables.
2. Describe Probability distributions and solve the real life problems using the same.
3. Discuss the strength, nature and the variability of relationship between two or more variables using correlation and regression techniques.
4. Apply one – way and two – way classification techniques and the various standard designs (CRD, RBD, LSD) for the real – life problems.
5. Analyses various statistical techniques used to find out the status of the process in manufacturing sector.

Unit – I Random Variables 15

Discrete and continuous random variables, moments, expectation, moment generating function and its properties.

Unit – II Probability and Distributions 15

Binomial, Poisson, Geometric, Uniform, Exponential, Gamma and Normal distributions.

UNIT - III Correlation and Regression 15

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

Unit – IV Design of Experiments 15

Analysis of variance, one way classifications, CRD, two way classification, RBD, Latin square.

Unit – V Statistical Quality Control 15

Control charts for measurements ($\overline{X}$and R charts), Control charts for attributes (p, c and np charts), examples of application of statistical control charts in garment industry.

Total: 75 hours

TEXT BOOK

1. "Probability and Statistical Quality Control", by Sonaversity, 2011.
2. Gupta.S.C. and Kapoor, V.K., "Fundamentals of Mathematical Statistics", Sultan Chand and Sons, Eleventh Edition, 2002.
3. Veerarajan T., "Probability, Statistics and Random Processes", Tata Mc.Graw Hill Education, 2008.

REFERENCES

1. Milton. J. S. and Arnold. J.C., **"Introduction to Probability and Statistics"**, Tata McGraw Hill, 4th Edition, 2007. (For Units 1 and 2)
2. Johnson. R.A. and Gupta. C.B., **"Miller and Freund's Probability and Statistics for Engineers"**, Pearson Education, Asia, 7th Edition, 2007.

3. Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., **"Probability and Statistics for Engineers and Scientists"**, Pearson Education, Asia , 8th Edition, 2007.
4. Navidi. W., "**Statistics for Engineers and Scientists**", Special Indian Edition, Tata McGraw-Hill Publishing Company Ltd, New Delhi, 2008.
5. Spiegel. M.R., Schiller. J., and Alu Srinivasan. R., **"Schaum's Outlines Probability and Statistics"**, Tata McGraw-Hill Publishing Company Ltd. New Delhi, 2007.

U15GE302R BASICS OF MECHANICAL AND ELECTRICAL ENGINEERING 3 0 0 3

COURSE OBJECTIVE

To impart knowledge on fundamental power plant engineering and refrigeration, air conditioning, DC AC circuits, motors and instruments.

COURSE OUTCOMES

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

1. Describe the essential features and working principles of conventional power plants
2. Explain the concept of Refrigerators and Air conditioning systems.
3. State the fundamental laws of electrical circuits and explain the basic principles related to DC and AC electrical circuits.
4. Explain the constructional features and principles of operation of DC and AC motors.
5. State the working principles of electrical measuring instruments and calculate electrical power consumption.

Unit I Power Plant Engineering 9

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; Internal energy; Entropy of vapour.

Unit II Refrigeration and Air Conditioning 9

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: Basic elements and parameters, Ohm's law, Kirchhoff's laws (statement only), series and parallel resistive circuits, star-delta transformation – simple problems.

AC Circuits: AC waveform and standard terminologies, single-phase RLC series circuit – power and power factor – simple problems. Introduction to three-phase system.

Unit IV DC and AC Motors 9

DC motors: Construction and Principle of operation, concept of back EMF, torque equation, types, characteristics. Armature and field speed control of DC shunt motor.

Three Phase Induction Motor: Construction, Working principle, torque equation, torque-slip characteristics, speed-torque characteristics. V/f speed control.

Unit V Measurements and Instrumentation 6

Basic principle of indicating instruments –types – torques – Moving Coil and Moving Iron instruments – dynamometer type wattmeter – induction type energy meter.

Total: 45 hours

TEXT BOOKS:

1. S.R.J.Shantha Kumar, "Basic Mechanical Engineering", 2nd Edition, Hi-Tech Publications, 2000.
2. V.K.Mehta and Rohit Mehta, "Principles of Electrical Engineering and Electronics",S.Chand publishers, 2011.

REFERENCES BOOKS:

1. P.K.Nag, "Power Plant Engineering" 3rd Edition, Tata McGraw-Hill Education, 2002.
2. S.K.Bhattacharya, "Basic Electrical and Electronics Engineering", Pearson publishers, 2012.
3. B.L. Theraja, "Fundamentals of Electrical Engineering and Electronics", S. Chand publishers, 2007.

U15CHE304R ENVIRONMENTAL SCIENCE AND ENGINEERING

Course Objectives:

L	T	P	C	M
3	0	0	3	100

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

- 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.
- Explain the concepts of an ecosystem and provide an overview of biodiversity and its conservation.
- Define the various known kinds of environmental pollution and discuss their causes, effects and control measures and to describe the safe disposal of hazardous wastes and waste water treatment.
- Give an account of the social issues with regard to the environment.
- 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(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

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 –- 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.

TOTAL : 45 PERIODS

Text Books:

1. AnubhaKaushik and Kaushik, "Environmental Science and Engineering" New Age International Publication, 4th Multicolour Edition, New Delhi, 2014.

Reference Books:

1. S. Radjarejesri et al.,"Environmental Science" Sonaversity, Sona College of Technology, Salem, 2018.
2. Masters, G.M., "Introduction to Environmental Engineering and Science", Pearson Education Pvt., Ltd., 2nd Edition, 2004.
3. Miller, T.G. Jr., "Environmental Science", Wadsworth Pub. Co.
4. Erach, B., "The Biodiversity of India", Mapin Publishing P.Ltd.,Ahmedabad, India.
5. ErachBharucha, "Textbook of Environmental Studies for Undergraduate Courses", 2005, University Grands Commission, Universities Press India Private Limited, Hyderguda, Hyderabad – 500029.

U15FT301R 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 of modern carding and draw frame processes.
3. List and explain the objectives, material passage and working of combing and roving processes.
4. State the objectives and describe the working of Ring spinning and doubling process and also to explain briefly about the Compact spinning and Rotor spinning.
5. Discuss the quality requirements and fibres used in the sewing thread 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, Difference between mixing and blending.
Blow Room: Objectives, Construction and working of mixing bale opener, step-cleaner. Brief study of scutcher. Modern blow room lines for processing cotton, man-made fibres and their blends.

Unit-II Carding and Drawing 9

Carding: Objectives of carding, Outline of the working of a modern high-production card.
Drawing: Objects of draw frame, Basic principles of doubling and drafting, Description and outline of the working of a modern draw frame.

Unit–III Combing and Roving 8 Combing:
Differentiation between carded and combed yarns, Brief study of comber lap preparation methods, Objectives of combing.
Roving: Objects of fly frame, Outline of the working of a modern speed frame.

Unit-IV Spinning and Doubling 9

Ring Spinning: Objects of ring frame, Outline of the working of a modern ring frame, Speed and production particulars, S and Z twist.
Modern spinning systems: Principle of yarn formation in Compact spinning, Rotor spinning. Properties and end uses of these yarns.
Doubling: Purpose of doubling, End uses of doubled yarn.

Unit V Sewing Thread and Fancy Yarns 10

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.

U15FT302R 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. Give an account of the various concepts of colour theory and the applications of colours.
5. Bring out the theme and development of portfolio.

UNIT-I Introduction to Fashion Art Design 9

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 -II Classification and Types of Fashion 9

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-III Elements and Principles of Design 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 Colour 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, color contrast, color harmony.

UNIT 5 Design and Development 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.

U15FT303R 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

Flow process chart of garment manufacturing.

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, sleeve 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.

U15FT304R PATTERN MAKING AND GRADING LABORATORY 0 0 4 2

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 (2 sessions)

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 (1 session)
2. **Collars:** Convertible, Shirt, Mandarin, Peter pan, Cape, Square, Scalloped, Sailor, Puritan, Shawl and Notch collar (1 session)
3. **Cuff:** Shirt cuff, French cuff and Contoured cuff (1 session)
4. **Necklines** (1 session)
5. **Yokes:** Plain yoke (1 session)

III. Develop the pattern and grade for the following garments

1. Baby frock (1 session)
2. Blouse (1 session)
3. Skirt and Top (1 session)
4. Men's Formal Shirt (1 session)
5. Men's Formal Trouser (1 session)

Total: 60 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 : 4o”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: 30 hours

Semester-III	U15GE301R:SOFT SKILLS AND APTITUDE – I	L	T	P	C	Marks
		0	0	2	1	100

Course Outcomes

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

19. Demonstrate capabilities in specific soft-skill areas using hands-on and/or case-study approaches
20. Solve problems of greater intricacy than those in BA-I and II in stated areas of quantitative aptitude and logical reasoning
21. Demonstrate higher than BA-I and II levels of verbal aptitude skills in English with regard to specific topics

1.Soft Skills	**Demonstrating soft-skill capabilities with reference to the following topics**: a. Attitude building b. Dealing with criticism c. Innovation and creativity d. Problem solving and decision making **e.** Public speaking **f.** Group discussions
2. Quantitative Aptitude and Logical Reasoning	**Solving problems with reference to the following topics:** a. Numbers: Finding units digit, Power rule b. Base system – Progressions: Arithmetic, geometric and harmonic c. HCF and LCM d. Averages e. Percentages f. Ratio and proportion g. Ages h. Partnership i. Profit and loss j. Mensuration: Area, perimeter, volume and Surface area k. Coding and Decoding: Numbers, alphabet, alphanumeric coding and Artificial language l. Direction Sense m. Symbols and series: Numbers, alphabet, symbols, pictures and alphanumeric n. Seating arrangement
3. Verbal Aptitude	**Demonstrating English language skills with reference to the following topics:** a. Verbal analogy b. Tenses c. Prepositions d. Reading comprehension e. Choosing correct / incorrect sentences f. Describing pictures