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

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit
Theory						
1	U15GE502R	Professional Ethics And Human Values	3	0	0	3
2	U15CE501R	Structural Analysis-I	3	2	0	4
3	U15CE502R	Environmental Engineering	3	0	0	3
4	U15CE503R	Design of Reinforced Concrete Elements	3	2	0	4
5	U15CE504R	Soil Mechanics	3	0	0	3
6	U15CE 902R	**Professional Elective:** Architecture and Town Planning	3	0	0	3
	U15CE 904R	**Professional Elective:** Elements of Building Planning				
Practical						
7	U15CE505R	Soil Mechanics Laboratory	0	0	4	2
8	U15CE506R	Concrete and Highway Laboratory	0	0	4	2
9	U15CE507R	Technical Seminar[#]	0	0	2	1
10	U15GE501R	Soft Skills and Aptitude-III	0	0	2	1
					Total Credits	**26**
[#] **Internal Mode of Examinations**						

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, Fifth Semester BE Civil Students and Staff, COE

U15GE502R	PROFESSIONAL ETHICS AND HUMAN VALUES	L	T	P	C
		3	0	0	3

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

1. Identify the core values that shape the ethical behavior of an engineer.
2. Utilize opportunities to explore one's own values in ethical issues.
3. Apply codes of ethics and standards in the engineering field.
4. Explore various safety issues and ethical responsibilities of an engineer.
5. Recognize and resolve global issues.

UNIT-I HUMAN VALUES 9

Morals, Values and Ethics - Integrity - Work Ethics - Service Learning - Civic Virtue - Respect for Others - Living Peacefully - Caring - Sharing - Honesty - Courage - Valuing Time - Co-operation - Commitment - Empathy - Self-Confidence - Character - Spirituality.

UNIT-II ENGINEERING ETHICS 9

Senses of Engineering Ethics - Variety of moral issues - Types of inquiry - Moral Dilemmas - Moral Autonomy - Kohlberg's theory - Gilligan's theory - Consensus and Controversy - Profession and Professionalism - Professional Ideals and Virtues - Theories of Right action- Uses of Ethical Theories.

UNIT-III ENGINEERING AS SOCIAL EXPERIMENTATION 9

Engineering as Experimentation - Contrasts with standard experiments- Engineers as Responsible Experimenters - Importance and limitations of Codes of Ethics - Industrial Standards - A Balanced Outlook on Law - Case Study: Space shuttle challenger disaster.

UNIT-IV SAFETY, RESPONSIBILITIES AND RIGHTS 9

Safety and Risk - Types of risk - Assessment of Safety and Risk - Risk Benefit analysis- Reducing Risk - Case Studies -Chernobyl and Bhopal plant disaster. Collegiality and Loyalty - Collective Bargaining - Confidentiality - Conflicts of Interest - Occupational Crime - Importance and consequences of whistle blowing - Professional Rights - Employee Rights - Intellectual Property Rights (IPR) - Discrimination.

UNIT-V GLOBAL ISSUES 9

Multinational Corporations - Environmental Ethics - Computer Ethics and Internet- Engineers and Technological progress - Weapons Development - Engineers as Managers - Consulting Engineers - Engineers as Expert Witnesses and Advisors - Moral Leadership - Participation in professional societies- Sample Code of Conduct (pertaining to specific professional societies).

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw-Hill, New York 2017.
2. Professional Ethics and Human values- Sonaversity, Edition 2018.
3. Charles E Harris, Michael S. Pritchard and Michael J Rabins, "Engineering Ethics –Concepts and Cases", Wadsworth Thomson Learning, United States, 2000

REFERENCES:

1. Charles D. Fleddermann, "Engineering Ethics", Pearson Education / Prentice Hall, New Jersey, 2012.
2. Charles E Harris, Michael S. Pritchard and Michael J Rabins, "Engineering Ethics – Concepts and Cases", Wadsworth Thomson Learning, United States, 2000
   Govindarajan M, Natarajan S, Senthil Kumar V. S, "Engineering Ethics", Prentice Hall of India, New Delhi, 2016.
3. David Ermann and Michele S Shauf, "Computers, Ethics and Society", Oxford University Press, 2003.
4. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford Press , 2000
5. R. Subramanian , "Professional Ethics ",Oxford University Press ,Reprint ,2015 .

U15CE501R	STRUCTURAL ANALYSIS-I	L	T	P	C
		3	2	0	4

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

1. Compute the deflection of determinate beams, frames and trusses by energy principles.
2. Analyze the propped cantilever, fixed beam and continuous beam by theorem of three moments.
3. Draw the influence line diagram for statically determinate beams and trusses.
4. Analyze the three hinged and two hinged arches.
5. Analyze the continuous beams and rigid frames by slope deflection method.

UNIT-I ENERGY METHODS 15

Strain energy in axial, shear, flexure and torsion- Castigliano's theorems- Principle of virtual -Unit load method- Application to compute deflection in statically determinate beams, frames and truss- Concept of Maxwell's reciprocal theorem.

UNIT-II INDETERMINATE BEAMS 15

Basic assumption in structure analysis-Classification of structures. Static and kinematic indeterminacy. Basic methods of structure analysis-Analysis of statically indeterminate structures: Fixed beam-Propped cantilever- fixed end moments and reactions- Theorem of three moments- Continuous beams- Shear force diagram and bending moment diagram.

UNIT-III MOVING LOADS AND INFLUENCE LINES 15

Moving loads for statically determinate structures-Single, two point load and several point loads: Maximum bending moment and shear force- Equivalent UDL-Absolute maximum bending moment. Enveloping curve for Maximum bending moment and shear force and determination of ILD for shear, moment and reaction for statically determinate beams and trusses.

UNIT-IV ARCHES 15

Introduction-Classification of arches; Three and two hinged arch: Parabolic, circular arches and semi circular arches-Determination of bending moment- Horizontal reaction-Normal thrust-Radial shear-Temperature effects.

UNIT-V SLOPE DEFLECTION METHOD 15

Slope deflection equations-Fixed end moments- Application to statically indeterminate beams and frames (with and without sway): Deformed shape, shear force and bending moment diagram (unknowns restricted to three only).

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

TEXT BOOKS:

1. Vaidyanathan, R. and Perumal, P, "Comprehensive Structural Analysis-Vol. I & II", Laxmi Publications, New Delhi, 2003.
2. Negi L.S. & Jangid R.S., "Structural Analysis", Tata McGraw Hill Publications, New Delhi, 2003.
3. Rajput, R.K., "Strength of Materials", S.Chand and Co, New Delhi, 2015.

REFERENCES:

1. Punmia B.C, "Theory of Structures", Standard Book House, New Delhi, 2000.
2. BhavaiKatti S.S, "Structural Analysis-Vol. 1 & Vol. 2", Vikas Publishing Pvt Ltd., New Delhi, 2008.
3. Thandavamoorthy T.S, "Structural Analysis", Oxford University Press, New Delhi. 2011.

U15CE502R	ENVIRONMENTAL ENGINEERING	L	T	P	C
		3	0	0	3

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

1. Identify the quantity and quality of water from various sources and the processes involved in the water conveyance systems.
2. Infer the design principles of unit operations and processes for water treatment.
3. Illustrate the design concepts and implementation of sewage transmission systems.
4. Design various sewage treatment systems.
5. Justify the suitable advanced treatment techniques for water and wastewater treatment.

UNIT-I WATER SUPPLY SYSTEM - SOURCE AND CONVEYANCE 9

Objectives-Population forecasting-Design period-Water demand - Characteristics-Sources of water – Selection of water source-Water quality parameters & significance - standards-Intake structures -Conveyance- Laying, jointing & testing of pipes- pump selection-appurtenances-System of water supply-Distribution.

UNIT-II DESIGN PRINCIPLES OF WATER TREATMENT 9

Objectives-Selection of unit operations and process-Principles of screening, flocculation, sedimentation, filtration, disinfection-Softening-demineralisation-Aeration-Iron removal-Defluoridation-Operation and maintenance aspects.

UNIT-III SEWERAGE SYSTEM:COLLECTION AND TRANSMISSION 9

Sources of wastewater- Quantity of sanitary sewage-storm water runoff estimation-wastewater characteristics and significance-design of sewers -Computer application-laying, jointing and testing of sewers-sewer appurtenances-pump selection

UNIT-IV SEWEAGE TREATMENT AND DESIGN PRINCIPLES 9

Objectives-Selection of unit operations and process-Design principles of primary and secondary treatment, screen chamber, grit chamber, primary sedimentation tank, activated sludge process-Modified activated sludge process and oxidation ditch- Trickling filter-Stabilization ponds-Septic tank with soak pits - Sludge: Treatment and disposal.

UNIT-V SEWAGE DISPOSAL AND RURAL SANITATION 9

Disposal on land-Sewage farming-Disposal into water bodies-Oxygen sag curve-Streeter Phelps model-Wastewater reclamation techniques-Sanitary fittings-one pipe and two pipe system-general layout of house drainage connection.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Garg S.K, “Environmental Engineering Vol.I & II”, Khanna Publishers, New Delhi,2009.
2. Punmia B.C, Jain A.K. and Jain A., “Environmental Engineering, Vol.I & II”, Lakshmi Publications, Newsletter, 2007.
3. Birdie.G.S, “ Water supply and sanitation Engineering” , Dhanpat Rai & Sons, 2003.

REFERENCES:

1. Metcalf and Eddy - Wastewater Engineering – Treatment and Reuse, Tata McGraw-Hill Company, New Delhi, 2003
2. Manual on Wastewater and Treatment CPHEECO, Ministry of Urban Affairs and employment, Government of India New Delhi, 1990.
3. Shan.C.S, “ Water supply and sanitation”, Galgotia Publishing Company , New Delhi 1994.

U15CE503R	DESIGN OF REINFORCED CONCRETE ELEMENTS	L	T	P	C
		3	2	0	4

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

1. Explain the basic concepts of reinforced concrete.
2. Design beams subjected to moment, shear and torsion.
3. Design slab for various boundary conditions.
4. Design columns with different end conditions.
5. Design different types of RC footing.

UNIT-I INTRODUCTION **15**

Material strength and properties – Stress- strain characteristics of concrete and steel -grades of concrete and steel, fatigue effects. Types of loads and load combinations. Factor of Safety. Evolution of different design philosophies on design of RCC sections. Limit state method: Limit state-Characteristic strength - Loads and load combination- Partial safety factor- moment of resistance of singly and doubly reinforced rectangular and flanged beam sections.

UNIT-II DESIGN OF BEAM **15**

Design of singly and doubly reinforced sections and flanged section subjected to flexure, shear and torsion- Flexural and anchorage bonds-Development length- Detailing of reinforcement.

UNIT-III DESIGN OF SLAB **15**

Introduction - Types of slab - Design of one way slab- Design of two way slabs with various boundary conditions - Design of cantilever slab-Check for shear and deflection-Detailing of reinforcement. Design of doglegged stair case-Detailing of reinforcement.

UNIT-IV DESIGN OF COLUMN **15**

Estimation of effective length of a column – Code requirements: Slenderness limits-minimum eccentricities and reinforcements; Compression members- Classification of columns-Design of short column and Long column: Axial and eccentric loading using interaction curve; Detailing of reinforcement.

UNIT-V DESIGN OF FOOTING **15**

Introduction -Types of footing- Selection of footing- Soil pressures under isolated footings-General design considerations and Code requirements-Design of Isolated square and rectangular footing - Combined rectangular footing –Strap footing-Mat footing-Detailing of reinforcement.

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

TEXT BOOKS:

1. UnnikrishnaPillai S,DevdasMenon, “Reinforced Concrete Design”, Tata McGraw-Hill Publishing Company Ltd,New Delhi 2016.
2. Krishna RajuN,“Design of Reinforced Concrete Structures”, CBS Publishers & Distributors, New Delhi2010.

REFERENCES:

1. VargheseP.C,“Limit State Design of Reinforced Concrete”, Prentice Hall of India Pvt. Ltd, New Delhi 2010.
2. Gambhir M.L,“Fundamentals of Reinforced Concrete Design”, Prentice Hall of India Pvt. Ltd, New Delhi 2012.
3. Ashok Kumar Jain, “Reinforced Concrete Limit State Design”, Nem Chand Brothers, 2015.
4 SinhaS.N,“Reinforced Concrete Design”, Tata McGraw-Hill Publishing Company Ltd, New Delhi 2014.

U15CE504R SOIL MECHANICS

L	T	P	C
3	0	0	3

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

1. Characterize the soil based on index and engineering properties.
2. Examine the soil water and water flow through soil.
3. Compute the stress distribution of soil under different loading conditions.
4. Determine shear strength parameters of soils.
5. Estimate the time rate of settlement due to consolidation..

UNIT-I INTRODUCTION **9**

Soil formation-Soil description and classification for engineering purposes, their significance - Phase relationships-Index properties of soils - BIS Classification system-Field identification and classification of soil.

UNIT-II EFFECTIVE STRESS AND PERMEABILITY **9**

Soil water-Static pressure in water – Effective stress concept in soil- Capillary stress-Darcy's law - Permeability measurement (Constant and Falling head) and field pumping in, pumping out tests-Factors influencing permeability of soils-Seepage-Introduction to flow nets.

UNIT-III VERTICAL STRESS DISTRIBUTION IN SOIL **9**

Stress distribution in homogeneous and isotropic medium- Contact pressure distribution- Boussinesq's theory **(**point load, line load and UDL load**)**-Westergaard's analysis – Stratified deposits- Use of Newmark's influence chart.

UNIT-IV SHEAR STRENGTH **9**

Shear strength of cohesive and cohesionless soils-Mohr's circle - Mohr-Coulomb failure theory-Measurement of shear strength: Direct shear, Tri-axial compression, Unconfined compressive strength Vane shear test; Pore pressure parameters –liquefaction potential.

UNIT-V COMPACTION AND CONSOLIDATION **9**

Soil compaction-Theory, laboratory and field compaction methods- Factors influencing compaction behavior of soils. Components of settlement - Immediate and consolidation settlement - Terzaghi's one dimensional consolidation theory-Computation of rate of settlement -√t and log t methods-e-log p relationship.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Arora K.R, "Soil Mechanics and Foundation Engineering", Standard Publishers and Distributors Pvt. Ltd, New Delhi, 2015
2. Gopal Ranjan and Rao A.S.R, "Basic and Applied Soil Mechanics", New Age International Publishers, New Delhi, 2016.

REFERENCES:

1. Venkatramaiah C, "Geotechnical Engineering", New Age International Publishers, New Delhi, 2017.
2. Murthy V.N.S, "Textbook of Soil Mechanics and Foundation Engineering; Geotechnical Engineering series", CBS Publishers Distribution Ltd, New Delhi. 2016.
3. Punmia B.C, "Soil Mechanics and Foundations", Laximi Publications Pvt. Ltd, New Delhi, 2017.
   Donald p. coduto, Man-Chu Ronald Yeung and William A. Kitch, Geotechnical Engineering, principles and practices, PHI Learning Private limited 2nd edition, 2011.
4.

		L	T	P	C
U15CE 902R	**ARCHITECTURE AND TOWN PLANNING**	**3**	**0**	**0**	**3**

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

1. Recognize the basic elements and principles of architectural design.
2. Explain about site planning, survey, site analysis and layout.
3. Summarize the various rules and regulation of town planning and development authorities.
4. Interpret various aspects of environment and climate in civil engineering projects& illustrate the principles of landscape design.
5. Discuss the concepts related to town planning and Urban renewal

UNIT-I ARCHITECTURAL DESIGN 9

Architectural design-Trinity of Architecture-An analysis- Integration of function and aesthetics-Introduction to basic elements and principles of design-Factors Influencing Architectural Design.

UNIT-II SITE PLANNING 9

Surveys-Site analysis-Building Bye Laws -objectives - Key/site plan -Development control- Layout - Zoning - Objective - Principles-Aspects - NBC for deign of layout.

UNIT-III BUILDING TYPES 9

Building types - Classification of residential, institutional, industries and public building - Planning concepts - Residential, institutional, commercial and Industrial - Application of anthropometry and space standards - Building rules and regulations - Integration of Building services.

UNIT-IV CLIMATE AND ENVIRONMENTAL RESPONSIVE DESIGN 9

Man and environment interaction-Factors that determine climate-Characteristics of climate types-Design for various climate types-Passive and active energy control-Green building concept- Fundamental - Requirements. Landscape - planning - purpose - principle.

UNIT-V TOWN PLANNING 9

Town planning - objects - principles - necessity - forms - stages - requirement of new towns. Survey - collection of data - types of survey - methods adopted to collect data. Urban renewal - objects - Defects of Existing Town - collection of data. Aspects of urban renewal projects.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Rangwala S.C, “Town Planning” Charotar Publishing House, Anand, 2016.
2. Muthu Shoba Mohan G, “Principles of Architecture” Oxford University Press, New Delhi, 2010.
3. VRA. Saathappan and K. Yogeshwari, Principles of Architecture, Raamalingaa Publication, 2005

REFERENCES:

1. Francis D.K.Ching, “Architecture: Form, Space and Order”, John Wiley & Sons, Inc. 2007.
2. Arvind Krishnan, Nick Baker, Simos Yannas, and Szokolay S.V, “Climate Responsive Architecture- A Design Hand Book for Energy Efficient Building”, Tata McGraw Hill Publishing Company Ltd, New Delhi, 2007.
3. National Building Code of India, SP7 (Group 1) Bureau of Indian Standards, New Delhi, 2005.

		L	T	P	C
U15CE 904R	**ELEMENTS OF BUILDING PLANNING**	**3**	**0**	**0**	**3**

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

1. Plan the residential building as per function requirements.
2. Design various elements of the building.
3. Comprehend the provisions and standards of housing elements.
4. Explain the different green building rating systems with real time examples.
5. Formulate and design the housing layouts by various standards of the building.

UNIT-I INTRODUCTION **9**

Introduction to building drawing-Preparation of drawing-Working drawing. Building plans approval procedure as per NBC. Classification of building-Site selection for residential building; Elements of climate-Directions and their characteristics-Orientation of buildings -Factors affecting orientation.

UNIT-II REQUIREMENTS OF BUILDING **9**

Principles of planning of buildings: Aspect-Prospect-Privacy- Sizes of the Rooms-Roominess-Grouping-Circulation-Sanitation-Elegance- Economy. Building Bye-Laws: Introduction-Objectives-Principles-Minimum plot sizes and building frontage. Minimum standard dimensions of building elements-Provisions for: lighting, ventilation, fire, means of access and parking.

UNIT-III PLANNING OF RESIDENTIAL BUILDING **9**

Introduction-House-Home-Rooms meant for the various activities: Purposes and requirements; Economical measures in building construction-Introduction to different methods of construction: Load bearing structures-Framed structures-Prefabricated structures. Introduction to intelligent building. Standard dimensions for various building units. Fixing the position of various building components and justification

UNIT-IV GREEN BUILDING **9**

Green building-Principles- Design criteria-Site sustainability-Efficiency: Water use- Energy-Indoor environmental quality-Green building materials-Cost of construction- Comparisons of green building with conventional building- Assessment and evaluation of green building- Green building certification-Green buildings in India.

UNIT-V BUILDING DRAWING **9**

Introduction-Nomenclature of building planning and construction- Documents to be submitted for approval of proposed building to the sanction authority. Guidelines for planning and drawing of residential building: Conventional symbols- Preparation of site plan, plan, elevation and sectional drawing- Interpretation of drawings.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Kumara Swamy N. “Building Planning and Drawing”, Charator Publishing House Pvt.Ltd, 2014.
2. Sahu G.C, Joygopal Jena, “Building Material s and Construction”, McGraw Hill Education (India) Pvt. Ltd, New Delhi, 2015.

REFERENCES:

1. Shah M.G. Kalec. M. and Patki SY, “Building Drawing”, Tata Mcgraw Hill, New Delhi, 2000.

		L	T	P	C
U15CE505R	**SOIL MECHANICS LABORATORY**	**0**	**0**	**4**	**2**

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

1. Determine the index properties and consistency limit of soils.
2. Apply the technical concepts and ways to solve engineering problems by conducting field and laboratory experiments.
3. Determine the engineering properties and shear strength of soils.

COURSE CONTENTS

1. DETERMINATION OF INDEX PROPERTIES

a. Specific gravity of soil
b. Grain size distribution – Mechanical sieve analysis
c. Grain size distribution –Sedimentation (Hydrometer) analysis
d. Atterberg's limits
e. Differential free swell tests

2. DETERMINATION OF INSITU DENSITY AND COMPACTION CHARACTERISTICS

a. Insitu density Test (Sand replacement method and Core cutter method)
b. Determination of moisture – density relationship using standard proctor compaction test.

3. DETERMINATION OF ENGINEERING PROPERTIES

a. Permeability determination (constant head and falling head methods)
b. One dimensional consolidation test (Determination of co-efficient of consolidation only)
c. Direct shear test in cohesion less soil
d. Unconfined compression test in cohesive soil.
e. Tri-axial compression test (Demonstration only)
f. Standard penetration test (Demonstration only)
g. static cone penetration test (Demonstration only)
h. Plate load test (Demonstration only)

TOTAL: 60 PERIODS

		L	T	P	C
U15CE506R	**CONCRETE AND HIGHWAY LABORATORY**	**0**	**0**	**4**	**2**

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

1. Analyze the various properties of concrete.
2. Characterize the aggregate and bitumen used for road construction.
3. Apply the technical concepts and ways to solve engineering problems by conducting experiments.

COURSE CONTENTS

TESTS ON FRESH CONCRETE:

a) Concrete mix design ACI & IS methods **(** 10262-2009)
b) Slump cone test
c) Flow table test
d) Compaction factor test
e) Vee bee test

TESTS ON HARDENED CONCRETE

a) Compressive Strength test
b) Split tensile strength test
c) Flexural strength test
d) Modulus of Elasticity test
e) Rebound hammer
f) UPV test

TEST ON AGGREGATES

a) Specific Gravity
b) Los Angeles Abrasion Test
c) Water Absorption of Aggregates

TEST ON BITUMEN

a) Specific Gravity of Bitumen
b) Penetration Test
c) Viscosity Test
d) Softening Point Test
e) Ductility Test

TESTS ON BITUMINOUS MIXES

a) Stripping Test
b) Determination of Binder Content
c) Marshall Stability and Flow Values

TOTAL: 60 PERIODS

		L	T	P	C
U15CE507R	**TECHNICAL SEMINAR**	**0**	**0**	**2**	**1**

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

1. Select a topic relevant to analysis, design and management of a civil engineering system.
2. Carry out a critical review of the literature on the chosen topic
3. Prepare and present a technical report

COURSE CONTENTS

To kindle as well as measure the ability of the student to study a topic in Civil Engineering, of current relevance, from technical literature and present a seminar on that topic. Arousing their field of interest in civil engineering, individual students are guided to choose a topic. Give a seminar on that topic for about fifteen minutes. It enables the students to gain knowledge in any of the technically relevant current topics and imparts confidence in the students in presenting the topic. The student will undertake a detailed study on the chosen topic under the supervision of a faculty member, by referring to papers published in reputed journals and conference proceedings. The seminar coordinator for the respective class is appointed by the Head of the Department. Respective seminar coordinator of the section will monitor the attendance for the technical seminar hours. With the approval of the Head of the Department, the respective seminar coordinator will arrange for reviewing the seminar. Each student has to submit a seminar report, based on the papers he/she has studied; the report should not be a reproduction of any original paper. Instead the student should evolve and construct his/her own ideas and enrich the seminar presentation and report. The candidate is expected to submit the seminar report on or before the last working day of the semester. The report will be duly acknowledged by Head of the Department. Final evaluation will be conducted in the form of project viva voce and also seminar will be evaluated on an internal assessment basis. The method of evaluation will be as follows:

Internal Continuous Assessment

25% - Relevance of the topic and literature survey

50% - Presentation and discussion

25% - Regularity in the class and Active Participation in the seminar

TOTAL: 30 PERIODS

Semester –V	U15GE501R- SOFT SKILLS AND APTITUDE - III	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 supplementary areas of soft-skills and job-related selection processes using hands-on and/or case-study approaches
2. Solve problems of advanced levels than those in SSA-II in specified areas of quantitative aptitude and logical reasoning and score 70-75% marks in company-specific internal tests
3. Demonstrate greater than SSA-II level of verbal aptitude skills in English with regard to given topics and score 70-75% marks in company-specific internal tests

1.Soft Skills	**Demonstrating soft-skill capabilities with reference to the following topics:** a. Career planning b. Resume writing c. Group discussion d. Teamwork e. Leadership skills f. Interview skills g. Mock interview h. Mock GDs
2.Quantitative Aptitude and Logical Reasoning Topics	**Solving problems with reference to the following topics :** a. Numbers: Remainder concept b. Time and work: Fraction technique, Efficiency technique, Pipes and cisterns and Chain rule c. Simple interest d. Compound interest e. Set theory: Venn diagram f. Puzzles g. Mathematical operators h. Syllogism (≥4 Statements) i. Data sufficiency j. Statement and assumptions k. Statement and conclusions l. Company specific aptitude questions
3. Verbal Aptitude	**Demonstrating English language skills with reference to the following topics:** a. Subject verb agreement b. Selecting the best alternative for the stated parts of given sentences c. Reading comprehension d. Contextual synonyms e. Sentence fillers f. Writing a story for a given picture g. Company specific aptitude questions

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

S. No	Course Code	Course Title		Lecture	Tutorial	Practical	Credit
Theory							
1	U15ME501R	Heat and Mass Transfer		3	0	0	3
2	U15ME502R	Dynamics of Machinery		3	0	0	3
3	U15ME503R	Design of Machine Elements		3	0	0	3
4	U15ME504R	Computer Aided Design and Manufacturing		3	0	0	3
5	U15ME505R	Automobile Engineering		3	0	0	3
6	U15ME901R	Professional Elective	Additive manufacturing Technology	3	0	0	3
	U15ME902R	Professional Elective	Flexible Manufacturing Systems				
	U15ME903R	Professional Elective	Heating, Ventilation and Air Conditioning				
Practical							
7	U15ME506R	Heat Power Laboratory		0	0	4	2
8	U15ME507R	Dynamics Laboratory		0	0	4	2
9	U15ME508R	CAD and CAM Laboratory		0	0	4	2
10	U15GE501R	Soft Skills and Aptitude-III		0	0	2	1
						Total Credits	**25**

Approved By

Chairman, 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, Fifth Semester BE Mechanical Students and Staff, COE

Course Code	**U15ME501R**	L	T	P	C
Course Name	**HEAT AND MASS TRANSFER**	3	0	-	3

Pre-requisites subject: Engineering thermodynamics, Thermal Engineering

Course Outcomes

Upon completion of this course the students will be able to

- **CO1** Determine the amount of heat transfer through plane walls, cylinder and composite walls and with internal heat generation.
- **CO2** Analyze the importance of extended surfaces and transient conduction.
- **CO3** Apply the concepts of convective heat transfer in forced convection and free convection systems and describe the concept of boiling and condensation.
- **CO4** Determine the amount of radiation heat exchange between surfaces and its thermal relations.
- **CO5** Evaluate the heat transfer in heat exchangers, by LMTD method and NTU methods, and mass transfer through diffusion.

Unit I STEADY STATE CONDUCTION L 9 T 0

Basic Concepts – Mechanism of Heat Transfer – Conduction, Convection and Radiation – General Differential equation of Heat Conduction – Fourier Law of Conduction – Cartesian and Cylindrical Coordinates – One Dimensional Steady State Heat Conduction – Conduction through Plane Wall, Cylinders and Spherical systems – Composite Systems – Conduction with Internal Heat Generation.

Unit II EXTENDED SURFACES & UNSTEADY STATE CONDUCTION L 9 T 0

Types of Fins – Fin model – Heat Flow Calculations – Circumferential and longitudinal fins.

Introduction to Transient Heat Conduction – Lumped Parameter Model – Semi Infinite Solid and Infinite Solid - Use of Heisler's Chart.

Unit III CONVECTION L 9 T 0

Basic Concepts – Convective Heat Transfer Coefficients – Boundary Layer Concept – Types of Convection – Forced Convection – External Flow – Flow over Plates, Cylinders and Spheres – nternal Flow – Laminar and Turbulent Flow – Combined laminar and Turbulent – Flow over Bank of tubes – Free Convection – Flow over Vertical Plate, Horizontal Plate, Inclined Plate, Cylinders and Spheres. Nusselt's theory of Condensation –film wise and dropwise condensation, Pool Boiling, Flow Boiling, Boiling Curve (elementary treatment only).

Unit IV RADIATION L 9 T 0

Basic Concepts, Laws of Radiation – Stefan Boltzman Law, Kirchoff Law – Black Body Radiation – Grey body radiation, Shape Factor Algebra – Electrical Analogy – Radiation Shields – Introduction

to Gas Radiation.

Unit V HEAT EXCHANGERS & MASS TRANSFER L 9 T 0

Types of Heat Exchangers – LMTD Method of heat Exchanger Analysis – Effectiveness – NTU Method of Heat Exchanger Analysis – Overall Heat Transfer Coefficient – Fouling Factors.

Basic Concepts – Diffusion Mass Transfer – Fick's Law of Diffusion – Steady state Molecular Diffusion.

Note: *(Use of standard* heat and mass transfer data book is permitted in the University *examination)*

Total Number of hours: 45

Learning Resources

Text Books

1. Kothandaraman C.P "Fundamentals of Heat and Mass Transfer" New Age International, New Delhi, 2000.
2. Sachdeva R C, "Fundamentals of Engineering Heat and Mass Transfer" New Age International, 2005.

Reference Books

1. Ozisik M.N, "Heat Transfer", McGraw-Hill Book Co., 1994.
2. Holman J.P "Heat and Mass Transfer" Tata McGraw-Hill, 2000.
3. Nag P.K, "Heat Transfer", Tata McGraw-Hill, New Delhi, 2002.
4. Incropera, Frank.P; Dewitt,David. P "Fundamentals of Heat and Mass Transfer", John Wiley & Sons Pvt. Ltd., 2000.

Course Code	**U15ME502R**	L	T	P	C
Course Name	**DYNAMICS OF MACHINERY**	3	-	-	3

Pre-requisites subjects: Engineering Mechanics and Kinematics of Machinery.

Course Outcomes

Upon completion of this course the students will be able to

CO1 Explain the force-motion relationship in components subjected to external forces.

CO2 Calculate the Static and dynamic balancing of engines.

CO3 Analyze the principles in mechanisms used for governing of machines

CO4 Analyze the undesirable effects of unbalances resulting from prescribed motions in mechanism.

CO5 Calculate the effect of Dynamics of undesirable vibrations.

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Unit I FORCE ANALYSIS L 9 T 0

D Alembert's principle -Applied and constraint forces – Free body diagrams – Static equilibrium conditions – Two, three & four members – Static force analysis of simple mechanisms – Dynamic equivalent system-correction couple – Inertia force and Inertia torque -Dynamic Analysis in reciprocating engines – Bearing loads – Crank shaft torque- Equivalent masses Turning moment diagrams – Single and multi-cylinder engines – Fluctuation of energy –Fly Wheels.

Unit II BALANCING L 9 T 0

Static and dynamic balancing of rotating masses – Balancing of reciprocating masses- Balancing of locomotives - Balancing of Multi-cylinder engines – Partial balancing of locomotive engines.

Unit III MECHANISM FOR CONTROL L 9 T 0

Governors – Types – Centrifugal governors – Gravity controlled and spring controlled governor Characteristics – Effect of friction – Hunting and Isochronism-calculation of equilibrium speed and ranges of speed of governors.

Gyroscopic couple – Gyroscopic effects on the movement of air planes and ships – Stability of two wheel drive and four wheel drive – Gyroscope stabilization

Unit IV LONGITUDINAL VIBRATIONS L 9 T 0

Introduction to vibration – Terminology – Classification of vibrations – Undamped and Damped free vibration of single degree of freedom systems-springs in series springs in parallel and combinations- Viscous damping-types of damped system. Forced vibration of single degree of freedom system- harmonic excitation- Logarithmic decrement- magnification factor, vibration isolation and transmissibility.

Unit V TRANSVERSE AND TORSIONAL VIBRATIONS L 9 T 0

Transverse vibrations of shafts and beams-natural frequency- Rayleigh`s method - Dunkerly"s method-whirling of shafts. Torsional vibrations -equivalent shafts- single rotor, two rotor and three rotor systems- Free vibration of geared systems.

Total Number of hours: 45

Learning Resources

Text Books

1. Rattan .S.S, “Theory of Machines”, Fourth Edition, Tata McGraw-Hill Publishing Company Ltd, 2014.
2. Sadhu Singh “Theory of Machines”, Pearson Education, 2013.

Reference Books

1. Ballaney.P.L ”Theory of Machines”, Khanna Publishers, 2013.
2. Rao J.S and Dukkipati R.V, “Mechanism and Machine Theory”, New Age International, New Delhi, 2014.
3. Thomas Bevan, “Theory of Machines” CBS Publishers and Distributers, 2005.
4. Shigley J.E. and Uicker J.J., "Theory of Machines and Mechanisms", 4th edition, oxford university press.

Course Code	**U15ME503R**	L	T	P	C
Course Name	**DESIGN OF MACHINE ELEMENTS**	3	-	-	3

(Use of P S G Design Data Book is permitted)

Prerequisites- subject: Engineering Mechanics, Kinematics of Machinery and Strength of Materials

Course Outcomes

Upon completion of this course the students will be able to

CO1 Select the materials based on Mechanical properties, different types of loading and introduction about simple, steady and variable stresses.

CO2 Illustrate the design procedure for various types of shafts, keys and couplings.

CO3 Design the threaded fasteners, bolted joints including eccentric loading and welded joints and riveted joints for pressure vessels and structures

CO4 Design the various types of springs like helical, leaf and torsional springs under constant loads and varying loads Flywheels considering stresses in rims and arms for engines and punching machines

CO5 State the design procedure for various types of bearings like sliding contact and rolling contact bearing.

Unit I **Steady and Variable Stresses** L 9 T 0

Introduction to the design process - factor influencing machine design, selection of materials based on mechanical properties, Fits and Tolerances, Direct, Bending and torsional stress equations – calculation of principle stresses for various load combinations, eccentric loading – Design of curved beams – crane hook - Factor of safety - theories of failure – stress concentration – design for variable loading – Soderberg, Goodman and Gerber relations.

Unit II **Design of shafts and couplings** L 9 T 0

Design of solid and hollow shafts based on strength and rigidity - Design of keys and key ways - Design of rigid couplings - Box, clamp, Flange and Design of flexible couplings - Bushed pin type.

Unit III **Design of fasteners and welded Joints** L 9 T 0

Threaded fasteners - Design of bolted joints including eccentric loading - Design of welded joints - eccentric loaded welded joints- riveted joints-failure of riveted joints for structures and pressure vessels.

Unit IV **Design of springs and Engine components** L 9 T 0

Design of helical, leaf and torsional springs under constant loads and varying loads - concentric springs - Flywheels considering stresses in rims and arms for engines and punching machines

Unit V Design of bearings L 9 T 0

Design of bearings - sliding contact and rolling contact types. - Selection of Rolling Contact bearings. Cubic mean load - Design of journal bearings - Mckees equation -Lubrication in journal bearings - calculation of bearing dimensions.

Total Number of hours: 45

Learning Resources

Text Books

1. Bhandari V, “Design of Machine Elements”, 3rd Edition, Tata McGraw-Hill Book Co, 2010.

2. Joseph Shigley, Charles Mischke, Richard Budynas and Keith Nisbett “Mechanical Engineering Design”, 8th Edition, Tata McGraw-Hill, 2008.

Reference Books

1. Sundararajamoorthy T. V. Shanmugam .N, “Machine Design”, Anuradha Publications, Chennai, 2003.

2. Robert C. Juvinall and Kurt M. Marshek, “Fundamentals of Machine Design”, Fouth Edition, Wiley, 2005

3. Alfred Hall, Halowenko, A and Laughlin, H., “Machine Design”, Tata McGraw-Hill Book Co. (Schaum’s Outline), 2010

4. Bernard Hamrock, Steven Schmid,Bo Jacobson, “Fundamentals of Machine Elements”, Second Edition, Tata McGraw-Hill Book Co., 2006.

5. Orthwein W, “Machine Component Design”, Jaico Publishing Co, 2003.

6. Ansel Ugural, “Mechanical Design – An Integral Approach", First Edition, Tata McGraw-Hill Book Co, 2003.

7. Merhyle F. Spotts, Terry E. Shoup and Lee E. Hornberger, “Design of Machine Elements” Eight Edition, Printice Hall, 2003.

Course Code	**U15ME504R**	L	T	P	C
Course Name	**COMPUTER AIDED DESIGN AND MANUFACTURING**	3	-	-	3

Pre-requisites subjects: Engineering graphics, manufacturing technology –I and Manufacturing technology - II

Course Outcomes

Upon completion of this course the students will be able to

CO1 State fundamental concepts of Computer aided design and Modeling Techniques.

CO2 Explain construction and development of modern CNC machine and give the details of Automatic Tool changers (ATC).

CO3 Write a CNC part program for manufacturing real time component applications.

CO4 Explain and describe the process planning and group technology in CIM environment.

CO5 Explain about the computer aided quality control systems based CMM testing and also explain flexible manufacturing systems.

Unit I COMPUTER AIDED DESIGN L 9 T 0

Introduction to CAD, Interactive display devices, Operator input/output devices, Graphic standards, 2D Transformation- Scaling, Translation and Rotation. Geometric Modeling- Wire Frame Modeling, Surface Modeling, Solid Modeling-Constructive solid geometry (CSG), Boundary Representation (B-Rep).

Unit II COMPUTER AIDED MANUFACTURING L 9 T 0

CNC Technology-Classification of CNC systems-Contouring System-Interpolators, open loop and closed loop CNC systems, Hardware features-Direct Numerical Control. Construction features - Structural members-Slide ways-Sides linear bearings-Ball screws-Spindle drives and feed drives-work holding devices and tool holding devices-Automatic Tool changers

Unit III CNC – PROGRAMMING L 9 T 0

Computer Numerical Control codes- Punched tapes, G,M Code, Standards, Types of dimensioning, Manual Part programming for point to point- Linear, Circular interpolation. - Canned cycles and subroutines. CNC programming practices for Turning and Milling Operations.

Unit IV GROUP TECHNOLOGY AND CAPP L 9 T 0

Introduction to CIM, Role of Elements, CIM Networking, Group Technology, Part Families, parts Classification & Coding, GT Machine cells, Shop floor phases, Benefits of GT. Computer Aided Process Planning (CAPP), Retrieval type, Generative type Process Planning Systems, Benefits of CAPP.

Unit V COMPUTER AIDED QUALITY CONTROL AND FMS L 9 T 0

Computer Aided Quality Control (CAQC)- Introduction, Contact Inspection methods, Non-Contact Inspection methods, Co-ordinate Measuring Machine. Flexible manufacturing Systems-Introduction, Scope, Types, Elements and Benefits of FMS.

Total Number of hours: 45

Learning Resources

Text Books

1. Ibrahim Zeid." CAD-CAM Theory and Practice", Tata McGraw-Hill Publishing Co. Ltd. 2nd edition.
2. P.Radhakrishan, S.Subramanyan, V. Raju, "CAD/CAM/CIM". New Age International Publishers, 3rd Edition 2012.
3. Mikell P. Groover and Emory W. Zimmers, Jr, "CAD/CAM Computer Aided and Manufacturing". Eastern Economy Edition, PHI publishers 2007.

Reference Books

1. Mikell.P.Groover "Automation, Production Systems and computer integrated and manufacturing", Pearson Education 2016.
2. P.N. Rao, "CAD/CAM Principles and Applications". Tata McGraw Hill Publications, 2010.
3. William .M. Neumann and Robert .F. Sproul, "Principle of Interactive Computer Graphics" McGraw Hill Book Co. Singapore, 2001.
4. Paul G. Ranky, "Computer Integrated Manufacturing- An Introduction with Case Studies" Prentice Hall International, 2004.

Course Code	**U15ME505R**	L	T	P	C
Course Name	**AUTOMOBILE ENGINEERING**	3	-	-	3

Pre-Requisite Subjects: Thermal Engineering & Thermodynamics

Course Outcomes

Upon completion of this course the students will be able to

CO1 Explain the vehicle structure and to discuss the various components of engine.

CO2 Describe the engine auxiliary systems and electrical system of an automobile.

CO3 Discuss about transmission systems and axle types.

CO4 Describe about the steering, brakes and suspension systems of an automobile.

CO5 Discuss the uses of alternative energy sources and describe the automotive safety and comfort systems.

Unit 1 VEHICLE STRUCTURE AND ENGINES L 9 T 0

Types of Automobiles ,Types of vehicle bodies & chasses ,basic layouts of automotive vehicles including electric and hybrid electric systems, specifications and performance parameters of vehicles.

Components of Engine – Their forms, Functions and Materials - Review of Cooling and Lubrication systems in Engine – Turbo Chargers – Electronic Engine Management System. Engine Emission Control by 3–Way Catalytic Controller

Unit II ENGINE AUXILIARY SYSTEMS ELECTRICAL SYSTEM L 9 T 0

Carburetor–working principle- Electronic fuel injection system – Mono-point and Multi - Point Injection Systems – Construction, Operation and Maintenance of Lead Acid Battery, Lithium Ion Battery.

Electrical systems – Battery generator – Starting Motor and Drives – Lighting and Ignition (Battery, Magneto Coil and Electronic Type)-Regulators-cut outs.

Unit III TRANSMISSION SYSTEMS AND AXLE TYPES L 9 T 0

Clutch – Types and Construction – Gear Boxes, Manual and Automatic – Simple Floor Mounted Shift Mechanism – Over Drives – Transfer Box Fluid flywheel-Torque convertors– Propeller shaft – Slip Joint – Universal Joints – Differential and types of Rear Axle Types of Front Axle – Hotchkiss Drive and Torque Tube Drive.

Unit IV STEERING, BRAKES AND SUSPENSION SYSTEM L 9 T 0

Wheels and Tyres – Wheel Alignment Parameters - Steering Geometry and Types of steering gear box– Power Steering – Braking Systems – Types and Construction – Diagonal Braking System –Electronic Board Diagnostics (EBD) . Suspension systems. fluid and solid suspension systems.

Unit V **ALTERNATIVE ENERGY SOURCES AND AUTOMOTIVE SAFETY, COMFORT SYSTEMS** **L 9 T 0**

Use of Natural Gas, LPG, Bio-gas, Biodiesel, Gasohol and Hydrogen in Automobiles - Electric and Hybrid Vehicles, Fuel Cells. Electrical system, Safety systems and HVAC system, connected vehicle system- compressed bio gas vehicle.

Total Number of hours: 45

Learning Resources

Text Books

1. Kirpal Singh "Automobile Engineering Vol. 1& 2", Standard Publishers, New Delhi.
2. Sethi H.M,"Automobile Technology", Tata McGraw-Hill-2013. ISBN-10: 0074603906, ISBN-13:9780074603901

References

1. William H. Crouse and Donald L. Anglin "Automotive Mechanics", 9th Edition. Tata McGraw-Hill, 2013.
2. Newton, Steeds and Garet, "Motor vehicles", Butterworth Publishers, 2007..
3. Srinivasan.S, "Automotive Mechanics" 4th edition, 2011, Tata McGraw-Hill.ISBN-13: 9780070494916.
4. Joseph Heitner, "Automotive Mechanics", 2nd edition, CBS publishers, 2006. ISBN-10: 8123908911.
5. Donald E. Malen, "Fundamentals of Automobile Body Structure Design", 1st edition, SAE international, 2011. ISBN-10: 0768021693.

Course Code	**U15ME901R**	L	T	P	C
Course Name	**ADDITIVE MANUFACTURING TECHNOLOGY**	3	-	-	3

Pre-requisites subjects: Engineering materials and CAD/CAM/CIM

Course Outcomes

Upon completion of this course the students will be able to

CO1 Discuss the advantages and need of time compression in recent product development and explain the product development steps.

CO2 Classify Rapid prototyping techniques (RP) and explain the liquid based RP process like STL and direct metal laser sintering principles and also discuss its process parameters.

CO3 Explain the principle of working solid based RP process like fused deposition modeling and laminated object manufacturing and also discuss its process parameters.

CO4 Discuss various powder based RP process like solid ground curing and 3D printer and its process parameters and also explain the fundamentals of concept modelers.

CO5 Explain advanced rapid tooling like laser engineered net shaping and ballistic particle manufacturing and know the various software and STL file format for RP process and also discuss application of RP process in medical field.

Unit I INTRODUCTION L 9 T 0

Need for time compression in product development, Product development – conceptual design – development – detail design – prototype – tooling.

Unit II CLASSIFICATION L 9 T 0

Classification of RP systems, Stereo lithography systems – Principle – process parameters – process details – machine details, Applications – Direct Metal Laser Sintering (DMLS) system – Principle – process parameters – process details – machine details, Applications.

Unit III FDM & LOM L 9 T 0

Fusion Deposition Modeling – Principle – process parameters – process details – machine details, Applications – Laminated Object Manufacturing – Principle – process parameters – process details – machine details, Applications.

Unit IV SGC & 3DP L 9 T 0

Solid Ground Curing – Principle – process parameters – process details – machine details, Applications. 3 – Dimensional printers – Principle – process parameters – process details – machine details, Applications, and other concept modelers like thermo jet printers, Sander's model maker, JP system 5, Object Quadra system.

Unit V LENS & Rapid Tooling L 9 T 0

Laser Engineering Net Shaping (LENS), Ballistic Particle Manufacturing (BPM) – Principle – Introduction to rapid tooling – direct and indirect method, software for RP – STL files, Magics,

Mimics – Application of Rapid prototyping in Medical field.

Total Number of hours: 45

Learning Resources

Text Books

1. Pham D.T. & Dimov.S.S., “Rapid manufacturing”, Springer-Verlag, London, 2001.
2. Amitabha Ghosh, “Rapid Prototyping – A Brief Introduction”, Affiliated East –West Press Private Limited, New Delhi, 2002

Reference Books:

1. N.Hopkinson, R.J.M, Hauge, p m, dickens, “Rapid Manufacturing – An Industrial revolution for the digital age”, Wiley, 2006
2. Ian Gibson, “Advanced Manufacturing Technology for Medical applications: Reverse Engineering, Software conversion and Rapid Prototying”, Wiley, 2006
3. Paul F. Jacobs, Rapid Prototyping and Manufacturing, “Fundamentals of Stereolithography”, McGraw Hill 1993.
4. Chua C.K, Leong K.F and Lim C.S, Rapid Prototyping: Principles and Applications, second edition, World Scientific, 2003.

Course Code	**U15ME902R**	L	T	P	C
Course Name	**FLEXIBLE MANUFACTURING SYSTEMS**	3	-	-	3

Course Outcomes

Upon completion of this course the students will be able to

CO1 Classify and distinguish FMS and other manufacturing systems including job-shop and mass production systems.

CO2 Explain processing stations and material handling systems used in FMS environments.

CO3 Design and analyze FMS using simulation and analytical techniques.

CO4 Understand tool management in FMS.

CO5 Analyze the production management problems in planning, loading, scheduling, routing and breakdown in a typical FMS.

Unit I INTRODUCTION L 9 T 0

Evolution of Manufacturing Systems, Definition, objective and Need, Components, Merits, Demerits and Applications Flexibility in Pull and Push type, Layouts and their Salient features, Single line, dual line, loop, ladder, robot centre type etc.

Unit II PROCESSING STATIONS AND MATERIAL HANDLING SYSTEM L 9 T 0

Salient features Machining Centers, Turning centre, Coordinate measuring machine (CMM), Washing/ Deburring station , An introduction, Conveyor, Robots, Automated Guided Vehicle (AGV), Automated Storage Retrieval System (ASRS)

Unit III MANAGEMENT TECHNOLOGY L 9 T 0

Tool Management, tool magazine, Tool preset, identification, Tool monitoring and fault detection, routing, Production Planning and Control, Scheduling and loading of FMS, Performance Evaluation of FMS, Analytical model and Simulation model of FMS

Unit IV FLEXIBLE MANUFACTURING CELLS L 9 T 0

Introduction - Cell description and classifications - Unattended machining -Component handling and storage system - Cellular versus FMS - System - Simulation, Hardware configuration - Controllers - Communication networks – Lean production and agile manufacturing.

Unit V FMS SOFTWARE L 9 T 0

Introduction - General Structure and requirements - Functional descriptions - Operational overview - Computer simulation - FMS installation - Objective - Acceptance testing - Performance goals - Expectations - Continued support.

Total Number of hours: 45

Learning Resources

Text Books

1. William W. Luggen, “Flexible Manufacturing Cells and Systems”, Prentice Hall, New Jersey, 1991.
2. Mikell P. Groover, “Automation Production Systems &Computer Integrated manufacturing”, Prentice Hall of India, New Delhi, 2016.
3. Jha.N.K, "Handbook of Flexible Manufacturing Systems", Academic Press Inc.,1991.

Reference Books

1. David J. Parrish, “Flexible Manufacturing”, Butterworth-Heinemann, Newton, MA, USA, 1993.
2. Radhakrishnan.P and Subramanyan.S, “CAD/CAM/CIM”, Wiley Eastern Ltd., New Age International Ltd., 2016.
3. Raouf.A and Ben-Daya.M, Editors, “Flexible manufacturing systems: recent development”, Elsevier Science, 1995.
4. Kalpakjian, “Manufacturing engineering and technology”, Addison-Wesley Publishing Co., 2009.
5. Taiichi Ohno, “Toyota production system: beyond large-scale production”, Productivity Press (India) Pvt. Ltd. 2011.

Course Code **U15ME903R**

Course Name **HEATING, VENTILATION AND AIR CONDITIONING**

Pre-requisites subject: Engineering Thermodynamics, Thermal Engineering and Heat and Mass Transfer

Course Outcomes

Upon completion of this course the students will able to

CO 1 State the significance of HVAC system and use of psychometric charts

CO 2 Discuss the concept of heating and cooling load calculation

CO 3 Analyze the concept of ventilation system and various application of ventilation system.

CO 4 Discuss the concept of air distribution system and explain the design of duct system.

CO 5 Explain the basic concept of different air conditioning system and discuss the concept of chilled water system.

UNIT-1 INTRODUCTION & BASICS OF HVAC **9**

Introduction to HVAC – Scope, Basics and importance of HVAC - Advancements in HVAC - Standards & codes used In HVAC System- Modes of heat transfer in a building - Basic components of air conditioning - Study on psychometric charts - Properties of Air (DBT, %RH, WB, DPT, enthalpy).

UNIT-2 HEATING AND COOLING LOAD ESTIMATION **9**

Introduction - Heating load – cooling load - solar radiation – Heat through building structures – Infiltration – Internal heat gains – Factors considered in load estimation sheet – Design procedure for heating load and Cooling load – simple problems.

UNIT-3 VENTILATION SYSTEM **9**

Basics of Ventilation – Need - limits of contaminants - estimation of ventilation rates - decay equation - air flow round buildings - Methods of Ventilation – Natural - wind effect - stack effect - combined effect. Mechanical – forced – exhaust and combined.
Ventilation System Design - Residence kitchen ventilation system design – Industrial Toilet ventilation.

UNIT-4 DUCT AND AIR DISTRIBUTIUON SYSTEM **9**

Duct system – Size, shape & material – Pressure losses in ducts – Duct design – determination of duct size – Equal friction method – Simple problems. Air distribution – Principle of air distribution – Air handling system – Room air distribution – Arrangements of duct – Types of air distribution system.

UNIT-5 AIRCONDITIONING & CHILLED WATER SYSTEM **9**

Window Air Conditioning Systems - Split Air Conditioning Systems - Central Air Conditioning Systems - Package Air Conditioning Systems. Chilled water system - types – Selection procedure - Components of chilled water system.

Total Periods = 45

Note: (Use of “Refrigeration and Air-Conditioning” data book, Domkundwar, Dhanpat Rai & co, and Approved HVAC data book are permitted in the University examination)

Learning Resources

Text Books

1. Faye C.McQuiston, Jerald D.Parker & Jeffrey D.Spitler “Heating, Ventilating, and Air Conditioning analysis and Design”, sixth edition, Wiley, Reprint 2016.
2. R.K.Rajput, “A Textbook of Refrigeration and Air-Conditioning”, S.K. Kataria & Sons, 2014.

Reference Books

1. Edward G.Pita “Air conditioning principles and systems”, PHI learning Private Limited, Fourth edition, Reprint 2012.
2. Ali vedavarz, Sunil kumar and Muhammed iqbal hussain, “The Handbook of Heating, Ventilation and Air Conditioning for Design and Implementation”, Industrial press inc, new york, 2007.
3. P.L.Ballaney, “Refrigeration and Air Conditioning”, Khanna Publishers, 2013.
4. Shan K. Wang, “Handbook Of Air Conditioning And Refrigeration”, Second Edition, McGraw-Hill.
5. Arthur A. Bell Jr, “HVAC Equations, Data, and Rules of Thumb”, McGraw-Hill.

Course Code U15ME506R HEAT POWER LABORATORY

Course Name

Pre-Requisite Subjects: Thermal engineering and Heat and mass transfer.

Course Outcomes

Upon completion of this course the students will be able to

CO1 Apply the fundamental theory and equations of one dimensional steady state heat conduction systems.

CO2 Analyze the convective heat transfer in forced and free convection systems by applying the concepts of thermodynamics, heat transfer, and fluid mechanics.

CO3 Analyze and optimize the heat exchangers LMTD method and Effectiveness-NTU method.

LIST OF EXPERIMENTS **Total Hours45**

1. Thermal conductivity measurements by guarded plate method
2. Thermal conductivity of metal bar.
3. Natural convection heat transfer from a vertical cylinder
4. Forced convection inside tube.
5. Heat Transfer from Pin-fin (Natural & Forced convection modes)
6. Determination of Stefan- Boltzman constant
7. Determination of Emissivity of a grey surface.
8. Effectiveness of parallel/ Counter flow heat Exchanger.
9. Thermal conductivity of insulating powder.
10. Thermal conductivity of composite wall material.

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

1. Heat transfer through guarded plate apparatus	1 No
2. Heat transfer through metal bar apparatus.	1 No
3. Heat transfer through Natural convection apparatus.	1 No
4. Heat transfer through Forced convection apparatus.	1 No
5. Heat Transfer through Pin-fin apparatus.	1 No
6. Heat transfer through Stefan- Boltzman constant apparatus.	1 No
7. Heat transfer through Emissivity apparatus.	1 No
8. Heat transfer through parallel/ Counter flow heat Exchanger.	1 No

9. Thermal conductivity of insulating powder.	1 No
10. Thermal conductivity of composite wall material.	1 No

Course Code	**U15ME507R**	L	T	P	C
Course Name	**DYNAMICS LABORATORY**	-	-	4	2

Pre-Requisite Subjects: Dynamics of Machinery

Course Outcomes

Upon completion of this course the students will be able to

CO1 Demonstrate the kinematics of 4bar, Slider crank and Crank Rocker mechanisms, Universal joints and Gear trains.

CO2 Determine the sensitivity, effort of Governors and determination of profile of cam. determine the gyroscopic couple of Gyroscope and determination of Critical speed of shaft .

CO3 Experience the balancing of rotating and reciprocating masses and determination of Moment of Inertia by oscillation method, determine the natural, tensional frequencies of beam and compound pendulum and determination of damping co-efficient of spring mass system.

LIST OF EXPERIMENTS **Total Hours 45**

1. Kinematics of 4 bar mechanisms – Slider crank and Crank Rocker Mechanism - Determination of velocity and acceleration.

2. Kinematics of Universal Joints – Determination of velocity and acceleration

3. Kinematics of Gear Trains – Simple, Compound, Epi-cyclic and differential: Determination of velocity ratio and Torque

4. Governors - Determination of sensitivity, effort, etc. for Watt, Porter, Proell, and spring controlled Governors

5. Cam – Determination of jump speed and profile of the cam.

6. Motorized Gyroscope-Verification of laws -Determination of gyroscopic couple.

7. Whirling of shaft-Determination of critical speed of shaft with concentrated loads.

8. Balancing of rotating and reciprocating masses.

9. Determination of moment of inertia by Oscillation method for connecting rod and flywheel.

10. Vibrating system - spring mass system - Determination of damping co-efficient of single degree of freedom system

11. Determination of torsional frequencies for compound pendulum and flywheel system with lumped Moment of inertia.

12. Transverse vibration –free- Beam. Determination of natural frequency and deflection of beam.

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

1. Four bar Mechanism
2. Slider Crank Mechanism
3. Universal Joint
4. Compound Gear Train
5. Epicyclic Gear Train
6. Differential Gear Mechanism (Assembled)
7. Universal Governor
8. Cam Analysis Machine
9. Motorized Gyroscope
10. Whirling of shafts
11. Balancing of rotating masses Apparatus.
12. Balancing of reciprocating masses Apparatus.
13. Dynamics Balancing Machine
14. Moment of Inertia by Oscillation
15. Vibrating Table
16. Compound Pendulum
17. Transverse Vibration Apparatus

		L	T	P	C
Course Code	**U15ME508R**				
Course Name	**CAD and CAM LABORATORY**	-	-	4	2

Pre-requisites subject: Computer aided drafting laboratory, Manufacturing Technology

Course Outcomes

Upon completion of this course the students will be able to

CO1	Explain the capability Code of practice for Engineering Drawing BIS specifications – Welding symbols riveted joints keys and fasteners.
CO3	Draw Orthographic views of standard machine components: Brackets V Blocks Stop Block Screw threads and Threaded fasteners.
CO4	Create 3D modeling of Flange coupling Plummer block bearing Universal Joint Machine vice and stuffing box, to understand turning and milling programs in CNC machines by using G & M Codes

Total Hours 45
LIST OF EXPERIMENTS

PART-A-CAD

1. **Drawing Standards**

Code of practice for Engineering Drawing, BIS specifications – Welding symbols,

Riveted joints, keys, Fasteners – Reference to hand book for the selection of standard components like bolts, nuts, screws, keys etc.

2. Introduction to Drafting Software

Drawing, Editing, Dimensioning and Plotting Commands-Layering concepts-Limits, Fits and Tolerances.

3. Preparation of 2-D Drawings

Orthographic views of standard machine components:

Brackets, V Blocks, Stop Block, Screw threads and Threaded fasteners.

4. Assembly Drawing (Preparation of assembled view) 1.Flange coupling

2. Plummer block
3. Bearing
4. Universal Joint
5. Machine vice
6. Stuffing box.

LIST OF EQUIPMENT'S

1. 60 Systems (Intel core 2 quad E8200@2.33GHz,1033MHz FSB, 4MB L2 Cache, 2GB RAM, 250GB HDD, 18.5"TFT Monitor).

LIST OF SOFTWARE (FOR A BATCH OF 30 STUDENTS)

1. Solid Works 2012 and ANSYS 12.0 - 100 users.

PART-B-CAM

1. CNC Part Programming for facing cycle.
2. CNC Part Programming for turning cycle.
3. CNC Part Programming for threading cycle.
4. CNC Part Programming Taper Turning operation
5. Circular Interpolation CCW&CW operation
6. Part Programming for Grooving, Drilling and Boring operation.
7. Part programming of Canned Cycle operations.
8. Wire cut EDM operation.

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

1. CNC Lathe
2. CNC Wirecut EDM
3. 30 System

List of software (for a batch of 30 students)

1. CADEM 8.0 - 30 users

Semester –V	U15GE501R- SOFT SKILLS AND APTITUDE - III	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 supplementary areas of soft-skills and job-related selection processes using hands-on and/or case-study approaches
5. Solve problems of advanced levels than those in SSA-II in specified areas of quantitative aptitude and logical reasoning and score 70-75% marks in company-specific internal tests
6. Demonstrate greater than SSA-II level of verbal aptitude skills in English with regard to given topics and score 70-75% marks in company-specific internal tests

1.Soft Skills	**Demonstrating soft-skill capabilities with reference to the following topics:** i. Career planning j. Resume writing k. Group discussion l. Teamwork m. Leadership skills n. Interview skills o. Mock interview p. Mock GDs
2.Quantitative Aptitude and Logical Reasoning Topics	**Solving problems with reference to the following topics :** m. Numbers: Remainder concept n. Time and work: Fraction technique, Efficiency technique, Pipes and cisterns and Chain rule o. Simple interest p. Compound interest q. Set theory: Venn diagram r. Puzzles s. Mathematical operators t. Syllogism (≥4 Statements) u. Data sufficiency v. Statement and assumptions w. Statement and conclusions x. Company specific aptitude questions
3. Verbal Aptitude	**Demonstrating English language skills with reference to the following topics:** h. Subject verb agreement i. Selecting the best alternative for the stated parts of given sentences j. Reading comprehension k. Contextual synonyms l. Sentence fillers m. Writing a story for a given picture n. Company specific aptitude questions

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

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit
Theory						
1	U15EE501R	Total Quality Management in Electrical Industry	3	0	0	3
2	U15EE502R	Linear Integrated Circuits	3	0	0	3
3	U15EE503R	Microprocessors and Microcontrollers	3	0	0	3
4	U15EE504R	Power Electronics	3	0	0	3
5	U15EE505R	Electrical Machine Design	2	2	0	3
6	U15EE901R	**Elective** – Non-Conventional Energy Sources	3	0	0	3
Practical						
7	U15EE506R	Linear and Digital IC Laboratory	0	0	4	2
8	U15EE507R	Microprocessors and Microcontroller Laboratory	0	0	4	2
9	U15EE508R	Power Electronics Design Laboratory	0	0	4	2
10	U15GE501R	Soft Skills and Aptitude - III	0	0	2	1
					Total Credits	**25**

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, Fifth Semester BE EEE Students and Staff, COE

U15EE501R TOTAL QUALITY MANAGEMENT IN ELECTRICAL INDUSTRY 3 0 0 3

COURSE OUTCOMES

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

- Explain the fundamental concepts and principles of total quality management (TQM) along with the contributions of quality gurus.
- Discuss the various statistical tools used for quality control.
- Illustrate the techniques of quality which are widely practiced in organizations.
- Discuss the fundamental concepts of ISO 9001:2015 and ISO 50001:2011 standards and quality awards.
- Explain the concepts of world class manufacturing.

UNIT I EVOLUTION OF QUALITY 7

Quality control – quality assurance – total quality management – core concepts – quality gurus and their contribution – quality costs – quality measurement.

UNIT II STATISTICAL PROCESS CONTROL IN INDUSTRY 15

Statistical quality control – quality control vsprocess control – control charts – applications – problems – seven tools of quality – seven tools of management – implementation in electrical industry.

UNIT III TECHNIQUES OF QUALITY IN INDUSTRY 8

TQM tools: Quality Function Deployment (QFD) – Failure Modes and Effect Analysis (FMEA) – applications in industry. Process approach and improvement: just in time – KANBAN – 5S principle in industry – zero defects – poka yoke –SMED-Quality circles.

UNIT IV QUALITY SYSTEMS AND AWARDS 8

ISO 9001:2015 and ISO 50001:2011: philosophy – elements – requirements – benefits – procedure – documentation – certification – auditing – implementation in organization – awards: MBNQA, EQA, RGNQA.

UNIT V WORLD CLASS MANUFACTURING 7

Six sigma – lean manufacturing – lean six sigma – theory of constraints – agile manufacturing.

Lecture: 45, Tutorial: 0, TOTAL: 45 Hours

TEXT BOOKS:

1. Ramasamy,Subburaj,"Total Quality Management", 7th reprint McGrawHill,2016.
2. Dale H. Besterfield, Carol Besterfield-Michna, Glen Besterfield and Mary Besterfield-Sacre,"Total Quality Management", Third edition, Pearson Education, 2013.

REFERENCES:

1. Dahlgaard Jens J; Kristensen Kai; Kanji Gopal K, "Fundamentals of Total Quality Management: process analysis and improvement" , Nelson Thornes Ltd, 2010
2. Lal.H," Total Quality Management: a Practical Approach", New Age International, 2014
3. James R.Evans& William M.Lidsay, "The Management and Control of Quality", Eighth Edition, South – Western (Thomson Learning), 2011.
4. https://www.iso.org/popular-standards.html

U15EE502R LINEAR INTEGRATED CIRCUITS 3 0 0 3

COURSE OUTCOMES:

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

- Describe the IC fabrication process of active and passive components.
- Infer the DC and AC characteristics of op-amp and its effect on output and their compensation techniques.
- Elucidate and design filters and generate waveforms using op-amp circuits.
- Explain and compare the working of multi-vibrators using special application IC 555 and PLL and its application in communication.
- Design the application specific ICs such as voltage regulators and isolation amplifier.

UNIT I IC FABRICATION 9

IC classification, fundamentals of monolithic IC technology – basic planner process – epitaxial growth, masking and etching, realization of monolithic ICs and packaging.fabrication of active and passive components (R, C, diodes, transistors, FETs) in ICs.

UNIT II CHARACTERISTICS OF OP-AMP 9

Block diagram of differential amplifier, packingcharacteristics, ideal op-amp – ideal differential amplifier – differential mode, common mode, CMRR –ideal op-amp characteristics – practical op-amp characteristics – open loop and closed loop configuration of ideal and practical op-amp as an inverting amplifier, non-inverting amplifier, voltage follower, DC characteristics, AC characteristics – frequency response, slew rate, frequency compensation.

UNIT III APPLICATIONS OF OP-AMP 9

summing amplifier – adder, subtractor, low pass and high pass filters, three op-amp instrumentation amplifier, log and antilog amplifiers, waveform generator (triangular, saw tooth and stair case waveforms), clippers and clampers, sample and hold circuit, differentiator, integrator, comparators & its characteristics, Schmitt trigger, peak detector, precision rectifiers.

UNIT IV SPECIAL ICS AND APPLICATIONS 9

555 timer circuit – functional block, applications - monostable multi-vibrator, astable multi-vibrator, 565 phase locked loop – functional blocks, capture range, lock range, applications – frequency multiplier, FSK, AM detection, FM demodulator, 566 voltage controlled oscillator circuit – functional block, voltage to frequency conversion factor, analogmultiplier ICs.

UNIT V VOLTAGE REGULATORS AND APPLICATION ICS 9

Fixed voltage regulators (IC78xx, 79xx), adjustable voltage regulators (LM317, 337), LM 380 power amplifier, ICL 8038 Function generator IC, general purpose voltage regulator (IC723), switching voltage regulator (ICµA 78S40) – SMPS, isolation amplifier, Opto-coupler, Opto-electronic ICs.

Lecture: 45, Tutorial: 0, TOTAL: 45 Hours

TEXTBOOKS:

1. D.RoyChoudhry, Shail Jain, “Linear Integrated Circuits”, New Age International Pvt. Ltd., 4th Edition ,2012.
2. RamakantA.Gayakwad, “Op-amp and Linear ICs”, Prentice Hall, 4th Edition, 2010.

REFERENCES:

1. Jacob Millman, Christos C. Halkias, “Integrated Electronics – Analog and Digital Circuit System”, Tata McGraw Hill, 2009.
2. Robert F. Coughlin, Frederick F. Driscoll, “Operational Amplifiers and Linear Integrated Circuits”, PHI, 2015.
3. S.Salivahanan& V.S. KanchanaBhaskaran, “Linear Integrated Circuits”, TMH, 2014.
4. K.R. Botkar, “Integrated Circuits”, Khanna Publisher, 5th Edition, 2010.

U15EE503R MICROPROCESSORS AND MICROCONTROLLERS 3 0 0 3

COURSE OUTCOMES:

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

- Analyse the architecture, discuss the addressing modes, instruction set interrupt structure and develop skill in simple programming of Intel 8085 microprocessor.
- Discuss various Peripheral Interfacing functions and interface with 8085 processor.
- Outline the architecture, discuss the addressing modes, instruction set interrupt structure and develop skill in simple programming of Intel 8086 microprocessor.
- Analyse the architecture, discuss the addressing modes, instruction set interrupt structure and develop skill in programming of Intel 8051 microcontroller.
- Apply the interfacing techniques in motors and traffic light controller for microcontroller based simple applications.

UNIT I 8085 MICROPROCESSOR 9

8085 architecture – instruction set – addressing modes – need for assembly language – development of assembly language programs – machine cycles and timing diagrams – interrupts - memory interfacing, typical EPROM and RAM Interfacing.

UNIT II PERIPHERALS INTERFACING OF 8085 9

Architecture and programming of ICs: 8255 PPI, 8259 PIC, 8251 USART, 8279 keyboard display controller ,8254 timer/ counter, interfacing ADC0801 A/D converter – DAC0800 D/A converter – waveform generation, sensors – interfacing IO devices with 8085.

UNIT III 8086 MICROPROCESSOR 9

8086 architecture – 8086 addressing modes – memory organization instruction set – 8086 assembly language programming – interrupts.

UNIT IV 8051 & PIC18F MICROCONTROLLER 9

8051: Architecture, I/O pins – ports and circuits – memory organization (internal and external) – counters and timers – serial data I/O – interrupts. PIC18F: Architecture, I/O pins – ports and circuits.

UNIT V 8051 PROGRAMMING AND APPLICATIONS 9

8051 addressing modes – instruction set – 8051 simple programming: speed control of stepper motor, induction motor, DC motor and traffic light control.

Lecture: 45, Tutorial:00, TOTAL: 45 Hours

TEXT BOOKS

1. Gaonkar, R. S., "Microprocessor Architecture, Programming and Application with the 8085", Penram International Publishing, 6th edition, 2013.
2. Soumitra Kumar Mandal, "Microprocessors and Microcontrollers", McGraw Hill Education (India) Private Limited, 2013.

REFERENCE BOOKS

1. Krishna Kant, "Microprocessors and Micrcontrollers", Eastern Econmy Edition, PHI Learning Private Limited, 2014.
2. Mohammed Ali Mazidi and Janice GillispieMazidi, "The 8051 Microcontroller and Embedded Systems", Pearson Education, 2005.
3. Senthilkumar, N., Saravanan, M., Jeevananthan, S., "Microprocessor and Microcontrollers", Oxford University Press, 2014.
4. Danny Causey, Muhammad Ali Mazidi and Ralin D McKinlay, "PIC Microcontroller & Embedded System: Using Assembly and C for PIC18", Pearson Education India, 2008.

U15EE504R POWER ELECTRONICS 3 0 0 3

COURSE OUTCOME

To enable students to,

- Explain different types of power semiconductor devices and their v-i and switching characteristics with protection circuits.
- Illustrate the operation, characteristics and performance parameters of single phase and three phase controlled converters.
- Classify different types of chopper and to analyse the operation of choppers with relevant mode waveforms.
- List various types of inverter and Explain the operation of single phase and three phase inverters with and outline voltage control and harmonic reduction methods.
- Explain operation of single phase and three phase AC voltage regulators with its sequence control techniques and Summarise the operation of cycloconverters.

UNIT I POWER SEMI-CONDUCTOR DEVICES 9

Symbol, VI and Switching characteristics of Power diodes, SCR, BJT, MOSFET, IGBT and IGCT – Firing and Gating circuits for MOSFET, IGBT – Protection for thyristor – Series and parallel operation of SCRand MOSFET.

UNIT II PHASE-CONTROLLED CONVERTERS 9

Single phase half wave and full wave converter - half controlled bridge converter and full controlled bridge converter with R,RL Load – Estimation of average & RMS values of load voltage, load current and input power factor.

Three phase full bridge converter – Half controlled and fully controlled converter with R, RL Load – Estimation of average & RMS values of load voltage, load current for R load.

UNIT III DC TO DC CONVERTER 9

DC Choppers : Principle of step up , step down chopper and Step Up/Down Chopper operation – Control strategies – Classification & operation of choppers class(A,B,C,D,E) – Operation of voltage, current and load commutated choppers.

UNIT IV INVERTERS 9

Types of inverters – operation of Single phase and three phase (120^{o}, 180^{o}) voltage source inverter modes analysis with star connected R load – operation of single phase current source inverter – series inverters – parallel inverter – Voltage control of Single phase inverters – harmonic reduction techniques and filters.

UNIT V AC TO AC CONVERTERS 9

AC Voltage Controllers : Single phase voltage regulators – half wave and full wave with R, RL loads – sequence control of AC regulators – two stage sequence regulator with R, RL load – Multistage sequential control of AC regulators – Introduction to Three phase regulators (no analysis).

Cycloconverters : Single phase to single phase cycloconverter – three phase to single phase and three phase to three phase cycloconverters.

Lecture : 45, Tutorial :0, TOTAL :45Hours

TEXT BOOKS

1. Singh.M.D.&Khanchandani.K.B. Power Electronics Mcgraw Education (India) Private limited, New Delhi 2016.
2. P.S.Bimbra “Power Electronics” Khanna Publishers, third Edition 2003.

REFERENCES

1. M.H. Rashid, ‘Power Electronics: Circuits, Devices and Applications’, Pearson Education, PHI Third edition, New Delhi 2004.
2. Ned Mohan, Tore. M.Undeland, William.P.Robbins, ‘Power Electronics: Converters, applications and Design’, John Wiley and sons, third edition, 2003.
3. Philip T. Krien, “ Power Electronics’ Oxford University Press, 2012.
4. Daniel.W.Hart, “Power Electronics”, Indian Edition, McGraw Hill, 3 rd Print, 2013.

U15EE505R ELECTRICAL MACHINE DESIGN 2 20 3

COURSE OUTCOMES:

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

- Approximate the design values for machine dimensions for the required power.
- Relate the output power of a DC machine with its main dimensions and design the armature of a DC machine.
- Relate the output power of a transformer with its core dimensions and design the transformer.
- Relate the power of an induction motor with its main dimensions and design squirrel cage and slipring induction motors.
- Relate the power of a synchronous machine with its main dimensions and design salient pole and cylindrical pole type synchronous machines.

UNIT I INTRODUCTION 12

Definition for design – considerations and limitations in design – concept of magnetic circuit – comparison of magnetic and electric circuits – MMF calculation for air gap and teeth – real and apparent flux density in rotating machines – total loadings – specific loadings – magnetic leakage calculations– leakage reactance – specific permeance of semi-closed parallel sided slots used ininductionmachineand transformers.

UNIT II D.C. MACHINES 12

Output equation – main dimensions – separation of D and L – choice of specific loadings – choice of number of poles – core length – armature diameter – pole proportions – design of air gap – armature design –design of commutator and brushes.

UNIT III TRANSFORMERS 12

Classification of transformers – output of single phase and three phase transformers – volt per turn and transformer constants – optimum design – design of core, windings and yoke for core and shell type transformers – temperature rise of transformers – design of tanks and cooling tubes.

UNIT IV THREE PHASE INDUCTION MOTOR 12

Output equation – main dimensions – separation of D and L – choice of specific loadings – design of stator – length of airgap – design of rotor bars and end rings of squirrel cage rotor – design of wound rotor.

UNIT V SYNCHRONOUS MACHINES 12

Output equation – runaway speed – main dimensions – separation of D and L – choice of specific loadings – short circuit ratio – estimation of airgap length – shape of pole face – design of stator and rotor of cylindrical pole and salient pole machines –design of damper winding – design of field winding.

Lecture: 30, Tutorial: 30, TOTAL: 60 Hours

TEXT BOOKS:

1. A.K.Sawhney, “A Course in Electrical Machine Design”, DhanpatRai and Sons, 2003.
2. C.Easwarlal, “Electrical Machine Design”, Sonaversity, First Edition, 2009.

REFERENCES:

1. V.N. Mittle and A. Mittle, “Design of Electrical Machines”, Standard Publications, 2002.
2. Sen S.K., “Principles of Electrical Machine Designs with Computer Programmes”,Oxford and IBH Publishing Co. Pvt. Ltd., Second Edition, 2009.
3. R.K.Agarwal, “Principles of Electrical Machine Design”, S.K.Kataria and Sons, Delhi, 2002.
4. A.Nagoorkani, “Electrical Machine Design”, RBA publications, 2005.

U15EE901R NON-CONVENTIONAL ENERGY SOURCES 3 0 0 3

COURSE OUTCOMES

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

- Describe the power demand scenario in world level and impact of various renewable energy sources in satisfying power demand.
- Explain the principle of operation and the application of solar system.
- Outline in the components and to find the suitability based on the performance of wind energy and Conversion system, biomass energy system
- Describe the principle of operation and the application of geo thermal power tidal power generation scheme, wave energy and OTEC scheme.
- Illustrate the emerging energy generation systems of MHD, Thermal and fuel cells applications.

UNIT – I INTRODUCTION 9

World energy futures–Energy sources and their availability – Energy cycle of the earth – environmental aspects of energyutilization – Energy plantation- Renewable energy resources and their importance- Prospects of Renewable energy sources.

UNIT – II SOLAR ENERGY SYSTEMS 9

Introduction –Solar radiation and measurements-Solar energy collectors-solar energy storage systems- Solar pond and applications- Applications of solar energy: solar pumping, solar cooking, solar distillation and solar greenhouse.

UNIT – III WIND AND BIOMASS ENERGY SYSTEMS 9

Introduction – Wind Energy conversion- Wind speed and power relation – Power extracted from wind – wind distributionand wind speed predictions – types of Wind power systems.

Bio mass conversion technologies-Biogas generation-Types of biogas plants-Bio gas from plant wastes-Utilization of Bio gas and applications.

UNIT – IV GEO THERMAL, TIDAL AND OCEAN ENERGY SYSTEMS 9

Geothermal energy – Estimates of Geothermal power- site selection for geothermal power plant- Applications of Geothermal energy.Origin of tides – Basic principle of Tidal power- Operation of a Tidal power plant. Ocean Thermal Energy conversion system- Open and closed OTEC cycles- Prospects of ocean thermal energy conversion in India.

UNIT – V EMERGING ENERGY SYSTEMS 9

Magneto Hydro Dynamic (MHD) Power Generation- MHD systems and its operation. Thermo Electric power generation- Basic principle- Thermo electric power generator.

Thermonuclear fusion energy-Nuclear fusion and reactions- Advantages. Fuel cell- classification of fuel cells-Fuel cell based electrical power generation scheme- Applications.

Lecture: 45; Tutorial: 0; Total: 45

TEXT BOOKS:

1. Rai, G.D., “Non-Conventional Energy Sources”, Khanna Publishers, Sixth Edition 2017.
2. Khan, B.H, Non- Conventional Energy Resources”, Mc. Graw Hill Education Ltd, third reprint 2017.

REFERENCES:

1. Rao S. Paruklekar,B.B, “Energy Technology – Non Conventional, Renewable and Conventional”, KhannaPublishers,1994.
2. F.Kreith and J.F.Kreider, “Principles of Solar Engineering”, McGraw Hill.
3. T.N.Veziroglu, “Alternative Energy Sources”, Vol 5 and 6, McGraw Hill.
4. MukundR.Patel, “Wind and Solar Power Systems”, CRC Press LLC.

U15EE506R LINEAR AND DIGITAL IC LABORATORY 0 0 4 2

COURSE OUTCOMES:

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

- Develop an inverting, non-inverting and Schmitt trigger circuits for the given parameter using Op-amp and also todesign circuit diagrams for instrumentation amplifier and precision rectifier using operational amplifier.
- Design an astable and mono stable multivibratorcircuits for the given frequency using IC555.
- Implement Boolean function and code conversion circuit using logic gates and also to verify the truth table for Adder, Subtractor, Multiplexer, Counter and De-multiplexer.

LIST OF EXPERIMENTS:

1. Design of inverting and non-inverting amplifiers.
2. Design of instrumentation amplifier using op-amp.
3. Design of integrator and differentiator (IC741).
4. Design of schmitt trigger using op-amp.
5. Design of precision rectifiers using op-amp.
6. Design of astable and monostable multi vibrators using IC555 timer.
7. Minimization of Boolean function and implement using logic gates.
8. Design of adder and subtractor
9. Design of code converters.
10. Design of encoders and decoders using suitable ICs.
11. Design of multiplexer and de-multiplexer
12. Design and implementation of 4-bit synchronous counter using JK flip flop

Total: 60 Hours

U15EE507R MICROPROCESSORS AND MICROCONTROLLERS LABORATORY 0 0 4 2

COURSE OUTCOMES:

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

- Write an assembly language program to perform basic arithmetic operations using 8085 Microprocessor instructions and also to interface various devices using 8085 instructions.
- Write an assembly language program to perform basic arithmetic operations using 8086 Microprocessor instructions.
- Write an assembly language program to perform basic arithmetic operations using 8051Microcontroller instructions

LIST OF EXPERIMENTS:

1. Assembly Language Programming of 8-bit binary addition and subtraction using 8085 processor.
2. Assembly Language Programming of 8-bit binary multiplication and division using 8085 processor.
3. Assembly Language Programming of 16-bit addition and multiplication using 8085 processor.
4. Assembly Language Programming of 8-bit Minimum/Maximum number, Ascending/Descending order using 8085 processor.
5. Assembly Language Programming of Code converter (BCD to Binary and Binary to BCD) using 8085 processor.
6. Assembly Language Programming of Interface Experiments (A/D and D/A interface) using 8085 processor.
7. Interfacing and Programming of Stepper Motor control using 8085 processor.
8. Assembly Language Programming of 16-bit binary addition and subtraction using 8086 processor.
9. Assembly Language Programming of 16-bit binary multiplication and division using 8086 processor.
10. Assembly Language Programming of 8-bit binary addition and subtraction using 8051microcontroller.
11. Assembly Language Programming of 8-bit binary multiplication and division using 8051 microcontroller.
12. Assembly Language Programming of Array of addition using 8051 microcontroller.

Total: 60 Hours

U15EE508R POWER ELECTRONICS DESIGN LABORATORY 0 0 4 2

COURSE OUTCOME

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

- Design different types of firing circuits for SCR and driver circuits for MOSFET and IGBT.
- Design various configurations of converters to feed R and RL loads.
- Verify the operation of step down and step up choppers, commutated choppers, single phase and three phase PWM inverters, cycloconverter and AC voltage regulators.

LIST OF EXPERIMENTS

1. Static characteristics of SCR, MOSFET and IGBT.
2. Construct R, RC and UJT firing circuits for SCR.
3. Driver circuit design for MOSFET and IGBT device.
4. Develop Digital Firing Circuits of SCR.
5. Design of Single phase half controlled & fully controlled converter using R, RL Loads.
6. Design of Three phase half controlled & fully controlled converter using R, RL Loads
7. Design of Step down and step up MOSFET based choppers.
8. Construct Current and Voltage Commutated Chopper.
9. Construct and verify the Four Quadrant operation of Chopper.
10. Design IGBT based single-phase PWM inverter.
11. Design IGBT based three-phase PWM inverter(120 and 180 degree)
12. Design of Single phase cycloconverter.
13. Construct Single phase and Three phase AC voltage regulators and verify its operation.

Total: 60 Hours.

Semester –V	U15GE501R- SOFT SKILLS AND APTITUDE - III	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 supplementary areas of soft-skills and job-related selection processes using hands-on and/or case-study approaches
8. Solve problems of advanced levels than those in SSA-II in specified areas of quantitative aptitude and logical reasoning and score 70-75% marks in company-specific internal tests
9. Demonstrate greater than SSA-II level of verbal aptitude skills in English with regard to given topics and score 70-75% marks in company-specific internal tests

1.Soft Skills	**Demonstrating soft-skill capabilities with reference to the following topics:** q. Career planning r. Resume writing s. Group discussion t. Teamwork u. Leadership skills v. Interview skills w. Mock interview x. Mock GDs
2.Quantitative Aptitude and Logical Reasoning Topics	**Solving problems with reference to the following topics :** y. Numbers: Remainder concept z. Time and work: Fraction technique, Efficiency technique, Pipes and cisterns and Chain rule aa. Simple interest bb. Compound interest cc. Set theory: Venn diagram dd. Puzzles ee. Mathematical operators ff. Syllogism (≥4 Statements) gg. Data sufficiency hh. Statement and assumptions ii. Statement and conclusions jj. Company specific aptitude questions
3. Verbal Aptitude	**Demonstrating English language skills with reference to the following topics:** o. Subject verb agreement p. Selecting the best alternative for the stated parts of given sentences q. Reading comprehension r. Contextual synonyms s. Sentence fillers t. Writing a story for a given picture u. Company specific aptitude questions

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

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit
Theory						
1	U15EC501R	Digital Communication	3	0	0	3
2	U15EC502R	Transmission Lines and Waveguides	2	2	0	3
3	U15EC503R	Microprocessors and Microcontroller	3	0	0	3
4	U15CS507R	Data Structures and Object Oriented Programming in C++	3	0	0	3
5	U15EC504R	Control Systems	2	2	0	3
6	U15EC505R	VLSI Design	3	0	0	3
Practical						
7	U15EC506R	Microprocessors and Microcontroller Laboratory	0	0	2	1
8	U15EC507R	VLSI Laboratory	0	0	2	1
9	U15EC508R	Communication Laboratory	0	0	2	1
10	U15GE501R	Soft Skills and Aptitude - III	0	0	2	1
					Total Credits	**22**

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, Fifth Semester BE ECE Students and Staff, COE

U15EC501R	DIGITAL COMMUNICATION	L T P C 3 0 0 3

COURSE OUTCOMES

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

1. Analyze the sampling process and different types of digital pulse modulation techniques.
2. Describe the baseband pulse transmission and ISI and to construct the duo-binary coding.
3. Compare the performance of various digital modulation systems for the pass-band data transmission.
4. Apply the different types of error control coding techniques.
5. Illustrate the methods of spread spectrum modulation and its performance parameters.

UNIT I	**PULSE MODULATION** Sampling Process – Signal Distortion and Recovery – PAM - PWM – PPM - Pulse Code Modulation – Noise Considerations in PCM Systems – Delta Modulation – Differential Pulse Code Modulation – Adaptive DPCM – Adaptive DM – TDM - Digital Multiplexers.	**9**
UNIT II	**BASEBAND PULSE TRANSMISSION** Matched Filter – Error Rate Due to Noise – Line Coding Formats – Inter -Symbol Interference – Nyquist's Criterion for Distortion Less Base Band Binary Transmission - Correlative Level Coding – Base Band M- ary PAM – Adaptive Equalization – Eye Patterns.	**9**
UNIT III	**PASS BAND DATA TRANSMISSION** Introduction – Pass Band Transmission Model – Generation and Detection – Signal Space Diagram – Bit Error Probability – Power Spectra of ASK- FSK- PSK – DPSK – QAM - QPSK and MSK Schemes – Comparison of Digital Modulation Systems using a Single Carrier – Carrier and Symbol Synchronization.	**9**
UNIT IV	**ERROR CONTROL CODING** Linear Block Codes – Cyclic Codes – Generator Polynomial – Encoder for Cyclic Codes – Convolutional Codes – Time Domain and Transform Domain Approach – Maximum Likelihood Decoding of Convolutional Codes – Viterbi Algorithm.	**9**
UNIT V	**SPREAD SPECTRUM MODULATION** Pseudo- Noise Sequences – Properties of Maximum Length Sequence – Direct Sequence Spread Spectrum with Coherent BPSK– Processing Gain –Probability of Error – Jamming Margin – Frequency – Hop Spread Spectrum – Gold Codes.	**9**
		Total: 45

TEXT BOOKS

1. Simon Haykin, "*Digital Communications*", Wiley India Pvt.Ltd, 2015.

REFERENCE BOOKS

1. John G. Proakis, "*Digital Communication*" 5th Edition, McGraw Hill, 2014
2. B. P. Lathi, Zhi Ding, '*Modern Digital and Analog Communication Systems"*, Oxford University Press, 2017.
3. Taub and Schilling, "*Principles of Digital Communication*", 4th edition, Tata McGraw-Hill, 2013.
4. Sanjay Sharma," *Digital Communication*," 6th edition, S.K.Kataria & son's publication, 2014.

U15EC502R	TRANSMISSION LINES AND WAVEGUIDES	L T P C 2 2 0 3

COURSE OUTCOMES

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

1. Analyse electromagnetic wave propagation in generic transmission line geometries.
2. Design impedance matching transmission line and calculate the reflection coefficient, SWR, using smith chart.
3. Analyze guided waves and their field pattern between parallel planes of perfect conductors.
4. Design and measure the various propagating modes of rectangular wave guides.
5. Derive the field equation of circular waveguides and resonators.

UNIT I	**TRANSMISSION LINE THEORY** Different Types of Transmission Lines – Characteristic Impedance – Propagation Constant-T and ∏ Section Equivalent to Lines – General Solution of the Transmission Line – Standard Forms for Voltage and Current of a Line Terminated by an Impedance – Physical Significance of the Equation and the Infinite Line – Standard Forms for the Input Impedance of a Transmission Line Terminated by an Impedance – Reflection Coefficient – Wavelength and Velocity of Propagation - Waveform Distortion – Distortion Less Transmission Line – The Telephone Cable – Line Loading - Campbell's Equation - Input Impedance of Lossless Lines – Reflection on a Line Not Terminated By Z_0 – Transfer Impedance – Reflection Factor and Reflection Loss – Insertion Loss	**12**
UNIT II	**TRANSMISSION LINE AT RADIO FREQUENCIES** Standing Waves and Standing Wave Ratio on a Line – One Eighth Wave Line – The Quarter Wave Line and Impedance Matching – The Half Wave Line – The Circle Diagram for the Dissipation Less Line – The Smith Chart – Application of the Smith Chart – Conversion from Impedance to Reflection Coefficient and Vice -Versa – Impedance to Admittance Conversion and Vice-Versa – Input Impedance of a Lossless Line Terminated by Impedance – Single Stub Matching and Double Stub Matching.	**12**
UNIT III	**GUIDED WAVES BETWEEN PARALLEL PLANES** Waves Between Parallel Planes of Perfect Conductors – Transverse Electric and Transverse Magnetic Waves – Characteristics of TE And TM Waves – Transverse Electromagnetic Waves – Velocities of Propagation – Component Uniform Plane Waves Between Parallel Planes – Attenuation of TE And TM Waves of Parallel Plane Guides – Wave Impedances.	**12**
UNIT IV	**RECTANGULAR WAVEGUIDES** Transverse Magnetic Waves in Rectangular Waveguides – Transverse Electric Waves in Rectangular Waveguides – Characteristic of TE And TM Waves – Cutoff Wavelength and Phase Velocity – Impossibility of TEM Waves in Waveguides – Dominant Mode in Rectangular Waveguide – Attenuation of TE And TM Modes in Rectangular Waveguides – Wave Impedances – Characteristic Impedance – Excitation of Modes.	**12**
UNIT V	**CIRCULAR WAVE GUIDES AND RESONATORS** Bessel Functions – Solution of Field Equations in Cylindrical Co-Ordinates – TM and TE Waves in Circular Guides – Wave Impedances and Characteristic Impedance – Dominant Mode in Circular Waveguide – Excitation of Modes – Microwave Cavities – Rectangular Cavity Resonators – Circular Cavity Resonator – Q Factor of a Cavity Resonator for TE_{101} Mode.	**12**
		Total: 60

TEXT BOOKS

1. J.D.Ryder, *"Networks, Lines and Fields"*, 2e,Pearson, 2015
2. E.C. Jordan and K.G.Balmain ,*"Electro Magnetic Waves and Radiating System"*, 2e,Pearson, 2015.

REFERENCE BOOKS

1. David M.Pozar, *"Microwave Engineering"*, 4th Edition, John Wiley, 2013.
2. Ramo,Whineery and Van Duzer, *"Fields and Waves in Communication Electronics"* , 3e,John Wiley, 2011.
3. R.S. Sabeenian, *"Transmission Line and Waveguides"*,Sonaversity.
4. G.S.Raju, *"Electromagnetic Field Theory and Transmission Lines"*, 3/e, Pearson Education India, 2012.

U15EC503R	MICROPROCESSORS AND MICROCONTROLLER	L	T	P	C
		3	0	0	3

COURSE OUTCOMES

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

1. Develop assembly language program to solve mathematical problems using 8bit and 16 bit microprocessors.
2. Create a multiprocessor system with 8086 microprocessor.
3. Interface I/O and memory devices with 8086 microprocessor.
4. Analyze the architecture and signals of 8051 microcontroller.
5. Develop a real time system using 8051 microcontroller.

UNIT I	**8 BIT AND 16 BIT MICROPROCESSORS** 8085 Microprocessor Architecture – Instruction Set – Addressing Modes – Assembly Language Programming. 8086 Microprocessor Architecture – Addressing Modes – Instruction Set – Assembly Language Programming.	**9**
UNIT II	**MULTIPROCESSOR CONFIGURATION** Introduction to Assembler Directives – Stacks – Procedures – Macros – Interrupts and Interrupt Service Routines – Multiprocessor Configurations – Coprocessor – Closely Coupled and Loosely Coupled Configurations.	**9**
UNIT III	**INTERFACING WITH 8086µP** Memory Interfacing and I/O Interfacing – Parallel Communication Interface – Serial Communication Interface – D/A and A/D Interface – Timer – Keyboard /Display Controller – Interrupt Controller – DMA Controller – Programming and Applications.	**9**
UNIT IV	**8051 MICROCONTROLLER** Introduction – Evolution of Microcontroller - Architecture of 8051 – Special Function Registers (SFRs) - I/O Pins Ports and Circuits - Instruction Set - Addressing Modes - Assembly Language Programming – RS232 Bus – Inter Integrated Circuit.	**9**
UNIT V	**INTERFACING WITH MICROCONTROLLER** Programming 8051 Timers – Serial Port Programming – Interrupts Programming – LCD and Keyboard Interfacing – ADC- DAC and Sensor Interfacing – External Memory Interface – Stepper Motor and Waveform generation.	**9**
		Total: 45

TEXT BOOKS

1. Douglas V Hall, *"Microprocessor and Interfacing : Programming and Interfacing"*, Edition-3Tata McGrawHill Companies, ,2012.
2. Soumitra Kumar Mandal , *"Microprocessors and Microcontrollers, Architecture, Programming and Interfacing using 8085, 8086 and 8051"*, McGrawHill Companies,2012.

REFERENCE BOOKS

1. A.K. Ray and K.M.Burchandi, *"Intel Microprocessors Architecture Programming and Interfacing"*, McGraw Hill International Edition, 2006.
2. Kenneth J Ayala, *"The 8051 Microcontroller Architecture Programming and Application"*, Edition-3,Penram International Publishers (India), New Delhi, 2007,.
3. Ramesh S Gaonkar, *"Microprocessor Architecture, Programming and application with 8085"*, 4th Edition, Penram International Publishing, New Delhi, 2002.
4. M. Rafi Quazzaman, *"Microprocessors Theory and Applications: Intel and Motorola"*, Prentice Hall of India, Pvt. Ltd., New Delhi, 2003.
5. Mohammed Ali Mazidi and Janice Gillispie Mazidi, *"The 8051 Microcontroller and Embedded Systems"*, Edition-2, Pearson Education Asia, New Delhi, 2008.

U15CS507R	DATA STRUCTURES AND OBJECT ORIENTED PROGRAMMING IN C++	L T P C 3 0 0 3

COURSE OUTCOMES

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

1. Understand the basic concepts of object oriented programming.
2. Design program for real time applications using inheritance and polymorphism.
3. Apply various linear tree data structures in real time applications.
4. Implement the operations of tree traversals and hashing techniques
5. Develop and apply algorithms for real time applications using graphs

UNIT I	**PRINCIPLES OF OOP** Basic Concepts of Object Oriented Programming – Expressions – Control Structures – Functions – Classes and Objects – Class Members – Access Control – Pointers – Constructors and Destructors – Parameter Passing Methods – Inline Functions – Static Class Members – This Pointer –Friend Functions – Dynamic Memory Allocation (new and delete).	**9**
UNIT II	**INHERITANCE AND POLYMORPHISM** **9** Inheritance Basics – Types of Inheritance – Base Class Access Control –Compile Time Polymorphism –Runtime Polymorphism using Virtual Functions – Abstract Class –Exception Handling.	**9**
UNIT III	**DATA STRUCTURES** Basic Data Structures –Abstract Data Type – Linear Data Structures – List ADT – Single – Double and Circular – Stack ADT – Queue ADT.	**9**
UNIT IV	**TREES AND GRAPHS** Basic Terminologies –Tree Traversals – Binary Trees – Binary Search Tree ADT – Graph Traversals –Shortest Path Algorithm – Dijkstra's Algorithm – Minimum Spanning Tree – Prim's Algorithm – Kruskal's Algorithm.	**9**
UNIT V	**SEARCHING TECHNIQUES** Searching Techniques – Linear Search – Binary Search – Sorting Techniques – Insertion – Bubble and Merge Sort.	**9**
	Total	**45**

TEXT BOOKS

1. Mark Allen Weiss, *"Data structures and Algorithms Analysis in C++"*, 4th Edition, Prentice Hall, 2013.
2. E. Balagurusamy, *"Object-Oriented Programming With C++"*, 3rd Edition, Tata McGraw Hill, 2006.

REFERENCE BOOKS

1. Adam Drozdek, *"Data structures and algorithms in C++"*, 3rd Edition, Cengage Learning, 2013.
2. Langsam, Augenstein and Tanenbaum *"Data structures using C and C++"*, 2nd Edition, Prentice Hall of India, 1998.
3. Micheal T. Goodrich, Roberto Tamassia, David Mount, *"Data Structures and Algorithms in C++"*, Wiley Student edition, John Wiley and Sons, 2009.

U15EC504R	CONTROL SYSTEMS	L T P C 2 2 0 3

COURSE OUTCOMES

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

1. Derive the transfer function of a given system using mathematical models.
2. Determine the time response of systems and analyze the steady state error.
3. Calculate the frequency domain specifications using frequency response plots.
4. Determine and analyze the stability of given system.
5. Solve the state equations using state space model and obtain the Controllability and Observability of the given system.

UNIT I	**BASIC CONCEPTS AND SYSTEM REPRESENTATION** Introduction - Open Loop and Closed Loop Systems - Mathematical Model of Control Systems - Transfer Functions - Mechanical Translational System - Mechanical Rotational Systems - Block Diagram Algebra - Signal Flow Graph - Mason's Gain Formula.	**12**
UNIT II	**TIME RESPONSE ANALYSIS** Time Response - Standard Test Signals - Type and Order of Control System - Time Response of First Order System for Unit Step - Unit Ramp and Impulse Input - Time Response of Second Order System for Unit Step Input - Time Domain Specifications - Steady State Error and Static Error Constants - Controllers – P - PI and PID.	**12**
UNIT III	**FREQUENCY RESPONSE ANALYSIS** Frequency Response - Frequency Domain Specifications - Resonant Peak - Resonant Frequency - Bandwidth- Cut-Off Rate - Gain Margin and Phase Margin - Frequency Response Plots - Polar Plot - Bode Plot - M and N Circles - Nichol's Chart.	**12**
UNIT IV	**STABILITY ANALYSIS** The Concepts of Stability - Necessary Conditions for Stability - Relative Stability - Routh Hurwitz Stability Criterion - Root Locus - Effect of Addition of Poles - Effect of Addition of Zeros - Nyquist Stability Criterion.	**12**
UNIT V	**COMPENSATORS AND STATE SPACE ANALYSIS** **Compensators:** Introduction - Types – Lag - Lead and Lag-Lead Design using Bode Plots. **State Space Analysis:** Concepts of State - State Variables and State Model for Linear Continuous Time Systems - Controllability and Observability.	**12**
		Total: 60

TEXT BOOKS

1. Samarajit Gosh, *"Control Systems Theory and Applications"*, 2nd New Edition, Pearson publications, 2017.
2. I.J.Nagrath and M.Gopal, *"Control Systems Engineering"*, 6th Edition, New Age International (P) Ltd,Publishers, 2017.

REFERENCE BOOKS

1. M.Gopal, *"Control Systems, Principles and Design"*, 4th Edition, Tata McGraw Hill, New Delhi, 2014.
2. A.Nagoorkani, *"Control Systems Engineering"*, 3rd Edition, RBA Publications, 2017.
3. S.Palani, *"Control Systems Engineering"*, 3rd Edition, Tata McGraw Hill, 2015.

U15EC505R	VLSI DESIGN	L T P C 3 0 0 3

COURSE OUTCOMES

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

1. Design VHDL code for combinational circuits and sequential circuits
2. Analyze MOS and CMOS transistor characteristics
3. Illustrate the fabrication processes of CMOS
4. Design CMOS combinational circuit.
5. Design sequential circuits and test CMOS circuits.

UNIT I	**VHDL** Introduction to VHDL – Tutorial – Entity Declaration – Architecture Body – Configuration Declaration – Package Declaration – Package Body – Identifiers – Operators – Behavioral Modelling – Process Statement – Wait Statement – If Statement – Loop Statement – Data Flow Modelling – Structural Modelling – Component Declaration – Component Instantiation.	**11**
UNIT II	**MOS TRANSISTOR THEORY** Introduction – MOS Transistors – CMOS Logic – Inverter – NAND gate – CMOS Logic Gates – Compound - MOS Transistor Theory – MOS Structure - nMOS and pMOS Transistor Operation –Long Channel V-I Characteristics – C-V Characteristics – Nonideal I-V Effects – DC Transfer Characteristics CMOS Inveter.	**9**
UNIT III	**CMOS PROCESSING TECHNOLOGY** Introduction – CMOS Technologies – Wafer Formation – Photolithography – Well and Channel Formation – Silicon Dioxide –Isolation – Gate Oxide – Gate and Source/Drain Formations – Contacts and Metallization – Passivation– nMOS Fabrication – n-well Process – p-well Process – Twin Well Process - Layout Design Rules – CMOS Process Enhancement - Stick Diagram – Inverter – CMOS NAND – CMOS NOR.	**9**
UNIT IV	**COMBINATIONAL CIRCUIT DESIGN** Static CMOS – Ratioed Circuits – Cascode Voltage Switch Logic – Dynamic Circuits – Domino Logic – Dual-Rail Domino Logic – Pass-Transistor Circuits – CMOS with Transmission Gates – Source of Power Dissiption.	**8**
UNIT V	**CMOS TESTING** Introduction – Testers – Text Fixtures and Test Programs – Logic Verification Principles - Silicon Debug Principles – Manufacturing Test – Design for Testability – Boundary Scan.	**8**
	Total	**45**

TEXT BOOKS

1. Neil H. E Weste and David Money Harris, "*CMOS VLSI Design a circuits and systems perspective*", 4th Edition, Pearson, 2015.
2. J. Bhasker, *"A VHDL Primer"*, Pearson Education, 3rd edition, 2015.

REFERENCE BOOKS

1. Jan M. Rabaey, Anantha Chandrakasan ,Borivoje Nikolic, "Digital Integrated Circuits a design perspective", Pearson Education, 2nd edition, 2016.
2. Charles H. Roth, Jr., Lizy Kurian John,"Digital System Design using VHDL", 3rd edition, Cengage, 2018.
3. Pucknell D.A and Eshraghian K., *"Basic VLSI Design"*, Third Edition, PHI, 2003.

U15EC506R	MICROPROCESSORS AND MICROCONTROLLER LABORATORY	L T P C 0 0 2 1

COURSE OUTCOMES

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

1. Write the assembly language programs to perform various arithmetic and logical operations using microprocessors.
2. Interface various peripheral ICs' and I/O devices with 8086 microprocessor.
3. Write the assembly language programs to generate time delay and to establish the data communications using 8051 microcontroller.

Exp. No.	List of Experiments
1	Study of 8085, 8086 and 8051 Trainer Kits.
2	8- bit Addition and Subtraction using 8085µP.
3	16-bit Manipulation (addition and subtraction) 8085µP.
4	8-bit Multiplication and Division 8085µP.
5	16-bit Multiplication and Division 8085µP.
6	Code Conversion 8085µP.
7	16 – bit Addition and Subtraction using 8086µP.
8	16 - bit Multiplication and Division using 8086µP.
9	String Manipulation using 8086µP.
10	Array Manipulation using 8086µP.
11	Experiments with 8255 in Mode 0 using 8086µP.
12	8279 Keyboard/Display Interface with the 8086µP.
13	Timer Interface 8253 with the 8086µP.
14	Stepper Motor Interface 8086µP.
15	8-bit Manipulations using 8051 Microcontroller.
16	16-bit Manipulations using 8051 Microcontroller.
17	Array Operations-Sum of N Elements using 8051 Microcontroller
18	Generation of Time Delay using 8051 Microcontroller.
19	Data Communications using Parallel and Serial Ports.

Total Hours: 30

U15EC507R	VLSI LABORATORY	L T P C 0 0 2 1

COURSE OUTCOMES

At the end of experiments, the students will be able to -

1. Design and simulation of Combinational logic circuits and Sequential logic circuits using VHDL
2. Design CMOS circuit using SPICE
3. FPGA Implementation

Exp. No.	List of Experiments
	Design and Implementation of Combinational logic circuits using VHDL
1.	Adder and Subtractor
2.	Multiplexer and Demultiplexer
3.	Encoder and Decoder
4.	Comparator
	Design and Implementation of Sequential logic circuits using VHDL
5.	Flipflops
6.	Ripple Counter
7.	Synchronous Counter
8.	Shift Register
9.	Sequence Detector using FSM
	Design CMOS circuits
10.	CMOS Inverter
11.	Logic Gates
	FPGA Implementation
12.	4 bit Adder
13.	4 bit Multiplier
14.	Traffic Light Controller

Total Hours: 30

U15EC508R	COMMUNICATION LABORATORY	L T P C 0 0 2 1

COURSE OUTCOMES

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

1. Design and construct signal generator and demodulator for AM and FM
2. Construct the sampling process of a signal and its recovery using the sampled version.
3. Generate and detect the signals using analog and digital pulse modulation techniques.

Exp. No.	List of Experiments
1	Amplitude Modulation and Demodulation.
2	Frequency Modulation and Demodulation.
3	Characteristics of AM Receiver (Selectivity and Sensitivity).
4	Sampling of an Analog Signal and Reconstruction.
5	Pulse Modulation Techniques - PAM, PWM, PPM.
6	Study of Line Coding Formats and Decoding.
7	Time Division Multiplexing using PAM.
8	Pulse Code Modulation.
9	Delta Modulation and Demodulation.
10	Differential Pulse Code Modulation.
11	Digital Modulation -ASK, FSK, PSK, QPSK.
12	Analysis of Filters using Network Analyzer.
13	RF Signal Analysis using Spectrum Analyzer.

Total Hours: 30

U15GE501R	SOFT SKILLS AND APTITUDE - III	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 supplementary areas of soft-skills and job-related selection processes using hands-on and/or case-study approaches
11. Solve problems of advanced levels than those in SSA-II in specified areas of quantitative aptitude and logical reasoning and score 70-75% marks in company-specific internal tests
12. Demonstrate greater than SSA-II level of verbal aptitude skills in English with regard to given topics and score 70-75% marks in company-specific internal tests

1.Soft Skills	**Demonstrating soft-skill capabilities with reference to the following topics:** a. Career planning b. Resume writing c. Group discussion d. Teamwork e. Leadership skills f. Interview skills g. Mock interview h. Mock GDs
2.Quantitative Aptitude and Logical Reasoning Topics	**Solving problems with reference to the following topics :** a. Numbers: Remainder concept b. Time and work: Fraction technique, Efficiency technique, Pipes and cisterns and Chain rule c. Simple interest d. Compound interest e. Set theory: Venn diagram f. Puzzles g. Mathematical operators h. Syllogism (≥4 Statements) i. Data sufficiency j. Statement and assumptions k. Statement and conclusions l. Company specific aptitude questions
3. Verbal Aptitude	**Demonstrating English language skills with reference to the following topics:** a. Subject verb agreement b. Selecting the best alternative for the stated parts of given sentences c. Reading comprehension d. Contextual synonyms e. Sentence fillers f. Writing a story for a given picture g. Company specific aptitude questions

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

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit
Theory						
1	U15CS501R	Software Engineering	3	0	0	3
2	U15CS502R	Computer Networks	3	0	0	3
3	U15CS503R	Embedded Systems Design	3	0	0	3
4	U15CS504R	Theory of Computation	3	0	0	3
5	U15CS902R	**Elective –** Multimedia systems	3	0	0	3
	U15CS904R	**Elective –** Data Warehousing and Data Mining				
	U15CS905R	**Elective –** C# and .Net Programming				
Practical						
6	U15CS505R	Computer Networks Laboratory	0	0	4	2
7	U15CS506R	Python Programming Laboratory	0	0	4	2
8	U15ENG501R	Professional Communication Skills Laboratory	0	0	2	1
9	U15GE501R	Soft Skills and Aptitude – III	0	0	2	1
					Total Credits	**21**

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, Fifth Semester BE CSE Students and Staff, COE

U15CS501R SOFTWARE ENGINEERING 3 0 0 3

COURSE OUTCOMES

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

- Compare and analyze the various lifecycle models of software process
- Design an appropriate analysis model that suits the requirement
- Design software architecture models for various applications
- Implement the strategies for software testing
- Estimate the cost of the project using appropriate methods

UNIT -I SOFTWARE PROCESS 9

Introduction –Software Engineering Paradigm – life cycle models (water fall, incremental, spiral, WINWIN spiral, evolutionary, prototyping, object oriented and Agile software project management model) - system engineering – computer based system – verification – validation.

UNIT -II SOFTWARE REQUIREMENTS 9

Functional and non-functional - user – system –requirement engineering process – feasibility studies – requirements – elicitation – validation and management – software prototyping – prototyping in the software process – rapid prototyping techniques – user interface prototyping -Software document. Analysis and modeling – data, functional and behavioral models – structured analysis and data dictionary.

UNIT -III DESIGN CONCEPTS AND PRINCIPLES 9

Design process and concepts – modular design – design heuristic – design model and document. Architectural design – software architecture – data design – architectural design– user interface design – user interface design principles. Real time systems - Real time software design. Software Configuration Management (SCM) – Need for SCM – Version control – Introduction to SCM process – Software configuration items - software design with extreme programming – Risk Management.

UNIT -IV TESTING 9

Taxonomy of software testing – levels – test activities – types of software test – black box testing – testing boundary conditions – structural testing – test coverage criteria based on data flow mechanisms – regression testing – testing in the large - software testing strategies - testing using extreme programming.

UNIT -V SOFTWARE PROJECT MANAGEMENT 9

Measures and measurements – S/W complexity and science measure – size measure – data and logic structure measure – information flow measure. Software cost estimation – function point models – COCOMO model- Delphi method.- Defining a Task Network – Scheduling – Earned Value Analysis – Error Tracking - Software changes – program evolution dynamics – software maintenance – Architectural evolution.

Total : 45 hours

TEXT BOOK

1. Roger S.Pressman, Software engineering- A practitioner's Approach, McGraw-Hill International Edition, 8th edition,2015.

REFERENCES

1. Ian Sommerville, Software engineering, Pearson education Asia, 9th edition, 2011.
2. Pankaj Jalote- An Integrated Approach to Software Engineering, Springer Verlag, 1997.
3. James F Peters and WitoldPedryez, "Software Engineering – An Engineering Approach", John Wiley and Sons, New Delhi, 2000.
4. Ali Behforooz and Frederick J Hudson, "Software Engineering Fundamentals", Oxford University Press, New Delhi, 1996

U15CS502R COMPUTER NETWORKS 3 0 0 3

COURSE OUTCOMES

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

- Identify the suitable network services for the given network applications
- Apply transport layer services using TCP or UDP protocols
- Design the network layer packet delivery using appropriate routing algorithms
- Analyze the various functionalities of data link layer
- Demonstrate the key concepts and functions of physical layer

UNIT-I INTRODUCTION AND APPLICATION LAYER 9

The Internet – Protocol – The network edge – ISPs and Internet backbones – Protocol layers and their service models. Network applications – The Web and HTTP – FTP – SMTP – DNS – SNMP.

UNIT-II TRANSPORT LAYER 9

Connectionless transport **–** User Datagram Protocol – Connection Oriented transport – Transmission Control Protocol –Congestion control – TCP congestion control – Introduction to Quality of Service.

UNIT III NETWORK LAYER 9

Circuit Switching – Packet Switching – Virtual Circuit and Datagram Networks – The Internet protocol (IP) – Datagram format – IPv4 addressing– Sub netting – ICMP – Ipv6 – Routing algorithms – Link State Routing – Distance Vector Routing – RIP – OSPF – BGP – Multicast – IGMP.

UNIT IV DATA LINK LAYER 9

Error-Detection and -Correction Techniques - Framing - Flow Control and Error control protocols (Simple - STOP and WAIT - Go Back-N ARQ - Selective Repeat ARQ - Piggybacking) **–** Media access protocols – Channel partitioning protocols – Random access protocols – Link layer addressing – ARP– Ethernet – Token Ring – Switches – Wireless LAN.

UNIT V PHYSICAL LAYER 9

Data and signals – Performance – Multiplexing – Transmission media.

Total: 45 hours

TEXT BOOK:

1. James F. Kurose, K. W. Ross, Computer Networking, A Top-Down Approach Featuring the Internet, 7th Ed, Addison-Wesley, 2017.

REFERENCES:

1. Behrouz A.Ferouzan,"Data Communications and Networking", Fifth Edition, Tata McGraw-Hill Publication, 2013.
2. Larry L. Peterson, Bruce S. Davie, "Computer Networks: A Systems Approach", Fifth Edition, Morgan Kaufmann Publishers Inc., 2011.
3. William Stallings, "Data and Computer Communications", Tenth Edition, Pearson Education, 2014.
4. Andrew Tanenbaum, Computer Networks, Prentice Hall of India, fifth edition, 2010
5. Douglas E. Comer, "Computer Networks and Internets with Internet Applications", Fifth Edition, Pearson Education, 2009

U15CS503R EMBEDDED SYSTEM DESIGN 3 0 0 3

COURSE OUTCOMES

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

- Describe the architecture of 8 bit and 16 bit microprocessors
- Analyze the functionality of each block in8051 microcontroller
- Design an electronic system using PIC microcontroller
- Analyze hardware and software architecture of any embedded systems
- Develop an embedded system using development boards

UNIT-I 8 bit and 16 bit Microprocessors 9

8085 architecture- Signal diagram- instruction set- addressing modes- interrupts -8086- architecture – Signal diagram – Arithmetic and logical instructions-addressing modes -memory segmentation

UNIT-II 8 bit Embedded Controller 9

Architecture of 8051 Microcontroller – signals – I/O ports – memory – counters and timers – serial data I/O – interrupts.

UNIT-III PIC Embedded Controller 9

PIC 16C61 / 71 microcontroller architecture – FSR – Reset action – Oscillatory connections – Memory organizations- Instructions-Addressing modes-I/O ports-Interrupts-Timers-ADC in PIC 16C61 / 71 microcontroller.

UNIT-IV Embedded System Concepts 9

Introduction to embedded system-Application areas-categories of embedded systems-Overview of embedded system architecture- Specialties of embedded systems-Recent trends in embedded systems-Hardware architecture of embedded systems.

UNIT-V Design of Embedded Systems 9

Hardware design-Selection of processor-Software design--Implementation-Integration and testing-Types of testing-Types of Hardware Platforms-Hardware description of AVR microcontroller development and its features-Introduction to RTOS –Architecture of the kernel-Scheduling Algorithms-FIFO-Round Robin-Shortest job first

Total: 45 hours

TEXT BOOKS:

1. Senthil Kumar N,Saravanan M ,Jeevananthan S “Microprocessors and Microcontrollers” 2nd Edition – Oxford University Press.2018,
2. K.V.K.K.Prasad, “Embedded Real-Time Systems: Concepts, Design & Programming”, Dreamtech press, 2016.
3. Ajay V Deshmukh, “Microcontrollers [Theory and Applications]”, McGrawHill,2017.

REFERENCES:

1. Soumitra Kumar Mandal , “Microprocessors and Microcontrollers, Architecture, Programming and Interfacing using 8085, 8086 and 8051”, McGrawHill Companies,2017
2. Ramesh S Gaonkar, “Microprocessor Architecture, Programming and application with 8085”, 4th Edition, Penram International Publishing, New Delhi, 2000.
3. DouglesV.Hall, “Microprocessor and Interfacing”, Programming and Hardware, Tata McGraw-Hill, 2017.
4. Shibu K V, “Introduction to Embedded Systems”, McGraw Hill, 2009.
5. Raj Kamal “Embedded Systems Architecture Programming and Design” 2nd Edition TMH, 2010.

U15CS504R THEORY OF COMPUTATION 3 0 0 3

COURSE OUTCOMES

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

- Compare and analyze various Finite Automata and convert NFA to DFA
- Construct finite automata to regular expression and identify the properties of regular language
- Design grammars and recognizers for different formal languages and design PDA
- Convert CFG to normal forms and design turing machines for various problems
- Determine the decidability and intractability of computational problems

UNIT - I AUTOMATA 9

Introduction to formal proof − Additional forms of proof − Inductive proofs – Finite Automata (FA) − Deterministic Finite Automata (DFA) − Non- deterministic Finite Automata (NFA) − Finite automata with epsilon transitions. Case Study: Cruise Control

UNIT - II REGULAR EXPRESSIONS AND LANGUAGES 9

Regular expression − FA and Regular expressions − Proving languages not to be regular − Closure properties of regular languages − Equivalence and minimization of automata.

UNIT - III CONTEXT-FREE GRAMMAR AND LANGUAGES 9

Context Free Grammar (CFG) − Parse trees − Ambiguity in grammars and languages − Definition of the pushdown automata − Languages of a pushdown automata − Equivalence of pushdown automata and CFG − Deterministic pushdown automata.

UNIT - IV TURING MACHINE 9

Normal forms for CFG − Pumping lemma for CFL − Closure properties of CFL −Turing machines − Programming Techniques for TM. Case study: Church's Thesis-Godelization.

UNIT – V UNDECIDABILITY 9

Recursively Enumerable (RE) - An Undecidable problem that is RE – Halting Problem− Post's correspondence problem −ClassesP and NP –NP Completeness-Relationship between Time Complexity and Space Complexity.

Total : 45 hours

TEXT BOOKS:

1. Hopcroft, J.E. Motwani, R. and Ullman, J.D "Introduction to Automata Theory, Languages and Computations", 2nd Edition, Pearson Education, 2013

REFERENCES:

1. MichealSipser, “Introduction of the Theory and Computation”,Thomson Brokecole, 1997
2. Martin, J., “Introduction to Languages and the Theory of Computation”, 3rd Edition, TMH, 2003.
3. Lewis, H. and Papadimitriou, C.H “Elements of the Theory of Computation”, 2nd Edition, Pearson Education/PHI, 2003.
4. Greenlaw, “Fundamentals of Theory of Computation, Principles and Practice”, Elsevier, 2008.

U15CS902R MULTIMEDIA SYSTEMS 3 0 0 3

COURSE OUTCOMES

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

- Design multimedia contents using texts, hypermedia and hypertext
- Design multimedia contents using sound, images, animation and video
- Compare the various image/video compression techniques
- Analyze the various hardware and software tools used in multimedia systems
- Design web pages with multimedia contents

UNIT-I INTRODUCTION TO MULTIMEDIA 9

Introduction to making Multimedia- Multimedia Skills and training- Text: Using text in Multimedia-Computer and Text- Font Editing and Design Tools- Hypermedia and Hypertext.

UNIT-II MULTIMEDIA FILE HANDLING 9

Sounds-Recording, Processing and Editing sounds using digital audio, audio file formats-Images-bitmap, vector and 3D images, Capabilities and Limitations, Animation-Celand Computer Animation, Animation file types, Video- digital video containers, Codecs, Shooting and editing video.

UNIT-III DIGITAL VIDEO AND IMAGE COMPRESSION9

Evaluating a compression system - Redundancy and visibility-Video compression techniques- Standardization of an algorithm - The JPEG image compression standard- ITU –T Standards – MPEGmotion video compression standard-DVI Technology.

UNIT-IV HARDWARE AND SOFTWARE TOOLS 9

Multimedia Hardware: Macintosh and Windows production platforms-Hardware Peripherals: Memory and Storage Devices, Input Devices, Output Devices, Communication Devices .Basic Software Tools.

UNIT-V MULTIMEDIA AND INTERNET 9

Internetworking –connections -Internet services -Tools for WWW - Designing WWW.

Total: 45 Hours

TEXTBOOKS:

1. Tay Vaughan, “Multimedia: Making It Work”, 7th Edition, Tata Mc-Grawhill,2014. (Unit I, II, IV and V)
2. John F.Koegel Buford, “Multimedia Systems”, Pearson Education ,Sixth Edition,2009. (unit III)

REFERENCES:

1. Ralf Steinmetz and Klara "Multimedia Computing, Communications and Applications", Pearson Education,2009.
2. Ze-Nian Li, Mark S Drew and Jiangchuan Liu, "Fundamentals of Multimedia", Second Edition, Springer, 2014
3. David Hillman, "Multimedia – Technology and applications",Galgotia Publications, Delhi, 2008

U15CS904R DATA WAREHOUSING AND DATA MINING 3 0 0 3

COURSE OUTCOMES

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

- Apply OLAP operations to query processing in data mining and evolve multidimensional models from a typical system
- Analyze various preprocessing techniques to improve data quality
- Identify the knowledge imbibed in the high dimensional system using different classification methods
- Apply clustering to discover the hidden interesting patterns from massive data
- Solve issues in emerging areas using mining techniques

UNIT – I DATA WAREHOUSE PROCESS AND CHITECTURE 9

Evolution of Decision Support Systems-–Building a Data warehouse- Data Warehouse and DBMS- Data marts-Metadata, Multidimensional data model, OLAP operations- Data cubes-Schemas for Multidimensional Database: Stars, Snowflakes and Fact constellations. Types of OLAP servers, 3–Tier data warehouse architecture, distributed and virtual data warehouses. Data warehouse implementation –Introduction to business intelligence- BI tools

UNIT – II INTRODUCTION TO DATA MINING CONCEPTS 9

Data mining-KDD versus data mining, Stages of the Data Mining Process-task primitives, Data Mining Techniques -Data mining knowledge representation – Data mining query languages, Issues, Data preprocessing – Data cleaning-Integration-transformation and reduction- Discretization and generating concept hierarchies-Data Generalization And Summarization Based Characterization -Mining frequent patterns- association-correlation -Installation of WEKA tool-Experiments with Weka – filters- discretization

UNIT – III CLASSIFICATION AND PREDICTION 9

Tree Induction - Bayesian Classification – Rule Based Classification – Classification by Back propagation - Lazy Learners – Other Classification Methods- Prediction- Evaluating classifier accuracy-Ensemble methods. Experiments with Weka generating rule and decision tree.

UNIT – IV CLUSTERING 9

Clustering techniques –Partitioning methods- k-Means and k-Medoids- Hierarchical Methods –agglomerative and divisive clustering–Grid Based Methods – Model Based Clustering Methods -Expectation Maximization– Constraint based Cluster Analysis – Outlier Analysis -Experiments with Weka – k-Means and Expectation Maximization

UNIT -V DATA WAREHOUSING AND DATA MINING APPLICATIONS 9

Mining complex data objects-Spatial databases- temporal databases- Multimedia databases- Time series and Sequence data; Text Mining –Graph mining-web mining-Application and trends in data mining

Total: 45 hours

TEXT BOOKS:

1. Jiawei Han and Micheline Kamber, Data Mining: Concepts and Techniques, Morgan Kaufmann Publishers, third edition 2011, ISBN: 1558604898.

REFERENCES:

1. Mehmed kantardzic,"Datamining concepts, models, methods, and algorithms", Wiley Interscience, 2003.
2. Ian Witten, Eibe Frank, Data Mining; Practical Machine Learning Tools and Techniques, third edition, Morgan Kaufmann, 2011.
3. George M Marakas, Modern Data Warehousing, Mining and Visualization, Prentice Hall, 2003.
4. Alex Berson and Stephen J. Smith, " Data Warehousing, Data Mining & OLAP", TataMcGraw Hill Edition, Tenth Reprint 2007.
5. G. K. Gupta, "Introduction to Data Min Data Mining with Case Studies", Easter Economy Edition, Prentice Hall of India, 2006.
6. www.cs.waikato.ac.nz/ml/weka/

U15CS905R C# AND .NET PROGRAMMING 3 0 0 3

COURSE OUTCOMES

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

- Illustratethe concepts of .Net framework and C# language
- Write C# program using Console class
- Design and develop real-time applications using object oriented concepts in C#
- Design and develop windows and web based applications using C#
- Write C# programs for database connectivity and data manipulation using ADO.Net

.

UNIT-I INTRODUCTION TO C# 8

Introducing C#, Understanding .NET, Overview of C#, Literals, Variables, Data Types, Operators, Expressions, Branching, Looping, Methods, Arrays, Strings, Structures, Enumerations.

UNIT-II OBJECT ORIENTED ASPECTS OF C# 9

Classes, Objects, Inheritance, Polymorphism, Interfaces, Operator Overloading, Delegates, Events, Errors and Exceptions.

UNIT-III APPLICATION DEVELOPMENT ON .NET 8

Windows Applications: Basic windows controls. Advanced controls, multi window applications, Accessing Data with ADO.NET: Connections, Data Adapters, Datasets, Data Application, Working with relational databases, multiple tables in a single dataset, Data views, Data Binding, Complex Binding, Navigating through datasets using bound controls.

UNIT -IV WEB BASED APPLICATION DEVELOPMENT ON .NET 8

Programming Web Applications with Web Forms, web server controls, Programming Web Services.

UNIT -V THE CLR AND THE .NET FRAMEWORK 12

Assemblies, Versioning, Attributes, Reflection, Viewing Metadata, Type Discovery, Reflecting on a Type, Marshaling, Remoting, Understanding Server Object Types, Specifying a Server with an Interface, Building a Server, Building the Client, Using Single Call, Threads.

Total: 45 hours

TEXT BOOKS:

1. E. Balagurusamy, "Programming in C#", Tata McGraw-Hill, 4th edition, 2016. (Unit I, II , V)
2. J. Liberty, "Programming C#", 6th edition, O'Reilly, 2010. (Unit III, IV)

REFERENCES:

1. Herbert Schildt, "The Complete Reference: C#", Tata McGraw-Hill,4th edition, 2010.
2. Robinson et al, "Professional C#", 2nd edition, Wrox Press, 2002.
3. Andrew Troelsen, "C# and the .NET Platform", APress, 2010.
4. ThamaraiSelvi, R. Murugesan, "A Textbook on C#", Pearson Education, 2003.

U15CS505R COMPUTER NETWORKS LABORATORY 0 0 4 2

COURSE OUTCOMES

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

- Implement the functionalities of various networkprotocols
- Simulate the network protocols using ns-2
- Analyze the performance of network protocols using Wire shark

LIST OF EXPERIMENTS:

1. Simulation of HTTP protocol using TCP Socket
2. Programs using TCP Sockets (like getting date and time from server, Chat application, etc...)
3. Programs using UDP sockets (like simple DNS)
4. Programs using RMI
5. Simulation of Error Correction Code (like CRC)
6. Learn to use commands like TCP Dump, Netstat, Trace Route
7. Simulation of PING using Raw Sockets
8. Network topology configuration using ns2
9. Performance comparison of Distance Vector Routing and Link State Routing algorithms in ns-2
10. Study of UDP/TCP performance using ns-2
11. Simulation of wireless network using ns-2
12. Packet sniffing using WIRESHARK application.

Total: 60 hours

U15CS506R PYTHON PROGRAMMING LABORATORY 0 04 2

Course Outcomes:

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

- Develop Python programs to implement basic concepts
- Develop Python programs to implement advanced concepts
- Develop Python programs for database handling

List of Experiments:

1. Write a Python program to print the calendar of a given month and year.
2. Write a Python program to count the number 5 in a given list of numbers.
3. Write a Python program to remove and print every second number from a list of numbers until the list becomes empty.
4. Write a Python program to get a single string from two given strings, separated by a space and swap the first two characters of each string.Sample String: 'Python' 'Java', Output String: 'Jython' ' Pava'.
5. Write a Python function to check whether a string is a pangram or not. (Note: Pangrams are words or sentences containing every letter of the alphabet at least once. For example: "The quick brown fox jumps over the lazy dog").
6. Write a Python program to check whether an element exists within a tuple.
7. Write a Python program to get a list, sorted in increasing order by the last element in each tuple from a given list of non-empty tuples. Sample List: [(2, 5), (1, 2), (4, 4), (2, 3), (2, 1)], Expected Result: [(2, 1), (1, 2), (2, 3), (4, 4), (2, 5)].
8. Write a Python program to check whether an element exists within a tuple.
9. Write a Python script to check if a given key already exists in a dictionary.
10. Write a Python function that accepts a string and calculate the number of upper case letters and lower case letters .*Sample String:* 'Sona College of Technology' , *Expected Output:* No. of Upper case characters: 3 No. of Lower case Characters: 20.
11. Write a Python program to find the greatest common divisor (gcd) of two integers using recursion.
12. Write a Python program to combine each line from first file with the

    corresponding line in second file.

13. Write a Python program to implement the concept of inheritance.

14. Write a Python class to find validity of a string of parentheses, '(', ')', '{', '}', '[' and ']. These brackets must be close in the correct order, for example "()" and "()[]{}" are valid but "[)", "({[)]" and "{{{" are invalid.

15. Write a Python program to execute SQL queries like create, insert, delete, update and select in any of the database like MySQL, SQLite etc.

Total : 60 Hours

U15ENG501R PROFESSIONAL COMMUNICATION SKILLS LABORATORY 0 0 2 1

COURSE OUTCOMES

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

- Construct sentences without grammatical mistakes
- Listen effectively and communicate confidently
- Face interviews, make presentations on technical topics and take part in group communication confidently
- Read and comprehend technical texts and general articles
- Develop effective passages / articles on technical topics

UNIT-I FUNCTIONAL GRAMMAR AND VOCABULARY FOR ENGINEERS 4

Introduction to grammar- different approaches - concord – preposition – tenses – remedial grammar – technical terms in computer science and engineering – words that are often used wrongly – vocabulary base.

UNIT-IILISTENING – FOUNDATION OF LANGUAGE SKILLS 3

Listening to lectures on technical topics and motivational speeches – making notes on audio and video lessons – interpreting the implied meaning.

UNIT-IIISPEAKING – ESSENTIAL PEOPLE SKILLS 8

Participating in interviews – organizing a presentation and preparing effective slides - developing content for presentation - group presentation.

UNIT-IV READING – AN IMPERATIVE RECEPTIVE SKILL 3

Reading technical articles and discussing - reading inspirational literature for intrinsic motivation and personality development – reading for academic and general purposes.

UNIT-V WRITING – AN INDISPENSIBLE COMMUNICATION SKILL 7

Describing processes and objects - constructing effective paragraphs on technical topics – developing general essays on current affairs and technical articles on scientific advancements.

Semester –V	U15GE501R- SOFT SKILLS AND APTITUDE - III	L	T	P	C	Marks
		0	0	2	1	100

Course Outcomes

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

13. Demonstrate capabilities in supplementary areas of soft-skills and job-related selection processes using hands-on and/or case-study approaches
14. Solve problems of advanced levels than those in SSA-II in specified areas of quantitative aptitude and logical reasoning and score 70-75% marks in company-specific internal tests
15. Demonstrate greater than SSA-II level of verbal aptitude skills in English with regard to given topics and score 70-75% marks in company-specific internal tests

1.Soft Skills	**Demonstrating soft-skill capabilities with reference to the following topics:** a. Career planning b. Resume writing c. Group discussion d. Teamwork e. Leadership skills f. Interview skills g. Mock interview h. Mock GDs
2.Quantitative Aptitude and Logical Reasoning Topics	**Solving problems with reference to the following topics :** a. Numbers: Remainder concept b. Time and work: Fraction technique, Efficiency technique, Pipes and cisterns and Chain rule c. Simple interest d. Compound interest e. Set theory: Venn diagram f. Puzzles g. Mathematical operators h. Syllogism (≥4 Statements) i. Data sufficiency j. Statement and assumptions k. Statement and conclusions l. Company specific aptitude questions
3. Verbal Aptitude	**Demonstrating English language skills with reference to the following topics:** a. Subject verb agreement b. Selecting the best alternative for the stated parts of given sentences c. Reading comprehension d. Contextual synonyms e. Sentence fillers f. Writing a story for a given picture g. Company specific aptitude questions

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

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit
Theory						
1	U15IT501R	Computer Networks	3	0	0	3
2	U15IT502R	Database Management Systems	3	0	0	3
3	U15IT503R	Theory of Computation	3	2	0	4
4	U15IT504R	Web Technology	3	0	0	3
5	U15IT904R	**Elective -** Computer Graphics	2	0	2	3
	U15IT905R	**Elective -** C# .Net				
Practical						
6	U15IT505R	Computer Networks Laboratory	0	0	2	1
7	U15IT506R	Database Management Systems Laboratory	0	0	4	2
8	U15IT507R	Web Technology Laboratory	0	0	4	2
9	U15IT508R	Mini Project - I	0	0	2	1
10	U15GE501R	Soft Skills and Aptitude - III	0	0	2	1
					Total Credits	**23**

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, Fifth Semester BE IT Students and Staff, COE

U15IT501R COMPUTER NETWORKS 3 0 0 3

COURSE OUTCOMES

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

1. Describe the structure and organization of computer networks; including the division into network layers, role of each layer, and relationships between the layers.
2. Analyze the link layer concepts of error-detection and correction techniques, multiple access protocols, point-to-point protocols and characteristics of link layer media (including wireless links).
3. Explain the transport layer concepts and protocol design including connection oriented and connection-less models, techniques to provide reliable data delivery and algorithms for congestion control and flow control.
4. Apply subnetting and supernetting concepts to maintain networks and explain the network layer concepts and protocol design including datagram forwarding, routing algorithms, and network interconnections.
5. Explain the basic concepts of application layer protocol design including client/server models, peer-to-peer models, and network naming.

UNIT I INTRODUCTION 9

Data Communications Networks, Network Types- Standards and administration- OSI Model- TCP/IP Protocol Suite.

Physical layer: Performance - Transmission Media: Guided and Unguided media –Switching: Circuit switched networks and Packet Switched Networks.

UNIT II DATA LINK LAYER 9

Introduction – Link Layer addressing - Error Detection: Types of Errors, Redundancy, Cyclic Codes - Cyclic Redundancy Check- Check Sum.

DLC Services – Data Link Layer Protocols, Media Access Control – Random Access, Controlled Access - Ethernet protocol – Standard Ethernet.

UNIT III NETWORK LAYER 9

Services, Packet Switching – Internet Protocol-Routing Algorithms - Unicast Routing Protocols - IPv6 Protocol.

UNIT IV TRANSPORT LAYER 9

Introduction - User Datagram Protocol (UDP) - User Datagram, UDP Services, UDP applications Transmission Control Protocol (TCP) - Services-Features-segment - TCP connection - Windows in TCP - Flow Control - Error Control - TCP Congestion Control.

UNIT V APPLICATION LAYER 9

Application Layer – WWW and Http, FTP – Two connections, Control connection, Data connection, security of FTP – Electronic Mail – Architecture, web based mail – Email security.

Total: 45 hours

TEXT BOOK

1. Behrouz A. Forouzan, “Data communication and Networking”, Tata McGraw-Hill, 5th Edition 2016.

REFERENCES

1. James F. Kurose and Keith W. Ross, “Computer Networking: A Top-Down Approach Featuring the Internet”, Pearson Education, 2011.
2. Larry L.Peterson and Peter S. Davie, “Computer Networks: A Systems Approach”, Harcourt Asia Pvt. Ltd., 2nd edition, 2009.
3. Andrew S. Tanenbaum, “Computer Networks”, Prentice Hall PTR, 4th Edition, 2012
4. Halsall, Fred, “Computer Networking and Internet”, Pearson Education, 5th edition, 2011.

U15IT502R DATABASE MANAGEMENT SYSTEMS 3 0 0 3

COURSE OUTCOMES

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

1. Comprehend the need, background, architecture and evolution of database management system and design ER diagram for database design
2. State the characteristics of relational model with an emphasis on how to organize, maintain, retrieve and secure information efficiently and effectively from a RDBMS and write queries to retrieve and manipulate databases
3. Design and evaluate the normality of a logical data model, and correct any anomalies
4. Explain the general idea of data storage, indexing techniques and query processing
5. Summarize the transaction management and recovery management techniques adopted in database management system

UNIT I INTRODUCTION 9

Database and Database Users: Characteristics of database approach, Advantages of DBMS Approach, Database Applications.

Database system concepts and architecture: Data models, Schemas, Instance, Three schema architecture and data independence, DBMS languages, DBMS interfaces, database system Environment, ER model, EER data model.

UNIT II RELATIONAL MODEL 9

Relational data model, relational constraints and relational Algebra: Relational model concepts, Relational constraints and Relational data base schema, update operations, basic Relational algebra operations, additional relational operations.

SQL: Data definition and constraints, Basic queries, insert, delete, update, complex queries, views, assertions and triggers, embedded SQL, dynamic SQL.

Database security and Authorization: security issues, grant/revoke privileges, SQL injections.

UNIT III RELATIONAL DATABASE DESIGN 9

Functional dependencies and normalization: Functional dependencies, Normal forms: 1NF, 2NF, 3NF, Boyce Codd NF, decomposition, multivalued dependencies and 4NF, join dependencies and 5NF.

UNIT IV DATA STORAGE AND QUERY PROCESSING 9

Disk Storage, Basic File Structures, and Hashing: Secondary Storage Devices, RAID, Operations on Files, Heap Files, Sorted Files, Hashing Techniques.

Indexing Structures for Files: Types of Single-Level Ordered Indexes, Multilevel Indexes, Dynamic Multilevel Indexes Using B-Trees and B+-Trees.

Query Processing: Translating SQL Queries into Relational Algebra, Algorithms for External Sorting, Algorithms for SELECT and JOIN Operations, Algorithms for PROJECT and Set Operations.

UNIT V TRANSACTION MANAGEMENT 9

Transaction Processing: Introduction, Transaction and System Concepts, desirable Properties of Transactions, Schedules based on Recoverability, Schedules based on Serializability.

Concurrency Control Techniques: Two-Phase Locking Techniques for Concurrency Control, Timestamp Ordering.

Database Recovery Techniques: Recovery Concepts, Deferred Update, Immediate Update, Shadow Paging, ARIES recovery algorithm.

Total: 45 hours

TEXT BOOK

1. Ramez Elmasri and Shamkant Navathe, "Fundamentals of Database Systems ", 6th Edition, Addison-Wesley, 2014

REFERENCES

1. Abraham Silberschatz, Henry F. Korth and Sudarshan. S, "Database System Concepts", 6th Edition, McGraw-Hill, 2016
2. Raghu Ramakrishnan, "Database Management System", Tata McGraw-Hill Publishing Company, 2003
3. Date. C. J, Kannan. A, Swamynathan. S, "An Introduction to Database Systems", 8th Edition, Pearson Education, 2012
4. Rajesh Narang, "Database Management systems", PHI Learning pvt. Ltd, New Delhi,2011.

U15IT503R THEORY OF COMPUTATION 3 2 0 4

COURSE OUTCOMES

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

1. Prove results using proof by induction, contradiction and understand formal definitions of automata, languages and Grammars.
2. Apply the models of Finite automata and explain the properties of languages with applications.
3. Explore the models of Pushdown automata, context free languages and describe the different forms of context free grammars.
4. Classify the different representations, techniques, extensions and simulating a Turing machine by Computer.
5. Describe concrete examples of computationally undecidable or inherently infeasible problems from different fields.

UNIT I AUTOMATA THEORY 15

Finite Automata: Constructing Automata, Deterministic Finite Automata (DFA), Non-Deterministic Finite Automata (NFA) Equivalence of DFA and NFA: Finite Automata with Epsilon Transitions, Finite Automata without Epsilon Transitions, Subset Construction Method, Minimizing Automata - Applications of Finite Automata

UNIT II REGULAR EXPRESSIONS AND CONTEXT FREE GRAMMARS 15

Regular Expressions and Properties: Constructing Regular Expressions, Finite Automata and Regular Expressions - Conversion of RE to Automata and Automata to RE, Applications of Regular Expressions, Pumping Lemma, Closure Properties.

Context Free Grammars: Definitions and Derivations, Parse trees, Applications, Ambiguity in Grammars and Languages.

UNIT III PUSHDOWN AUTOMATA AND CONTEXT FREE LANGUAGES 15

Pushdown Automata: Definition, The Languages of a PDA, Constructing PDA's, Equivalence of PDA and CFG, Deterministic Pushdown Automata

Normal Forms and Properties: Chomsky Normal Form (CNF), Greibach Normal Form (GNF), Pumping Lemma and Closure Properties of CFL.

UNIT IV TURING MACHINE AND RECURSIVE ENUMERABLE LANGUAGE 15

Introduction: Definition, Constructing Simple TM's, Representations, Programming Techniques – Automata with storage, Multi-tape tracks, Checking of symbols, Subroutines, Universal Turing Machine, Turing Machines and Computers

UNIT – V UNDECIDABILITY AND COMPLEXITY 15

Undecidability: Language that is not Recursively Enumerable, Undecidable Problem that is Recursive Enumerable, Undecidable Problem about Turing Machine, Post Correspondence Problem, Modified PCP

P and NP: The Class P, The class NP, The NP-Complete Problem

Lecture: 45 +Tutorials: 30 hours

Total : 75 hours

TEXT BOOKS

1. John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman "Introduction to Automata Theory, Languages, and Computation ", 3rd Edition, Pearson Education, 2008

REFERENCES

1. Kavi Mahesh "Theory of Computation – A Problem-Solving Approach", John Wiley-India, First Edition, 2012
2. A.M. Natarajan, A. Tamilarasi, P. Balasubramani "Theory of Computation ", New Age International Publishers, 2007
3. Raymond Greenlaw, H. James Hoover "Fundamentals of the Theory of Computation: Principles and Practice", Morgan Kaufmann Publishers, 1998
4. John C. Martin "Introduction to Languages and the Theory of Computation", 4th Edition, McGraw-Hill, 2010

U15IT504R **WEB TECHNOLOGY** **3 0 0 3**

COURSE OUTCOMES

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

1. Design a web page for any application using HTML5 and CSS3
2. Create an interactive and semantic web page using Java scripts and XML.
3. Write server side programs using the Servlets and JSP
4. Write server side programs using open source technologies such as PHP and MySQL
5. Apply AJAX , JSON and Node.js in the web application development

UNIT I INTRODUCTION TO INTERNET, HTML 5 and CSS 3 **9**

History of Internet, WWW- HTML Common tags- List, Tables, images, forms, Frames- HTML 5:New Elements, Graphics, Media and APIs CSS2 and CSS3: Selectors ,Box Model, Backgrounds, Image Values and Replaced Content, Text Effects, 2D and 3D Transformations, Animations and Multiple Column Layout

UNIT II JAVASCRIPT AND XML **9**

Java Script control structures, Dynamic HTML- Javascript document object model - Event Handling - Window Object - Document object - Browser Object - Form Object - Navigator object - Screen object - User defined object – Cookies – XML Introduction- XML DTD, XML Schema, XML-CSS-XSLT

UNIT III WEB SERVERS, SERVLETS AND JSP **9**

Tomcat web server - Introduction to Servlets: Lifecycle of a Servlet, JSDK, The Servlet API, Handling Http Request & Responses.

JSP - The Problem with Servlet - The Anatomy of a JSP Page, JSP Processing – JSP scripting elements – Implicit objects – Directive elements.

UNIT IV PHP AND MYSQL **9**

PHP: Introduction,syntax,variables,strings,operators,if-else,loop,switch,array,function,form, mail, fileupload, session, filters, PHP-ODBC.

MySQL: Introduction– Setting up account– Starting, terminating and writing your own SQLprograms - PHP and SQLdatabase – PHP Connectivity.

UNIT V ASYNCHRONOUS SCRIPTING **9**

AJAX Concepts – AJAX request from JavaScript and JQuery- Processing JSON with jQuery and Javascript – Node.Js: Introduction, Environment Setup, Package Manager, Callbacks Concept, Event Loop, Emitter, Buffers, Streams, File System and Web Module

Total: 45 hours

TEXT BOOKS

1. Internet and World Wide Web – How to program by Paul J. Deitel , Harvey M.Deitel, 5th Edition, PHI/Pearson Education Asia, 2012.
2. N P Gopalan, J Akilandeswari, " Web Technology – A developers Perspective", PHI Learning Pvt. Ltd., New Delhi, 2014.
3. Ullman,"PHP fortheWeb:VisualQuickStartGuide", 5rd Edition, PearsonEducation, 2016.
4. Brad Dayley, "Node.js, MongoDB, and AngularJS Web Development", Addison-Wesley, 2014 .
5. Rebecca.M.Riordan,"Head First Ajax :A Brain-Friendly Guide",O'Reilly Media,2009.

REFERENCE

1. James Conard,PatrickDengler,BrainFranics Et Al, " Introducing .NET ", Shroff Publishers, New Delhi, 2001.
2. Hortsmann& Cornell, "CORE JAVA 2 ADVANCED FEATURES, VOL II", 8th Edition, Pearson Education, 2008.
3. Heather Williamson, "XML: The Complete Reference", 1st Edition. McGraw-Hill, 2001.

U15IT505R **COMPUTER NETWORKS LABORATORY** **0 0 2 1**

COURSE OUTCOMES

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

1. Identify Network Devices and configure and test network
2. Write programs for UDP, TCP and other protocols using Socket Programming and network simulator
3. Implement flow control protocols

LIST OF EXPERIMENTS

1. Study of Network devices in detail.
2. Study of Network IP.
3. Configuration of networks in Linux using ipconfig, route, bind, etc.
4. Configuration of firewall and masquerading in Linux; network trouble-shooting and performance monitoring using netstat, ping, tcpdump, etc.
5. Study of TCP/UDP socket programming
6. Implementation of UDP
7. Implementation of TCP
8. Implementation of stop and wait protocol
9. Implementation of sliding window protocol
10. Implementation of shortest path algorithm
11. Implementation of Chat application
12. Implementation of File transfer

Note: Two or three experiments numbered from 6 to 12 can be implemented using network simulator.

Total: 30 hours

U15IT506R DATABASE MANAGEMENT SYSTEMS LABORATORY 0 0 4 2

COURSE OUTCOMES

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

1. Build tables, construct relationships among them and retrieve data with simple and complex queries
2. Build various constraints, triggers and indexes on the tables
3. Design and implement a database and to integrate into a simple application

LIST OF EXPERIMENTS

1. Create a relational database system using DDL commands with constraints.
2. Update the database system using DML commands.
3. Query the database using simple and complex queries.
4. Create and update views.
5. High level programming language extensions (Control structures, Procedures and Functions).
6. Create triggers.
7. Create assertions and indexes.
8. Use of front end tools to manipulate the database.
9. Generate reports using a reporting tool.
10. Database Design and implementation of an application system. (Suggested Mini Project)

Total: 60 hours

U15IT507R **WEB TECHNOLOGY LABORATORY** **0 0 4 2**

COURSE OUTCOMES

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

1. Develop web applications using HTML5, CSS3 and Java Scripts.
2. Develop a server-side application to generate dynamic web pages using Servlet, JSP and PHP technologies
3. Develop an interactive and rich GUI based web applications using AJAX and node.js.

EXPERIMENTS

1. Web page creation using HTML and DHTML and Client side Scripting Languages
2. Design a web page using CSS (Cascading Style Sheets)
3. Write JavaScript to validate the fields in a conference registration page.
4. Write a GUI program for getting time and data information from the server.
5. Design a JSP program to store and retrieve the data in pure XML format from database.
6. Write a JSP program for order processing
7. Write a java program/servlet/JSP to connect to that database and extract data from the tables and display them. Experiment with various SQL queries.
8. Write a Servlet, bean program to access information from databases
9. Create a Web page by using PHP and My SQL for Email Service.
10. Develop a AJAX based web application that interacts with database and retrieve JSON document for the processing.
11. Develop a Node.js based web application
12. Develop a web application in IBM Bluemix cloud that offers PaaS.

Total: 60 hours

U15IT904R COMPUTER GRAPHICS 2 0 2 3

COURSE OUTCOMES

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

1. Draw the basic output primitives and perform different 2D transforming and clipping.
2. Explain 3D object representation and perform 3D object transformation and visible surface identification.
3. Explain the concepts of Animation and create different basic primitives using OpenGL
4. Comprehend and apply different methods of shading, creating shaded objects, Rendering texture and Drawing Shadows
5. Implement various Fractals using different techniques and will be able to perform Ray Tracing.

UNIT I BASIC PRIMITIVES 7

Output Primitives: Line, Circle and Ellipse drawing algorithms and Attributes of output primitives.

UNIT II 2D CONCEPTS 7

Transformation: Translation, Rotation and Scaling.

V**iewing:** Line, Polygon, Curve and Text clipping algorithms.

UNIT III 3D DISPLAY METHODS 5

Three dimensional display methods: Parallel projection, Perspective projection, Depth Cueing, Visible Line and Surface Identification, Surface Rendering and Exploded and Cutaway Views.

UNIT IV 3D OBJECT REPRESENTATION 5

Three dimensional object representation: Polygons, Curved lines, Splines, Quadric Surfaces, Visualization of data sets.

Color Models: RGB, YIQ, CMY, HSV.

UNIT V ANIMATION AND GRAPHICS PROGRAMMING 6

Animations: General Computer Animation, Raster, Key frame

Graphics programming using OPENGL: Basic graphics primitives, drawing three dimensional objects, drawing three dimensional scenes.

Total: 60 hours

TEXT BOOK

1. Donald Hearn, Pauline Baker, “Computer Graphics – C Version”, Second Edition, Pearson Education, 2004.
2. F.S. Hill, “Computer Graphics using OPENGL”, Second Edition, Pearson Education, 2003.

REFERENCES

1. James D. Foley, Andries Van Dam, Steven K. Feiner, John F. Hughes, “Computer Graphics- Principles and practice”, Second Edition in C, Pearson Education, 2007.
2. Edward Angel, Interactive Computer Graphics. A Top-Down Approach Using OpenGL (fifth Edition), Pearson Education, 2008.
3. Peter Shirley and Steve Marschner, Computer Graphics (first edition), A. K. Peters, 2010.

LIST OF LAB EXERCISES

1. Study of basics of openGL.
2. To implement Bresenham’s algorithms for line, circle and ellipse drawing
3. To perform 2D Transformations such as translation, rotation, scaling, reflection and sharing.
4. To implement Cohen–Sutherland 2D clipping and window–viewport mapping
5. To perform 3D Transformations such as translation, rotation and scaling.
6. Write a OpenGL program to construct a hut

U15IT905R **C# AND .NET** **2 0 2 3**

COURSE OUTCOMES

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

1.Explain basic concepts of C#.Net

2.Write applications using OOPs concepts in C# with exception handling

3.Implement database connectivity applications using ADO.Net

4.Apply and use data binding controls and BLOB objects

5.Explain .Net framework and LINQ programming

UNIT I BASICS OF C# 6

Introducing C# − Understanding .NET − Overview of C# − Literals − Variables − Data types − Operators − Expressions − Branching − Looping − Methods − Arrays − Strings − Structures − Enumerations.

UNIT II OBJECT ORIENTED CONCEPTS IN C# 6

Classes − Objects − Inheritance − Polymorphism − Interfaces − Operator Overloading − Delegates − Events − Errors and exceptions.

UNIT III APPLICATION DEVELOPMENT ON .NET 6

Building windows applications − Windows form controls - Common Dialog Boxes - Creating user controls - ADO.NET Architecture – ADO.NET Components and Classes – ADO.NET Connected and Disconnected Models.

UNIT IV DATA BINDING AND THREADS 6

XML and ADO.NET – Simple and Complex Data Binding – Data Grid View Class - Storage and retrieval of BLOB objects - Threads.

UNIT V .NET FRAMEWORK AND LINQ 6

Assemblies − Versioning − Attributes − Reflection − Marshalling – Remoting – Introduction to LINQ.

Total: 60 hours

TEXT BOOKS

1. Balagurusamy, E., “Programming in C#”, 3rd Edition, McGraw- Hill, 2010.
2. Liberty, J., “Programming C# 6.0”, O’Reilly, 2015.

REFERENCES

1. Herbert Schildt, “The Complete Reference −C#”, Tata McGraw- Hill, 2004.
2. Robinson, “Professional C#”, 2nd Edition, Wrox Press, 2002.
3. Thamarai Selvi, S. and Murugesan, R., “A Textbook on C#”, Pearson Education, 2003.
4. Andrew Troelsen, “C# and the .NET Platform”, A! Press, 2003.
5. Paul J. Deitel and Harvey M.Deitel, C# 2008 for Programmers, 3rd Edition, Pearson Education.

Lab Exercises:

1. Arrays and strings
2. Inheritance
3. Windows form creation
4. Delegates and Events
5. Creating user controls
6. Multi module assembly
7. Database creation using ADO.NET
8. LINQ Programming

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 V under Regulations 2015R (CBCS)
Branch: Fashion Technology

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit
Theory						
1	U15FT501R	Garment Construction-II	3	0	0	3
2	U15FT502R	Garment Production Machinery and Equipment	3	0	0	3
3	U15FT503R	Apparel Production Planning and Control	3	0	0	3
4	U15FT504R	Clothing Size, Fit and Comfort	3	0	0	3
5	U15FT901R	**Elective** - Computer Applications in the Garment Industry	3	0	0	3
	U15FT902R	**Elective** - Surface Ornamentation of Fabrics				
	U15FT904R	**Elective** - Visual Merchandising				
Practical						
6	U15FT505R	Garment Construction Laboratory - II	0	0	4	2
7	U15FT506R	Apparel Machinery Laboratory	0	0	2	1
8	U15FT507R	In-Plant Training	0	0	0	1
9	U15FT501R	Soft Skills and Aptitude -III	0	0	2	1
					Total Credits	**20**

Approved By

Chairman, Fashion Technology BoS
Dr.G.Gunasekaran

Member Secretary, Academic Council
Dr.R.Shivakumar

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

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

U15FT501R	GARMENT CONSTRUCTION - II	3 0 0 3

COURSE OBJECTIVE

To impart knowledge on measurement for children's, men's and women's garment, draft the pattern and construct the children's, men's and women's garment and check the fit of the garment, drafting and construction of lingerie and the importance and application of elastomeric yarns.

COURSE OUTCOMES

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

- Explain the fundamental concepts of measurement for children's garment, draft the pattern and construct the garment and enumerate the factors affecting the selection of fabrics, trimmings, seams used in children's wear, explain the method of fabric consumption and check the fir of the garment.
- Explain the procedure involved in drafting and construction of men's wear, state the method followed in minimising the fabric used and check the fit of the garment.
- Describe the method of drafting and construction of men's suit and explain the principles of fit, explain the method to judge the fit of the men's suit'.
- Mention the importance and method of taking measurement for women's garment, state the procedure of pattern drafting and construction of women's wear and explain the process involved in minimizing fabric consumption for women's wear.
- Describe intimate apparels and its fitting, explain the procedure involved in drafting and construction of lingeries and state the importance of elastomeric yarns and its application in the manufacture of lingeries.

UNIT I Measurement for Children's Garments 9

Measurement for Children's Garments: Measurement required for construction of children's garments. Step by step procedure for pattern drafting, construction, minimizing fabric consumption and checking the fit for children's wear- body suit, baby frock, shorts, rompers, pedal pushers. Factors affecting selection of fabrics, trimmings, seams used in children's wear.

UNIT II Men's Wear 9

Step by step procedure for pattern drafting, construction and minimizing fabric consumption for men's casual wear, formal wear, work wear and under clothing. Check the fit of the garments.

Casual wear : T-Shirts, Bermudas, Pyjamas, Boxer shorts, Cargos
Formal wear : Formal shirts, Formal trousers
Work wear : Dungarees and overalls
Inner Wear : Vests and briefs

UNIT III Men's Formal Wear 9

Men's Formal Wear: Step by step procedure for pattern drafting: construction and minimizing fabric consumption, principles of fit for men's suits: 2 piece and 3 piece suits, single and double breasted suits.

UNIT IV Women's Wear 9

Women's Wear: Measurement required for construction of women's garments. Step by step procedure for pattern drafting, construction and minimizing fabric consumption for women's wear.

Casual wear : Night wear
Traditional wear: Salwar kameez, Chudidhar
Western wear : Ladies tops, Formal trousers, Skirts: 'A' line, Umbrella, six gore, Circular skirt.

UNIT V Lingerie **9**

Lingerie: Intimate apparels, different types of fitting for ladies inner wear, step by step procedure of construction, brassiers, size and fit, ladies panties, other lingerie's, use of elastomeric yarns in lingerie.

TOTAL: 45 hours

TEXT BOOKS

- Patrick John Ireland, "**Fashion Design Illustration: Men"**, B.T Batsford Ltd., London, 1996.
- Gerry Cooklin, "**Pattern Grading for Children's Clothes"**, Om Book Service, New Delhi, 1991.
- Harold Carr and Barbara Latham, "**The Technology of Clothing Manufacture"**, Blackwell Science Inc., Oxford, 1994.
- Singer Sewing Staff, "**Sewing Lingerie"**, CyDeCosse Incorporated, Minnetonka, 1991.

REFERENCES

- Singer Sewing Staff, "**Sewing Active Wear",** Creative Publishing International Editors, 1986.
- Singer Sewing Staff, "**Sewing Pants That Fit"**, Cowles Creative Publishing Inc., 1989.
- Gerry Cooklin, "**Garment Technology for Fashion Designers"**, Blackwell Science, Oxford, 1997.

U15FT502R	GARMENT PRODUCTION MACHINERY AND EQUIPMENT	3 0 0 3

COURSE OBJECTIVE

To impart knowledge to the students about the spreading techniques with different forms of fabrics, cutting machines, parts and setting points of sewing machine and specialised industrial sewing machine

COURSE OUTCOMES

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

- Explain different methods of spreading of fabrics with respect to type of fabric.
- Describe the types and functions of various fabric cutting machines.
- Explain the functions of primary and auxiliary parts of sewing machine.
- Elucidate the working principles of over lock and flat lock sewing machine.
- Explain the functions and working principles of special purpose sewing machines.

UNIT I Spreading 8

Spreading: Types of fabrics: One way, two way fabrics, their effect on spreading. Methods of fabric spreading, spreading equipment, computerized spreaders, marker planning, marker efficiency, factors affecting marker efficiency, marker duplicating methods and computer aided marker planning, types of fabric packages.

UNIT II Cutting Machines 8

Introduction to cutting machines: Types and functions of cutting machines, straight knife, round knife, band knife cutting machines, notches, drills, die cutting machines, computerized cutting machines. Maintenance of cutting machines, common defects in cutting and their remedies.

UNIT III Sewing Machine - SNLS 10

Basic parts of sewing machine: Primary and auxiliary part and their functions, bobbin case / bobbin hook, throat plate, take up devices, tensioners, feed dog, pressure foot. Types of needle, parts of needle and their function, needle finishes. Adjustments of stand height, pedal, needle bar, stitch length selection, feed timing, needle and bobbin thread tension, stitch cycle timing diagram. Common defects and remedies. Special attachments in sewing machines: guides, folders, stackers, trimmers, ziggers.

UNIT IV Multi Thread Sewing Machines 10

Over lock machines: Types of over lock machines, parts and their functions. Threading diagram of over lock machines. Adjustment of needle height, feed dog height, angle, differential feed ratio, position of upper and lower knives, loopers. Defects and remedies.

Flat lock machines: Types, parts and their functions. Threading diagram of flat lock machines. Adjustment of parts: Needle height, feed dog height, differential feed ratio, loopers. Maintenance of flat lock machines. Defects and Remedies.

UNIT V Special Purpose Sewing Machines 9

Introduction to different special purpose sewing machines: Basic working of feed of arm, button hole sewing, button sewing, bar tack, blind stitch machines. Embroidery sewing machines. Latest developments in sewing machines. Sewing machine maintenance, maintenance schedule for various machines.

Total: 45 hours

TEXTBOOKS

1. Carr and Latham's **"Technology of Clothing Manufacture"** Revised by David J.Tyler, Blackwell Publishing, 2008.
2. Laing R.M., Webster J, "**Stitches and Seams",** The Textile Institute, Manchester, UK, 2009.

REFERENCES

- Shaeffer Claire, "**Sewing for the Apparel Industry**", Prentice Hall, New Jersey, 2001.
- Singer Sewing Reference Library, "**Sewing Lingerie**", CyDeCosse Incorporated, Minnesota, 1991.
- Jacob Solinger, "**Apparel Manufacturing Handbook**", Reinhold Publications, 1998.

U15FT503R	APPAREL PRODUCTION PLANNING AND CONTROL	3 0 0 3

COURSE OBJECTIVE

To impart knowledge about the production, pre-production activities, marker, lay planning, bundle ticket, operation sequence, production planning and control, and the assessment of the quality of the developed products.

COURSE OUTCOMES

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

1. Explain the functions and techniques involved in production and pre-production activities.
2. Describe the lay planning and bundle ticket process in apparel production.
3. Discuss the different types of production system and operation break down for various garments.
4. Explain the capacity calculation and line balancing in cutting, sewing and finishing.
5. Discuss the production planning tools and its implementation in garment industry.

UNIT I Introduction 9

Production: Definition, Terminology, Functions of production department, Duties and responsibilities of a production manager / supervisor.

Pre-production activities: Lead time, Product development steps from a prototype to the production model, Product data management and detailed interpretation of specification sheets.

UNIT II Lay Planning and Bundle tickets 8

Lay planning: Lay lot planning, numerical exercises on lay lot planning, shrinkage allowance.

Bundle Tickets: Importance and guidelines, sorting and bundling, move ticket, barcode and RFID Technology.

UNIT III Production Systems and Operation Sequence 10

Production systems: Whole garment production system, batch production system, straight line production system, unit production system, quick response production system, modular production system.

Operation breakdown: T- shirt, men's full sleeve shirt, trousers, jeans, ladies night dress, shorts, machines and attachment details.

UNIT IV Capacity Calculation and Line Balancing 9

Capacity calculation: Cutting, sewing and finishing, analysis of man - machine requirements for a given target.

Line balancing: Importance, techniques and line balancing matrix, TAKT time analysis.

UNIT V Production Planning Tools 9

Principles of scheduling: Scheduling charts, GANTT chart, backlog graph, CPM and PERT analysis.

Line Planning: Multi-style planning, evaluation of plant layout, pitch time analysis, production grid.

TOTAL: 45 hours

TEXT BOOKS

- Cooklin Gerry, "**Introduction to Clothing Manufacture"**, Blackwell Science Ltd., Oxford, 2006.
- Ruth E. Glock and Grace I. Kunz, "**Apparel Manufacturing: Sewn Product Analysis",** Fourth Edition, Pearson Education, New Delhi, 2005.

REFERENCES

- Chuter A. J., "**Introduction to Clothing Production Management**", Blackwell Science Publishing, 1995.
- Harold Carr and Barbara Latham, "**The Technology of Clothing Manufacture**", Om Book Service, New Delhi, 1995.

3. Jacob Solinger**,** "**Apparel Production Handbook**", Van Nostrand Reinhold Publications, New York, 1998.

U15FT504R	CLOTHING SIZE, FIT AND COMFORT	3 0 0 3

COURSE OBJECTIVE

To impart knowledge about human anthropometrics and size systems, method of evaluation of clothing fit and clothing appearance, principle of 3D body scanning, virtual garmenting and various men's and women's garment fitting solutions.

COURSE OUTCOMES

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

- Define anthropometry and sizing system. Explain the principles of sizing systems and also categorise the sizes for men, women and children wear.
- Discuss about the subjective evaluation and objective evaluation of clothing fit.
- Discuss the importance of clothing comfort and properties related to tailoring performance.
- Elaborate the points to be kept in mind while judging physiological comfort and fitting of textile products.
- Explain the influence of thermal comfort on selection of fabrics.

UNIT I Human Anthropometrics and Sizing Systems 8

Basics of sizing systems: Definition, traditional anthropometry, development of sizing system, international sizing, principles of sizing system, size categories in menswear, women's wear and children's wear.

UNIT II Evaluation of Clothing Fit 10

Subjective Evaluation of Clothing Fit: Definition of fit, importance of fit, standards of fit, influence of clothing fit, testing methods for dimensional fit, subjective rating scales and subjective fitting guide.

Objective Evaluation of Clothing Fit: Fit formula, algebraic evaluation of clothing fit, pressure evaluation of clothing fit.

UNIT- III Clothing Comfort 9

Comfort: Introduction to clothing comfort, types and definition, human clothing system, comfort perception and preferences, Need and selection of clothing, Components of clothing comfort, Clothing Comfort and wearer's attitude, clothing performance characteristics: comfort, durability, hand and Tailorability, Fabric properties related to tailoring performance.

UNIT IV Physiological and Fitting Comfort 9

Concept related to physiological aspects of clothing comfort, factors affecting garment fit and comfort – air gap thickness, garment ventilation, fluctuating microclimate in loose-fit garment, garment fit and pressure sensation. Fabric properties related to clothing appearance and fit.

UNIT V Thermal Comfort 9

Physical phenomena affecting thermal comfort, Effect of fabric properties of heat transfer, Moisture vapour permeability, Liquid moisture permeability – absorbency, wettability, waterproof, contact angle, moisture management, Air permeability – factors influencing air permeability.

Total: 45 hours

TEXT BOOKS

- Fan J., Yu .W and Hunter L., "**Clothing Appearance and Fit",** Textile Institute, Woodhead Publishing Limited, England, 2004.
- Das .A and Alagiruamy .E, **"Science in clothing comfort**"– Wood head Publishing Ltd., 2010.
- **"The Perfect Fit: Classic Guide to Alter Patterns"**, Creative Publishing International, USA, 2005.
- Das A and Alagirusamy , "**Science in clothing comfort**", Wood head publishing limited, England 2010.

REFERENCES

- Sandra Betzina, "**Fast Fit-Easy Pattern Alterations for Every Figure"**, The Taunton Press Inc., Singapore, 2003.

RELATED JOURNALS

- **Journal of Textile & Apparel Technology and Management**, North Carolina, USA **International Journal**.
- **Stitch World -** Industry magazine. (stitchworld.net).
- **Apparel Views** magazine. (www.apparelviews.com*)*

U15FT505R	GARMENT CONSTRUCTION LABORATORY - II	0 0 4 2

COURSE OBJECTIVE

To impart knowledge on method of taking measurements for men's causal, men's formal and men's underwear garments and the process of pattern making and the construction of men's casual, men's formal and men's underwear garments wear.

COURSE OUTCOMES

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

- State the importance of measurement taking for men's wear and demonstrate the process of pattern drafting and construction of men's casual and inner garments.
- Explain the method of taking measurements for men's inner wear and state the drafting procedure and the steps involved in the construction of men's inner wear.
- Explain the method of taking measurements for women's casual wear and state the drafting procedure and the steps involved in the construction of women's casual wear

Construction of

Men's casual wear:

- Men's Bermudas (1session)
- Men's' shorts (2 session)
- Men's T-Shirt (1 session)

Men's inner garments:

- Briefs (1/2 session)
- Vests (1/2 session)

Women's casual wear

- Ladies Salwar (1 session)
- Ladies Kameez (2 session)
- Ladies Chudidhar (1 session)
- Ladies Pallazo (1 session)

TOTAL: 60 hours

Garment Construction Laboratory - II

List of equipment required for a batch of 30 students

S. No.	Name of the equipment / software	Quantity Required
1.	Single needle lock stitch machine	30
2.	Flat lock machine	1
3.	Feed off arm machine	1
4.	Over lock machine	3
5.	Button hole and button stitch machine	1 each
6.	Ironing Table	1
7.	Steam Iron Box	1
	Total	**39**

U15FT506R	APPAREL MACHINERY LABORATORY	0 0 2 1

COURSE OBJECTIVE

To impart knowledge on specialised sewing machines, settings and identification of stitch defects and remedies.

COURSE OUTCOMES

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

- Identify the major parts, perform various settings, threading sequence, prepare samples and calculate SPI for given stitch length for basic sewing machines.
- Identify the major parts, perform various settings, threading sequence, prepare samples and calculate SPI for given stitch length for specialised machine.
- Set up a sewing machine to produce a specified sample by performing machine settings, machine threading using suitable SPI and stitch length without sewing defects.

LIST OF EXPERIMENTS

- Identify the single needle lock stitch machine parts, study various setting points, perform threading, prepare samples by using various folders and calculate the SPI for specified/chosen stitch length. (session 1)
- Identify the double needle lock stitch machine parts, study various setting points, perform threading, prepare stitch sample and calculate the SPI for given stitch length. (session 1)
- Identify an over lock machine parts, study various setting points, perform threading, prepare stitch sample and calculate the SPI for given stitch length. (session 1)
- Studies of the over lock machine adjustments for needle-thread, looper thread tension, feed-ratio, needle and looper setting and knife setting. (session 1)
- Identify the flat lock machine parts, study various setting points, perform threading, prepare stitch sample and calculate the SPI for given stitch length. (session 1)
- Study of the flat lock machine for making adjustments of the needle-thread and looper-thread tension, feed-ratio, needle-and-looper setting and spreader setting. (session 1)
- Identify the button sewing machine parts, study various setting points, perform threading and prepare stitch sample. (session 1)
- Identify the Button holing machine parts, study various setting points, perform threading and prepare stitch sample. (session 1)
- Identify the Feed-off arm machine parts, study various setting points, perform threading and prepare stitch sample. (session 1)
- Identify the Bar tack machine parts, study various settings points perform threading and prepare stitch sample. (session 1)
- Identify various stitch defects, their causes and remedies and adjustments of machine settings for remedy. (session 1)

TOTAL: 30 hours

Apparel machinery laboratory
List of equipment required for a batch of 30 students

S. No.	Name of the equipment / software	Quantity Required
1	Single Needle Lock Stitch Machine Industrial machine	30
2	Over lock machine	1
3	Flat lock machine	1
4	Button sewing machine	1
5	Button Hole machine	1
6	Feed off f arm machine	1
7	Flat lock elastic attaching machine	1
8	Bar tack sewing machine	1
9	Double Needle Lock Stitch machine	1
	Total	38

U15FT507R	IN-PLANT TRAINING	0 0 0 1

COURSE OBJECTIVE

To impart knowledge to the students in the real world of textile / garment industry in various departments.

COURSE OUTCOMES

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

- Explain the process sequence followed in the industry.
- Explain the organisation structure of the industry.
- Explain the various technical particulars pertaining to the industry.

- The students have to undergo a 2 week in-plant training related to the subject learnt in the immediately preceding semesters.

- The students have to submit a report of their in-plant training.

- A committee of three staff members as internal examiner and an external examiner will conduct a Viva voce and evaluate student performance.

- Students successfully completing the 2 week in-plant training will be awarded one credit.

PROFESSIONAL ELECTIVE I

U15FT901R	COMPUTER APPLICATIONS IN THE GARMENT INDUSTRY	3 0 0 3

COURSE OBJECTIVE

To impart the basic concepts and application of CAD, CAM, CIM in garment industry, fundamentals of E-commerce, application of textile, garment CAD and virtual fitting tools in apparel industry, feature and uses of different software in garment industry.

COURSE OUTCOMES

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

1. Describe the basic terms of computer application, concept of network and application in E-commerce in garment industry.
2. Explain the different modules and application of CAD in textile and garment industry.
3. Explain the application of different computer controlled machines used in garment industry.
4. Explain various virtual fitting and 3D body scanning concept used in the garment industry.
5. Describe the concept of production and management software used in the garment industry.

UNIT I Computer Application in Retail Sales 8

Basic concepts: Definition and concepts of CAA (computer aided administration), CAD (computer aided designing), CAM (computer aided manufacturing), and CIM (computer integrated manufacturing), electronic spread sheet and its application.

Concept of network: Definition, concept, types of network, application of web in garment industry.

E-Commerce: Fundamentals of E-commerce, types of E-commerce and application of E-commerce, electronic data interchange, application of intranets. Mobile applications and their facilities in online retail sales.

UNIT II Textile and Garment CAD 10

Textile CAD: Plain and stripe effect, weave construction library, development of various woven design, simulation of colour and weave effect, CAD system for printing.

Garment CAD: Application of fashion designing softwares, pattern making, grading and marker planning using apparel software.

Computer Aided Colour matching: Principle and application of computer aided colour matching system, fabric defect analysis using image processing system.

UNIT III CAM/CIM in Apparel Industry 9

Computer Controlled Machines: Fabric laying, cutting, sorting, labelling machines, embroidery machine and its softwares. Modern inspection machines/systems, BMS vision cyclops, Zellweger uster fabric scan, shelt on web SPECTOR.

Computer Application in Sewing: Application of computerized sewing machine, computerized unit production systems used in apparel industry, computer controlled overhead transport and computer aided warehouse storage systems. RFID application in sewing department, robotics application in garment industry.

UNIT IV Virtual Fitting Tools 9

Virtual Fitting: Draping models in commercial CAD, virtual fitting, 3-Dimensional apparel design systems for pattern generation and garment fit.

3D body scanning: Application of 3D body scanner, global development of body scanners, challenges of body scanning and working principle of 3D body scanner: layer scanning, white light pattern scanning, image processing method.

UNIT V Different Software used in Apparel Industry 9

Production and Management Tools: Computer aided production planning and control, application of cut planner and general sewing data (GSD), Product development using CAD, RFID application in logistics and supply chain management. Introduction to MIS. Concept of ERP and its application in garment unit. Applications of RFID and ERP in E-commerce. Case studies.

TOTAL: 45 hours

TEXT BOOKS

- Alison Beazley & Terry Bond, "**Computer Aided Pattern Design and Product Development**", Blackwell Science Publisher, USA, 2004.
- Aldrich Winfred, "**CAD in Clothing and Textiles**", Blackwell Science Ltd., 1994.
- Sigmon D M, Grady P L and Winchester S C, "**Computer Integrated Manufacturing and Total Quality Management**", Textile Institute Publication, 1998.

REFERENCES

- Taylor Patrick, "**Computer in the Fashion Technology**", Om Book Service, 1997.
- Gupta, Sanjeev, Gupta Shameena, "**Computer Aided Management**", Excel Books, 2004.
- J.Fan,W.Yu and L.Hunter , "**Clothing Appearance and Fit: Science and Technology**" Woodhead Publishing Ltd, 2004.
- Stephen Gray, "**CAD / CAM in clothing and Textiles**", Gower Publishing Limited, 1998.

U15FT902R	SURFACE ORNAMENTATION OF FABRICS	3 0 0 3

COURSE OBJECTIVE

To impart knowledge to the students about the hand and machine embroidery and its various types of stitches along with traditional embroidery, surface ornamentations, computerised embroidery and costing.

COURSE OUTCOMES

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

- Explain the fundamentals of hand and machine embroidery.
- Describe the procedure and types of stitching hand embroidery stitches and Indian traditional embroideries and develop the samples.
- Describe the procedure of making specialised hand and machine embroidery and develop the samples.
- Discuss the design generation for machine embroidery using CAD.
- Explain the working of computerised embroidery machine and derive the cost for the finished embroidery article.

UNIT I Introduction to Embroidery 9

Hand Embroidery: Introduction, origin of embroidery, general rules for hand embroidery, tracing of embroidery design, precautions to be taken for proper maintenance of embroidery articles. Selection of needle, threads and fabrics for hand embroidery.

Machine Embroidery: Introduction, overview of machine embroidery, general rules for machine embroidery, attachments in sewing machines for embroidery, selection of needle, threads and fabrics for machine embroidery. Causes and remedies.

UNIT II Hand Embroidery Stitches and Indian Traditional Embroidery 9

Hand Embroidery Stitches: Knowledge, classification and practice of , running stitch, back stitch, cretan stitch, couching, button hole, satin, long and short, wheat, chain, stem, herringbone, cross stitch, knotted stitches and fish bone.

Indian Traditional Embroideries: Type of stitches, designs, colours and materials used for Phulkari, Kasuti, Kashmiri embroidery, Kutch work, Chikkankari, Kantha, Tribal embroideries. Causes and remedies.

UNIT III Specialised Surface Ornamentation 9

Specialised Embroidery: Knowledge and practice of surface ornamentations, eyelet work, cutwork, richelieu work, lace work, drawn thread and fabric work, patch work, mirror work, appliqué, shaded embroidery, zardosi work, shadow work, stone (kundan) work, badla work, bead and sequins work, bobbin-thread embroidery. Causes and remedies.

UNIT IV CAD in Embroidery 9

Introduction: Introduction to CAD in embroidery, selection of thread, colour and suitable stitches for embroidery using computer, advantages and limitations of CAD in embroidery.

Design preparation: CAD software used for embroideries, Process of designing, Types of stitches in CAD, its applications and punching procedure.

UNIT V Computerised Embroidery Machine and Costing. 9 Computerised Embroidery Machine: Types of embroidery machines and their working vertical embroidery machines, multi-head embroidery machines, special attachments in embroidery machines, types and purposes of frames and backing materials. Causes and remedies.

Costing: Estimating and costing of materials and embroidery articles.

TOTAL: 45 hours

TEXT BOOKS

- Parul Bhatnagar, "**Traditional Indian Costumes and Textiles**", Abhishek Publications, Chandigarh, 2004.
- Jay Diamond and Ellen Diamond, "**Fashion, Apparel, Accessories, Home Furnishings**" Pearson Prentice Hall, New Jersey, 2007.
- Usha Srikant, **"Designs for a lifetime",** Samata Enterprises, Mumbai, 2002.

REFERENCES

- Shailaja D. Naik, "**Traditional Embroideries of India**", A.P.H Publishing Corporation, New Delhi, 1996.
- Gini Stephens Frings, "**Fashion - From Concept to Consumer**", Prentice Hall, New Jersey, 1999.
- Sheila Paine, "**Embroidered Textiles**", Thames and Hudson Ltd., 1990.
- Gail Lawther, "**Inspirational Ideas for Embroidery on Clothes and Accessories**", Search Press Ltd., 1993.
- **Training Manual for Embroidery Machine Operators**, TAJIMA, UIET, Tirupur, 2003.
- **Training Manual for Embroidery Machines**, Barudan, Tirupur, 2002.

U15FT904R	VISUAL MERCHANDISING	3 0 0 3

COURSE OBJECTIVE

To impart knowledge to the students on how to plan creative ideas in setting up a store which will serve as value.

COURSE OUTCOMES

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

- Define the significance and role of visual merchandising in a retail environment, in order to effectively present the merchandise to the consumers.
- Classify the various elements of Visual presentation and understand their significance in visually presenting a display.
- Analyze and identify the best suitable environment for merchandise including interior, exterior and point of displays.
- Acquire knowledge on various techniques used in presenting and optimizing the merchandise to customers.
- Acquire knowledge on the various features available in a computer controlled visual merchandising.

UNIT 1 Fundamentals of Visual Merchandising 9

Definition, objectives and scope, types of display and display settings, retail stores and approaches of visual merchandising, types of retail stores, store atmospherics, approaches in visual merchandising in various stores, department store approach and small store approach. Role of Visual Merchandising in the changing face of retailing.

UNIT II Elements of Visual Presentation 9

Overview of the various elements, colour, lighting, line composition, graphics and signage, store exteriors and interiors, sensory stimulants like scent, sound etc., Application of colour schemes and colour psychology to create mood in garment display.

UNIT III Mannequins and Fixtures 8

Mannequins and other human forms, alternatives to mannequins. Criteria for selection of fixtures, dressing fixtures, modular fixtures. Store exterior, signs, marquees, outdoor lighting, banners, planters, awnings and windows in store front design.

UNIT IV Store interiors, Points of Display and Display Techniques 10

Focal points, island displays, risers and platforms, the runway, counters and display cases, museum cases, demonstration cubes, ledges, shadow boxes, enclosed displays, fascia, t-walls. Point of purchase display, industrial display, merchandise mix, fashion shows, trade organizations and sources, attention getting devices, familiar symbols. Masking and proscenia: purpose and techniques used.

UNIT V Store Planning and Execution of a Visual Presentation 9

Grid, race track, freeform and their Direction of flow. Floor plans and reading of floor plans, Plan-o-gram-definition, purpose and planning. Theme, ensemble, racks, shelves, bins, assortment planning, optimize apparel assortments, display calendar and planning a display, scheduling the promotion, budgeting and safety factors in visual merchandising.

TOTAL: 45 Hours

TEXT BOOKS

- Pegler M.M., "**Visual Merchandising and Display"**, IV Edition, Fair child Publications, NewYork, 2001.
- Diamond. J. Diamond. E., "**Contemporary Visual Merchandising"**, Prentice Hall Inc. New Jersey 2003.
- Diamond.E, "**Fashion Retailing - A Multi-channel Approach"**, II Edition, Prentice Hall Inc., New Jersey 2006.

REFERENCES

1. Rath P.M., Peterson J., Greensley. P, Gill. P, "**Introduction to Fashion Merchandising"**, Delmar Publishers Inc., New York 1994.
2. Phillips P.M., "**Fashion Sales Promotion"**, II Edition, Prentice Hall Inc, New Jersey, 1996.
3. Curtis E, **"Fashion Retail"**, John Wiley and Sons Ltd, England, 2004.

Semester –V	U15GE501R- SOFT SKILLS AND APTITUDE - III	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 supplementary areas of soft-skills and job-related selection processes using hands-on and/or case-study approaches
17. Solve problems of advanced levels than those in SSA-II in specified areas of quantitative aptitude and logical reasoning and score 70-75% marks in company-specific internal tests
18. Demonstrate greater than SSA-II level of verbal aptitude skills in English with regard to given topics and score 70-75% marks in company-specific internal tests

1.Soft Skills	**Demonstrating soft-skill capabilities with reference to the following topics:** a. Career planning b. Resume writing c. Group discussion d. Teamwork e. Leadership skills f. Interview skills g. Mock interview h. Mock GDs
2.Quantitative Aptitude and Logical Reasoning Topics	**Solving problems with reference to the following topics :** a. Numbers: Remainder concept b. Time and work: Fraction technique, Efficiency technique, Pipes and cisterns and Chain rule c. Simple interest d. Compound interest e. Set theory: Venn diagram f. Puzzles g. Mathematical operators h. Syllogism (≥4 Statements) i. Data sufficiency j. Statement and assumptions k. Statement and conclusions l. Company specific aptitude questions
3. Verbal Aptitude	**Demonstrating English language skills with reference to the following topics:** a. Subject verb agreement b. Selecting the best alternative for the stated parts of given sentences c. Reading comprehension d. Contextual synonyms e. Sentence fillers f. Writing a story for a given picture g. Company specific aptitude questions