UG Curriculum-2020
of
B. Tech. in Automobile Engineering
B. Tech. in Mechanical Engineering

School of Technology

Pandit Deendayal Energy University

Program Educational Objectives (PEOs)

1. To prepare the graduates with strong foundation in science and engineering for successful careers in core mechanical and interdisciplinary industries, higher education and research.
2. To prepare graduates who can become entrepreneur/innovators to design and develop system/process/product/service to address social and industrial challenges.
3. To prepare graduates with leadership qualities, strong communication skills, professional and ethical values.
4. To prepare lifelong learners graduates to excel in their professional career as well as to pursue higher education.

Program Outcomes (POs)

1. **Engineering knowledge:** An ability to apply knowledge of mathematics, science, and engineering in solving/analyzing problems in industries, research and development institutions, public sector units, higher education and in academia.
2. **Problem Analysis:** An ability to design and conduct experiments, as well as to analyze and interpret data in mechanical engineering theory and practice at various industrial work-places.
3. **Design/ Development of solutions:** An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, health and safety, manufacturability, and sustainability.
4. **Multidisciplinary Approach:** An ability to function on multidisciplinary teams.
5. **Modern tool usage:** An ability to identify, formulate, and solve engineering problems using modern tools and techniques.
6. **Communication:** An ability to communicate effectively.
7. **The Engineer and Society:** The broad education necessary to understand the impact of mechanical engineering solutions in a local, global, economic, environmental, and societal context.
8. **Life-long learning:** A recognition of the need for, and an ability to engage in life-long learning.
9. **Investigations of complex problem:** Use of Applied research including design of experiments, analysis and interpretation of data, synthesis of the information to provide valid solutions with the knowledge of contemporary issues.
10. **Project Management:** An ability to apply engineering knowledge and management principles skills to manage engineering projects.
11. **Environment and Sustainability:** An ability to design sub-systems, systems, components and processes to fulfil demand of environmental sustainability.
12. **Ethics:** Apply engineering principles toward the professional values and ethics.

Program Specific Outcomes (PSOs)

1. To **analyze the problems** and **create solution** by applying engineering knowledge with a multidisciplinary approach in the area of vehicle function, vehicle design and vehicle performance.
2. To analyze, interpret and provide solutions for the technical challenges faced by the Automobile Industry **using engineering software/tools.**
3. **To work effectively in a team** to address **complex issues** by engaging in **lifelong learning** and following **ethical and environmental** practices.

COURSE STRUCTURE FOR B.TECH. FIRST YEAR (Automobile Engineering)

SEMESTER I (Subjects)				B.TECH. FIRST YEAR (Automobile Engineering)											
Sr. No.	Category Code	Course Code	Course Name	Teaching Scheme					Exam Scheme						
									Theory			Practical		Total Marks
				L	T	P	C	Hrs/wk	CE	MS	ES	CE	ES	
1	BSC	20MA101T	Mathematics – I	3	1	0	4	4	25	25	50	-	-	100
2	BSC	20CH101T	Engineering Chemistry	3	0	0	3	3	25	25	50	-	-	100
3	BSC	20CH101P	Engineering Chemistry Lab	0	0	2	1	2	-	-	-	50	50	100
4	ESC	20ME102T	Elements of Mechanical Engineering	3	0	0	3	3	25	25	50	-	-	100
5	ESC	20ME102P	Elements of Mechanical Engineering-Lab	0	0	2	1	2	-	-	-	25	25	50
6	ESC	20IC101T	Basic Electronics	2	0	0	2	2	25	25	50	-	-	100
7	ESC	20IC101P	Basic Electronics Lab	0	0	2	1	2	-	-	-	25	25	50
8	ESC	20ME101P	Engineering Graphics – Lab	0	0	4	2	4	-	-	-	25	25	50
9	ESC	20CP101T	Programming with C	1	0	0	1	1	25	25	50	-	-	100
10	ESC	20CP101P	Programming with C - Lab	0	0	2	1	2	-	-	-	25	25	50
11	HSC	20HS102T	Environmental Studies	3	0	0	3	3	25	25	50	-	-	100
12	HSC	16SP101	NCC-I	0	0	2	1	2	-	-	-	-	-	100
		16SP102	NSS-I											
		16SP103	Sports-I											
Total				**15**	**1**	**14**	**23**	**30**						

CE = Continuous Evaluation MS = Mid Semester Exam ES = End Semester Exam

20MA101T					MATHEMATICS-I					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
3	1	0	4	4	25	50	25	--	--	100

COURSE OBJECTIVES

- To be able to evaluate problems related to differential and integral calculus of complex functions.
- To be able to obtain area, volume using integral calculus.
- To be able to formulate and solve various engineering problems using calculus.
- To study the properties of Matrix algebra and apply them to solve the system of algebraic equations.

UNIT 1 DIFFERENTIAL CALCULUS AND ITS APPLICATIONS **08 Hrs.**

Partial derivative and its application, - Euler's theorem - Total derivatives - Jacobians – Maxima and Minima of two variables using Lagrange's multipliers. Convergence of infinite series.

UNIT 2 INTEGRAL CALCULUS AND ITS APPLICATIONS **12 Hrs.**

Definition Evaluation of double integral (Cartesian – Polar form) – Change of orders - Change of variables – Evaluation of triple integral, change of variables (Cartesian to spherical – and cylindrical) – Applications, area – volume – center of mass – center of gravity by double and triple integral.

UNIT 3 MATRIX ALGEBRA AND ITS APPLICATIONS **10 Hrs.**

Solution of system of algebraic equation - Rank of a matrix, consistency of system of equation - Characteristic equation of a square matrix- Eigen values and Eigenvectors of a real matrix - Properties of eigen values and eigen vectors - Cayley-Hamilton theorem (without proof) - finding inverse of a matrix - Diagonalisation of a matrix using orthogonal transformation.

UNIT 4 VECTOR CALCULUS **10 Hrs.**

Gradient, divergence and curl – Directional derivative – Irrotational and Solenoidal vector fields – Vector Integration – Simple problems on line, surface and volume integrals – Green's theorem in a plane, Gauss divergence theorem and Stokes' theorem (without proofs) – Simple application involving cubes and rectangular parallelepipeds.

40 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 – **Identify** the use of convergence of infinite series in engineering aspects.
CO2 – **Understand** the concept of Directional derivative, Irrotational, and Solenoidal vector fields.
CO3 – **Apply** appropriate tool/method to extract the solutions of engineering problems.
CO4 – **Analyze** the obtained solution in context with theory.
CO5 – **Appraise** mathematical problems from real to complex domain.
CO6 – **Evaluate** problems on Green's, Stokes' and Divergence theorems.

TEXT/REFERENCE BOOKS

1. B. S Grewal, Higher Engineering Mathematics, (43rd Edition), Khanna Pub., Delhi (2014).
2. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, Alpha Science, 3rd Ed., 2007.
3. Erwin Kreyszig, Advanced Engineering mathematics, John Wiley, 10th Ed., 2015.
4. G. Strang, Linear Algebra and its applications, 4th Edition, Cengage Learning, 2005.
5. K. Hoffman and R. A. Kunze, Linear Algebra, Prentice Hall of India, 2002.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100	**Exam Duration: 3 Hrs.**
Part A: 10 questions 3 marks each	30 Marks (40 min)
Part B: 5 questions 6 marks each	30 Marks (50 min)
Part C: 5 questions 8 marks each	40 Marks (90 min)

20CH101T					Engineering Chemistry					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
3	0	0	0	3	25	50	25	--	--	100

COURSE OBJECTIVES

- To develop the fundamental understanding about atomic structure and interatomic bonding.
- To provide the knowledge about structural features, synthesis, properties of various categories of materials.
- To develop the skills for phase, microstructural and elemental characterisation of materials.
- To provide the knowledge about the role of chemistry in modern engineering applications.

UNIT 1 Atomic structure and interatomic bonding **12h**

Electrons in atoms, Bohr atomic model, wave mechanical model, introduction to quantum chemistry, wave functions and probability densities, quantum numbers, orbital shapes - *s,p,d,f*- LCAO-MO of H_2, covalent, ionic and metallic bonding, bonding forces and energies, lattice energy and Madelung constant, metallic crystal structure, ceramic crystal structure and influencing factors.

UNIT 2: Chemistry of materials **10 h**

Introduction and classification of materials; structural features, synthesis, properties of metallic (e.g. noble metal), polymeric (e.g. thermoplastic and thermosetting), glass-ceramic (e.g. silicates, metal oxides) carbonaceous materials (e.g. fullerene, carbon nanotube, graphene); Introduction to nanomaterials, surface area to volume ratio and aspect ratio of nanomaterials, quantum confinement, top-down and bottom up chemical/physical approaches for synthesis of nanomaterials.

UNIT 3: Chemistry of Fuels and energy devices **10 h**

Fuels – Classification of fuels; Determination of calorific values of solid fuels by bomb calorimeter – Manufacture of synthetic petrol by Fischer-Tropsch method – Knocking in IC engines – Octane and cetane rating of fuels; Petrol and Diesel Engine, chemistry for alternative source and storage of energy (supercapacitor, fuel cell, battery); role of chemistry on in photo-voltaic devices (solar cell).

UNIT 4: Instrumental methods of chemical analysis **12 h**

Characterization of materials using X-ray diffraction (XRD), thermal Analysis (TGA-DTA-DSC), basics and application of Microwave spectroscopy, FTIR, UV-visible spectroscopy; NMR spectroscopy; Chromatographic techniques (GC, HPLC).

Max. 44 h

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Understand the fundamental concept about atomic structure and interatomic bonding.

CO2 - Acquire knowledge about metallic and ceramic crystal structure.

CO3 - Acquire knowledge about structural features, properties of different classes of materials including nanomaterials.

CO4 - Explain the methodologies for the synthesis of different categories of materials.

CO5 - Develop the skill for phase, microstructural and elemental characterisation of materials.

CO6 - Develop the knowledge on the role of chemistry in various modern engineering applications.

TEXT/REFERENCE BOOKS

1. An Introduction to Materials Science & Engineering, W.D. Callister, John Wiley & Sons (2007).
2. Fundamental of Ceramics, MW Barsoum, IOP publishing (2003).
3. Text book of Nanoscience and Nanotechnology, T. Pradeep, Mc. Graw Hill Education (2003).
4. Textbook of Nanoscience and Nanotechnology, Murty, Shankar, B Raj, Rath, Murday, Springer (2013).
5. Materials Science and Engineering, V. Raghavan, Prentice-Hall of India Private Limited (2003).
6. Principles of Instrumental Analysis, Douglas A. Skoog, Donald M.West, 6th Edition, Cengage (2014)

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100 **Exam Duration: 3 h**

Part A/Question: 3 Questions from each unit, each carrying 3 marks 36 Marks

Part B/Question: 2 Questions from each unit, each carrying 8 marks 64 Marks

20CH101P					Engineering Chemistry Lab					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
0	0	2	1	2	--	--	--	50	50	100

COURSE OBJECTIVES

- To enhance and develop scientific and analytical skills
- To relate concepts learned in chemistry and engineering to the real-world situations.
- To acquire skills to perform laboratory experiments.
- To demonstrate safe and proper use of standard chemistry glassware and equipment.

LIST OF EXPERIMENTS

1. **External Indicator**–To determine the strength of given solution of ferrous ammonium sulphate by titrating against standard N/40 $K_2Cr_2O_7$ using potassium ferricyanide as an external indicator
2. **Iodometry**– To determine the strength of given copper sulphate solution by titrating against N/20 sodium thiosulphate (hypo) solution
3. **Iodimetry**– To determine the strength of given ascorbic acid by titrating against standard N/10 iodine solution
4. **Complexometric Titration**– To determine the total, permanent and temporary hardness of given water by complexometric titration using standard 0.01M EDTA solution
5. **pH metric titration**– To determine the strength of given HCl solution using a standard NaOH solution by performing a pH-metric titration
6. **Conductometric titration**– To determine the strength of given HCl solution using a standard NaOH solution by performing a conductometric titration
7. **Potentiometric titration**– To determine the strength of given HCl solution potentiometrically
8. **Chemical Kinetics**– To study the kinetics of decomposition of sodium thiosulphate by a mineral acid
9. **Chloride in Water**– Determination of Chloride in the given water sample by Mohr Method
10. **Polymerization**– To prepare a polymer (Nylon 6,10), identify the functional groups by FT-IR
11. **Spectrophotometry**– To determine the λmax and concentration of given unknown potassium permanganate using UV-Visible Spectroscopy technique

Max. <28> Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Apply the concepts learned in chemistry and engineering to the real-world situations.

CO2 - Enhanced ability to identify, analyse and interpret the results from the experiments

CO3- Carry out quantitative analysis by instrumental method using Conductometer.

CO4- Analyse compounds by titrimetric, gravimetric and instrumental methods

CO5- Determine the concentration of unknown solutions by Spectrophotometric method.

CO6- Investigate the reaction rate and predict the order and rate constant

TEXT/REFERENCE BOOKS

1. College Practical Chemistry, VK Ahluwalia, S Dhingra, A Gulati, Universities Press
2. Foundations of Experimental Chemistry, JB Baruah, P Gogoi, PharmaMed Press.
3. A Text Book of Chemistry Practicals Vol I & II, SS Sawhney, M S Jassal, SP Mittal, APH Publishing Corp.>

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100 **Exam Duration: 3Hrs**

Part A : Lab Work – Continuous Assessment 50 Marks

Part B : Lab Exam and Viva 50 Marks

20ME102T					Elements of Mechanical Engineering					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
3	0	0	3	3	25	50	25	--	--	100

COURSE OBJECTIVES

- To introduce and define the basics concept of mechanical engineering.
- To familiarize the working principles of IC engines and industrial robotics systems.
- To enable the students to understand the details about the energy systems and its components.
- To demonstrate the various machine elements, materials and its function.
- To help the students acquire knowledge about the various manufacturing process.

UNIT 1 Introduction to Thermodynamics **10 Hrs.**

Definition and applications, systems and control volumes, thermodynamic properties, thermodynamic systems, state and equilibrium processes and cycles, temperature and Zeroth law of thermodynamics, forms of Energy, energy transfer by work and heat, law of conservation of energy, energy conversion efficiencies.

Properties of Pure substances - Definition, examples and phases, phase change of pure substances, property diagrams and property tables. Solution of Numerical Problems through EES Software.

UNIT 2 Law of degradation of Energy and Internal Combustion Engines **10 Hrs.**

Limitations of First Law, Thermal Energy reservoirs, heat engines, Refrigerators and Heat pumps, Kelvin Plank and Clausius statement and their equivalence.

Introduction, classification and brief description of I.C. engines mechanism, 4-Stroke and 2-Stroke cycles and engines. Otto, Diesel and dual cycles; MEP and air standard efficiencies.

UNIT 3 Engineering materials and Introduction to Manufacturing Processes **10 Hrs.**

Stresses, strains and material properties.

Conventional manufacturing process: Lathe Machines, CNC machines, drilling machines, universal Milling machines. Non-conventional manufacturing processes: Additive Manufacturing, 3D printing.

UNIT 4 Introduction to industrial robotics and Industry 4.0 **10 Hrs.**

Introduction, Industrial and Non-industrial robots, Anatomy and configuration of Industrial Robots, Robot Components, Robot Applications.

Max. 40 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1: Define the "fundamentals' and "terminologies" used in Engineering Thermodynamics.
CO2: Explain the energy conservation principles applicable for ideal gas and pure substance applications
CO3: Analyse the performance of thermodynamic cycles.
CO4: Evaluate the performance of power cycles
CO5: Identify the principles of different machining techniques and material properties.
CO6: Understand the anatomy, applications of robots and introduction to industry 4.0.

TEXT/REFERENCE BOOKS

1. Cengel, Yunus A., and Michael A. Boles. Thermodynamics: An Engineering Approach 6th Editon (SI Units). The McGraw-Hill Companies, Inc., New York, 2013.
2. Sharma, Pramod C. A textbook of production engineering. S. Chand Publishing, 2019.
3. Nag, P. K. Engineering thermodynamics. Tata McGraw-Hill Education, Sixth Edition, 2017.
4. Groover, Mikell P., Mitchell Weiss, and Roger N. Nagel. Industrial robotics: technology, programming and application. McGraw-Hill Higher Education, 2015

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100 **Exam Duration: 3 Hrs**

Unit 1 and 2: Two question from each unit (Total 4 question with subparts)	40 Marks
Unit 3 and 4: Two question from each unit (Total 4 question with subparts)	60 Marks

20ME102P					Elements of Mechanical Engineering Lab.		
Teaching Scheme					Examination Scheme		
L	T	P	C	Hrs/Week	Practical		Total Marks
					Continuous Evaluation	End Semester LE/Viva	
0	0	2	1	2	25	25	50

COURSE OBJECTIVES:

- To Perform experiments and collect experimental data on thermal and mechanical systems to validate theoretical principles.
- **To analyse, differentiate** and **evaluate** Law of conservation of energy on thermal systems.
- **To evaluate** performance of heat engine and heat pumps.
- **To calculate and compare** the components, application of the conventional manufacturing machines, non-conventional manufacturing machines and industrial robotic systems.
- **To demonstrate** the working principle of heat engine and additive manufacturing process.

List of Experiments:

1. To understand and perform fluid property evaluation using property tables and engineering equation solver software.
2. To perform experimental study and verify 1st law of thermodynamics by energy balance of heat exchanger.
3. To evaluate thermodynamic systems using Engineering Equation Solver.
4. To determine Performance of Heat pump and evaluate its coefficient of performance.
5. To understand and demonstrate components and working cycle of Internal Combustion engine.
6. To understand and demonstrate construction and working of conventional manufacturing machine.
7. To understand and demonstrate construction and working of non-conventional manufacturing machine.
8. To study additive manufacturing process applied for 3D printing.
9. To develop a working model of a simple robotic system.

Course Outcomes (COs):

On completion of the course, students will be able to

CO1 - Understand and **evaluate** conservation law of thermodynamics through experimentation.
CO2 - Understand and **analyse** thermal systems data using engineering equation solver.
CO3 – Measure the coefficient of performance of heat pump.
CO4 - Examine the internal combustion engine components and its working.
CO5 - Demonstrate the various components of convention and non-conventional manufacturing machines and elaborate their applications.
CO6 – C**lassify** the components in industrial robots and **develop** a simple robotic system.

Resources/Text/Reference books

1. Sukhatme, Suhas P., and J. K. Nayak. Solar energy. McGraw-Hill Education, 2017
2. Cengel, Yunus. Heat and mass transfer: fundamentals and applications. McGraw-Hill Higher Education, 2014
3. Groover, Mikell P., Mitchell Weiss, and Roger N. Nagel. Industrial robotics: technology, programming and application. McGraw-Hill Higher Education, 2015

END SEMESTER LAB EXAMINATION

Max. Marks: 50 **Exam Duration: 2 hrs**

Quiz/Experiment	20 Marks
Viva	30 Marks

20IC101T					Basic Electronics					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
2	0	0	2	2	25	50	25	0	0	100

COURSE OBJECTIVES

- To understand rectification through p-n junction diode and applications of diode
- To learn different configurations and static characteristics of bipolar junction transistor and MOSFET
- To illustrate the OPAMP application in different real life circuits
- To introduce basic concepts of digital electronics

UNIT 1: DIODES AND RECTIFIERS **8 Hrs.**

Review of p-n junction diode, 1-phase half wave, full wave and bridge rectifier using diode. Calculation of average & rms value, PIV, efficiency, transformer utilization factor and ripple for different diode rectifier circuit. Use of Capacitor Filter for ripple reduction, voltage multipliers, Zener diode in load and line regulation.

UNIT 2: BJT, FET AND MOSFET **07 Hrs.**

Working of a BJT, transistor biasing, different transient circuit configuration (CB, CE and CC), static characteristic for BJT, transistor as switch, amplifier, concept of feedback amplifier and oscillator. Classification of FET, static characteristics of FET, FET biasing and load line, MOSFET, static characteristic of MOSFET and biasing

UNIT 3: OPAMP **04Hrs.**

Introduction, Block Diagram and Characteristics of Ideal Op-Amp, Parameters of an Op-Amp, Inverting and Non- Inverting Amplifier, Virtual Ground, Adder, Subtractor, Comparator, Integrator and Differentiator.

UNIT 4: DIGITAL ELECTRONICS **07Hrs.**

Number system, Binary arithmetic, logic gates and combinational logic, Boolean algebra, DeMorgan's Theorems, Logic minimization and Karnaugh maps, full adder, multiplier, multiplexing, Flip Flops, Introductory Sequential Logic, Counters, Registers

Total 26 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 –Demonstrate application of different diode in circuits
CO2 – Evaluate zener diode as voltage regulator
CO3- Apply BJT, FET and MOSFET in different circuits
CO4–Understand static characteristics OPAMP
CO5–Illustrate basic concepts and theorem of digital systems
CO6–Build digital circuits using logic gates and flip flops

TEXT/REFERENCE BOOKS

1. Boylestad and Nashlesky, "Electronic Devices and Circuit Theory", PHI
2. N.N. Bhargava, S.C. Gupta, and D.C. Kulshreshtha, "Basic Electronics And Linear Circuits", McGraw Hill Education (India)
3. R. A. Gaikwad, "Operational Amplfier and Linear Integrated Circuits", PHI
4. Morris Mano, "Digital Design", PHI
5. J. Millman, C. Halkias and C. Parikh, "Integrated Electronics", Tata McGraw Hill.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100	**Exam Duration: 3 Hrs**
Short Questions (such as: MCQ, fill-in-the-gaps, objective or short one-line questions, match the following etc. (1 or 2 marks each)	20 to 40 Marks
Large Questions (such as: problem analysis, numerical solutions, logical/analytical steps and methods, derivations, descriptive answers, tabular solutions, graphical solutions, etc.(10 to 20 marks each)	80 to 60 Marks

20IC101P					Basic Electronics Lab					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
0	0	2	1	2	0	0	0	25	25	50

COURSE OBJECTIVES

- To understand the characteristics of PN junction diodes and their applications
- To Observe properties of BJT, FET and MOSFET
- To illustrate the OPAMP application in different real life circuits
- To introduce basic concepts of digital electronics

Experiment Sessions would be simulation based covering but not limited to following topics:

1. To study the simulation tool and its features for analog circuit simulation
2. To study the VI characteristic of silicon and germanium diodes.
3. To study reverse characteristics of zener diode.
4. To study half wave, full wave and bridge rectifiers
5. To study BJT as switch
6. To study common emitter amplifier
7. To study different biasing circuits of BJT
8. To study transfer and drain characteristic of FET and MOSFET
9. To study the simulation of digital circuits
10. To study and verify logic gates
11. To implement X-OR and X-NOR gates using basic gates
12. To study and design adder and subtracter circuits
13. To study and design flip flops
14. To study OPAMP and its properties
15. To study ADC and DAC
16. Design of mini project in a group of 4-5 students

COURSE OUTCOMES

On completion of the course, student will be able to

CO1: Study the fundamentals of electronic components
CO2: Understand the working principle of semiconductor devices
CO3: Apply the analog and digital concept in building real time circuits
CO4: Analyze the behaviour of semiconductor devices, OPAMP, ADC and DAC
CO5: Evaluate different circuit for different device parameters
CO6: Build analog and digital sub-system

TEXT/REFERENCE BOOKS

1. Boylestad and Nashlesky, “Electronic Devices and Circuit Theory”, PHI
2. N.N. Bhargava, S.C. Gupta, and D.C. Kulshreshtha, “Basic Electronics And Linear Circuits”, McGraw Hill Education (India)
3. R. A. Gaikwad, “Operational Amplfier and Linear Integrated Circuits”, PHI
4. Morris Mano, “Digital Design”, PHI
5. J. Millman, C. Halkias and C. Parikh, “Integrated Electronics”, Tata McGraw Hill.

20ME101P					Engineering Graphics - Lab					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
0	0	4	2	4	-	-	-	25	25	50

COURSE OBJECTIVES

- To learn fundamental of engineering drawing and standards used in drawing
- To enable the students with various concepts of projections and standards related to technical drawings.
- To demonstrate and communicate ideas using orthographic (2D) & isometric projection (3D) methods
- To help students to use CAD software to solve engineering problems

UNIT 1 Introduction **10 Hrs.**

Introduction to Engineering Graphics – Importance and applications, drawing instruments & accessories, lettering, types of lines, dimensioning methods, basic geometric drawing.

Computer Aided Engineering Drawing: Introduction to CAD, use of softwares in drawing, CAD software user interface, commands, menus and toolbars.

UNIT 2 Orthographic Projection **14 Hrs.**

Introduction to projection, types of projection, 1st angle and 3rd angle projection, 2D sketch, sketch entities and tools – origin, points, lines, arcs, polygons, fillets and chamfer, trim, extend and offset, projections from pictorial view, orientation of views, sections and sectional views.

UNIT 3 Isometric Projection and Projection of Solids **14 Hrs.**

Construction of isometric views from orthographic projections, approach to modelling, moving from 2D to 3D, creating 3D models using CAD features, assembly of components and exploded views.

Classification of solids, projections of solids like cylinder, cone, pyramid and prism with its inclination to reference plane, concept of development of lateral surfaces, intersection of solids.

UNIT 4 Computer aided drafting **14 Hrs.**

Drafting – Drafting standards, drawing views, alignment of drawing views, dimensions and tolerances, symbols, comments and annotations, computer aided drafting, drawing sheet and title block.

Tolerance - Introduction to limits, fits and tolerances, standardized representation of threads, fasteners, welds, bearings and springs, dimensional and geometric tolerances, surface finish symbols.

Total 52 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Understand the fundamentals of engineering graphics and **remember** the basic rules of dimensioning and labelling.

CO2 - **Develop** the ability to learn fundamental of CAD software and its use to solve engineering problems.

CO3 - **Comprehend** the concept of projection and use it to **represent** the views on reference planes.

CO4 - **Apply** the technical communication skill for 3-dimensional geometries in the form of 3D models using isometric projection.

CO5 - **Analyze** the orientation of geometrical bodies with respect to reference planes and **evaluate** the intricate details of solid using sectioning and development of lateral surfaces.

CO6 - **Create** drawing sheet by **organizing** drawing views and **applying** necessary dimensions and tolerances.

TEXT/REFERENCE BOOKS

1. R Hanifan, “Perfecting Engineering and Technical Drawing”, Springer International Publishing Switzerland
2. Bethune, J. D., “Engineering Design and Graphics with SolidWorks 2019, 1st edition”, Macromedia Press
3. K Morling, “Geometric and Engineering Drawing”, Elseveir Insights
4. DM Kulkarni, “Engineering Graphics with AutoCAD”, Easter Economy Edition
5. Agrawal, B. & Agrawal C. M., “Engineering Drawing”, Tata McGraw Hill Publishers
6. P.J. Shah, “Engineering Graphics”, S. Chand Publishing
7. David C Planchard, “Engineering Graphics with SOLIDWORKS 2019: A Step-by-Step Project Based Approach’’, SDC Publications.

Max. Marks: 50 **Exam Duration: 2 Hrs**

Continuous evaluation	25 marks
End semester examination and Viva-voce	25 marks

20CP101T					Programming with C					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
1	0	0	1	1	25	25	50	-	-	100

COURSE OBJECTIVES

- To develop a greater understanding of the issues involved in programming language, design and implementation
- To inculcate functional and logical problem-solving skills through programming.
- To understand the basic concepts of C programming

UNIT 1 BASICS OF C PROGRAMMING **4 Hrs.**

Input, Output constructs, different data types, types of Operators, Precedence and associativity of Operators, Control Structure and Loop Structure

UNIT 2 ARRAY AND STRINGS **4 Hrs.**

1-dimensional, 2-dimensional and 3-dimensional arrays, different types of user defined functions, String operations in form of Character arrays, In-built String functions

UNIT 3 POINTERS **4 Hrs.**

Basic pointer arithmetic, arrays and String using Pointer, call the functions using Call-by reference property

UNIT 4 FILE HANDLING **2 Hrs.**

open the file in write mode and write the data into it, open the file in read mode and read from the file, Open the file in append mode and append the contents in the file, handle the File operations using seek function.

Max. 14 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 – Understand functional and logical problem-solving skills through programming
CO2 - Write, compile and debug programs in C language
CO3 – Use basic and derived data types in C and Operators in C.
CO4 - Design programs involving decision structures, loops, and functions in C.
CO5 - Implement Programs to perform pointer arithmetic and array handling with Pointers.
CO6 - Perform File-handling operations in C.

TEXT/REFERENCE BOOKS

1. E.Balaguruswamy, Programming in ANSI C, McGraw-Hill
2. Jeri R. Hanly and Elli B.Koffman, Problem Solving and Program Design in C.
3. Brain W.Kernighan & Dennis Ritchie, C Programming Language, PHI

SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100 **Exam Duration: 3 Hrs**

Short Questions (such as: MCQ, fill-in-the-gaps, objective or short one-line questions, match the following etc. (1 or 2 marks each)	20 to 40 Marks
Large Questions (such as: problem analysis, numerical solutions, logical/analytical steps and methods, derivations, descriptive answers, tabular solutions, graphical solutions, etc. (10 to 20 marks each)	80 to 60 Marks

20CP101P					Programming with C - Lab					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
0	0	2	1	2	-	-	-	25	25	50

COURSE OBJECTIVES

- To understand the basic concepts of C programming
- To understand design and implementation issues involved with variable allocation and binding, control flow, types, subroutines, parameter passing
- To develop understanding of Compilation process.

LIST OF EXPERIMENTS:

Practical list should be prepared based on the content of the subject and following guidelines should be useful. - Computer Programming covering all constructs of C language.

Following list gives some programming examples. Faculty can prepare their own list in same manner keeping above guidelines and syllabus in mind.

1. Add, substract, multiply, divide two numbers.
2. Convert hours into minutes, minute to hours, etc.
3. Convertion related programs dollars into Rs. Where 1 $ = 48 Rs. , grams to KG, KileBytes to Megabytes, etc.
4. Convert celcius into Fahrenheit. F = (9/5 * C) + 32 and Fahrenheit into celcius. C = 5/9 * (F – 32)
5. Calculate simple and compound interest where I = PRN/100.
6. Calculate area & perimeter of a square, rectangle, circle, triangle.
7. Program to sort N numbers. (Ascending and Descending)
8. Program to calculate string length, reverse the string, etc.
9. Program to check the string and number is palindrome or not.
10. Program to generate sine, cosine, tan series.
11. Program to generate fibonnaci series.
12. Program to calculate factorial using recursion.
13. Program to create a database using array of structures.
14. Programs related to pointers.
15. Programs related to file.

Design based Problems (DP)/Open Ended Problem:

1. Develop a game/Puzzle in C language.
2. Use interrupts to develop programs related to basic operations.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 – Understand functional and logical problem-solving skills through programming
CO2 - Write, compile and debug programs in C language
CO3 – Use basic and derived data types in C and Operators in C.
CO4 - Design programs involving decision structures, loops, and functions in C.
CO5 - Implement Programs to perform pointer arithmetic and array handling with Pointers.
CO6 - Perform File-handling operations in C.

TEXT/REFERENCE BOOKS

1. E.Balaguruswamy, Programming in ANSI C, McGraw-Hill
2. Jeri R. Hanly and Elli B.Koffman, Problem Solving and Program Design in C.
3. Brain W.Kernighan & Dennis Ritchie, C Programming Language, PHI

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 50 **Exam Duration: 2 Hrs**

Part A/Question: <QUIZ/VIVA> <25> Marks
Part B/Question: <PRACTICAL PERFORMANCE> <25> Marks

20HS102T					ENVIRONMENTAL STUDIES					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
3	0	0	3	3	25	50	25	--	--	100

COURSE OBJECTIVES

- Understanding about Bird's eye view of Environment,
- Understanding of multidisciplinary aspect of environment
- Understanding of pollutions and their effects on environment
- Understanding about various environment pollution control strategies

UNIT 1 Bird's Eye view to Environment 08Hrs.

Environmental Studies – Its importance and Multidisciplinary nature; Ecosystem and its various types, factors affecting the functioning of an ecosystem; Biodiversity – its importance, threats and conservation; Natural Resources – Forest, Water, Mineral, Energy, Minerals, Food; Review of State of India's Environment.

UNIT 2 Multi-scale Environmental Pollution 10 Hrs.

Concept of Clean Environment, Introduction to various environmental standards – air, water, soil, noise, heat. Causes and Effects of Air Pollution, Water Pollution, Soil Pollution, Solid Waste (organic and Inorganic) Pollution, Hazardous Waste Pollution, Marine Pollution, Noise Pollution, Thermal Pollution, Radioactive Pollution; Pollution across Indian cities – case studies; Introduction to man-made disasters like floods, heat waves, landslides, etc.

UNIT 3 Environmental Pollution Control Strategies 12 Hrs.

Multi-approaches (role of research, technology, policy, planning & implementation, legislation & judiciary, incentives & business) for reducing various types of pollution; Case studies of Pollution control strategies; Review of the Central and State Government's policies and mechanisms for managing various natural resources and controlling the various types of pollutions (including Swacch Bharat Abhiyan), Global Initiatives for environmental management; Indian Culture and Traditional Wisdom for managing environment

UNIT 4 Social Issues and the Environment 09 Hrs.

Concept of sustainability and Sustainable Development, Environmental Sustainability Index, Environmental Ethics, Public awareness and people's participation (bottlenecks and solutions), Consumerism and Waste products, Introduction to Carbon Footprint & Water Footprint, Green Buildings, Green Business (profitability in managing environment)

TOTAL 39 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to:

CO1- Understand the various facets of environment,
CO2- Understand of multidisciplinary aspects of environment
CO3- Understand about the different types of pollutions
CO4- Understand the effects of pollution on human health, plants, materials and environment
CO5- Understand about the various environment pollution control strategies
CO6- Understand about various concepts of sustainable development

TEXT/REFERENCE BOOKS:

1. Bharucha Erach, Textbook for Environmental Studies, UGC New Delhi
2. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd, Ahmedabad 380013, India
3. Clark, R. S., Marine Pollution, Clanderson Press Oxford
4. Daniel B. Botkin & Edwards A. Keller, Environmental Science, Wiley INDIA edition.
5. Hawkins R. E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay
6. Miller T. G. Jr., 2006. Environmental Science, Clengage Learning, India
7. Odum E. P. 1971. Fundamentals of Ecology, W. B. Saunders Co, USA
8. Wagner K. D., 1998. Environmental Management, W. B. Saunders Co, USA

END SEMESTER EXAM PAPER SCHEME (Max Marks: 100)

Max. Marks: 100 (Left aligned)		**Exam Duration: 3 Hrs**
Part A	4 Questions of 10 Marks each. 1 Question from every unit.	40
Part B	6 Questions of 10 Marks each. 3 Questions from Unit 3 & 4 each	60

16SP101/16SP102/16SP103					NCC-I/NSS-I/SPORTS-I					
Teaching Scheme					Examination Scheme					
					Theory			Practical		
L	T	P	C	Hrs/Week	MS	ES	IA	LW	*Participation and Attendance	Total Marks
0	0	2	1	2	* Continuous Evaluation			--	100	100

COURSE OBJECTIVES

- To develop discipline, character, brotherhood, the spirit of adventure and ideals of selfless service amongst young citizens
- To develop youth leadership in the students.
- To induce social consciousness among students through various camps and 'Shibir' activities.
- To develop skills and physical fitness among students through indoor & outdoor sports, field & track events.

National Cadet Corps (NCC):

Introduction to NCC, Aims and objectives, Structure and organization, NCC Song, Incentives, National Integration and Awareness, Drill, saluting, Personality Development & Leadership, Disaster Management, Social Awareness & Community Development, Health & Hygiene, Adventure camps, Environment Awareness and Conservation, Obstacle Training, Armed forces, Map reading, Field Craft & Battle Craft, Introduction to Infantry Weapons & Equipment, Weapon Training (During camps), Participation into Republic and Independence day ceremonial parades,

National Service Scheme (NSS):

Importance and role of youth leadership, Life competencies, Youth development programmes and youth 'shibir', Health, hygiene and sanitation, Youth health, lifestyle, first aid, youth and yoga

Sports:

Importance of sports/games in life, Physical fitness, Introduction to various games and sports, field and track events, Physical training, exercises, running, walking, jogging, Teaching of different sports/games, track & field events , demonstration, practice, skills and correction, Introduction to Yoga & Meditation.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 – **Understand** the importance of Nation building and individual contribution to the same.
CO2 – **Integrate** physical fitness and mental wellbeing
CO3 – **Discover** grassroots challenges of community
CO4 – **Creating** societal impact
CO5 – **Maintain** discipline and team spirit
CO6 – **Upholding** the value of one for all and all for one

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100 **Exam Duration: --**

* All registered students will be evaluated based on his/her attendance during the NCC/NSS/Sports sessions and participation to camps and other activities.

COURSE STRUCTURE FOR B.TECH. FIRST YEAR (Automobile Engineering)

SEMESTER II (Subjects)				B.TECH. FIRST YEAR (Automobile Engineering)											
Sr. No.	Category code	Course Code	Course Name	Teaching Scheme					Exam Scheme						
									Theory			Practical		Total Marks
				L	T	P	C	Hrs/wk	CE	MS	ES	CE	ES	
1	BSC	20MA103T	Mathematics - II	3	1	0	4	4	25	25	50	-	-	100
2	ESC	20CE101T	Element of Civil Engineering & Solid Mechanics	4	0	0	4	4	25	25	50	-	-	100
3	ESC	20CE101P	Element of Civil Engineering & Solid Mechanics - Lab	0	0	2	1	2	-	-	-	25	25	50
4	ESC	20EE101T	Elements of Electrical Engineering	3	0	0	3	3	25	25	50	-	-	100
5	ESC	20EE101P	Elements of Electrical Engineering - Lab	0	0	2	1	2	-	-	-	25	25	50
6	BSC	20PH101T	Engineering Physics	3	0	0	3	3	25	25	50			100
7	BSC	20PH101P	Engineering Physics Lab	0	0	2	1	2	-	-	-	25	25	50
8	ESC	16ME103P	Workshop Practice	0	0	2	1	2	-	-	-	25	25	50
9	ESC	20CP102P	Fundamentals of Python Programming	0	0	2	1	2	-	-	-	25	25	50
10	HSC	20HS101P	Communication Skills - I	0	0	2	1	2	-	-	-	25	25	50
11	HSC	16HS109T	Professional Ethics & Human Values	1	0	0	1	1	25	25	50	-	-	100
12	HSC	16SP101	NCC - II	0	0	2	1	2	-	-	-	-	-	100
		16SP102	NSS - II											
		16SP103	Sports - II											
13	HSC	16TP110	Civic Services & Social Internship	0	0	0	1	0	-	-	-	-	-	100
			Total	**14**	**1**	**14**	**23**	**29**						

CE = Continuous Evaluation MS = Mid Semester Exam ES = End Semester Exam

20MA103T					MATHEMATICS - II					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
3	1	0	4	4	25	50	25	--	--	100

COURSE OBJECTIVES

- To be able to apply the calculus of complex functions to construct analytic functions.
- To be able to compute residues and apply them to evaluate contour integrals.
- To be able to formulate and solve various engineering problems using the methods of solving ODEs.
- To study the properties of Laplace transforms and apply them to solve ODEs.

UNIT 1 COMPLEX DIFFERENTIATION **10 Hrs.**

Limit, Continuity, Differentiability of function of complex variable, Analytic function, Cauchy-Euler equation (in Cartesian and polar coordinates), Harmonic function and its significance, Singularities, Taylor's series, Mapping (translation, rotation and inversion), bilinear transformation, Conformal mapping, Applications of Conformal mapping.

UNIT 2 COMPLEX INTEGRATION AND APPLICATIONS **10 Hrs.**

Definition of a Complex line integral, Contour integrals, Cauchy- Goursat theorem, Cauchy integral theorem, Cauchy Integral formula (CIF), CIF for derivatives, Calculation of residues, Cauchy Residue theorem, Applications of residues to evaluate real definite integrals.

UNIT 3 ORDINARY DIFFERENTIAL EQUATIONS WITH APPLICATIONS **10 Hrs.**

Differential equations of first order and higher degree, Higher order differential equations with constant coefficients, Rules for finding C.F. and P.I., Method of variation of parameters, Cauchy and Legendre's linear equations, Linear differential equations of second order with variable coefficients; Simultaneous linear equations with constant coefficients, Applications of higher order differential equations in solving engineering problems.

UNIT 4 LAPLACE TRANSFORMS **10 Hrs.**

Piecewise continuous functions and exponential functions, Definition, Existence and Properties of Laplace transforms, Heaviside function, Inverse Laplace transform, Properties of inverse Laplace transforms, Convolution theorem, Applications of Laplace Transforms in solving differential equations.

40 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 – Identify the use of various special functions in engineering aspects.
CO2 – Illustrate the ability to handle mathematical models, to describe physical phenomena, using suitable techniques.
CO3 – Apply appropriate tool/method to extract the solutions of engineering problems.
CO4 – Analyze the obtained solution in context with theory.
CO5 – Appraise mathematical problems from real to complex domain.
CO6 – Create a mathematical model of engineering interest.

TEXT/REFERENCE BOOKS

1. R.V. Churchill and J. W. Brown, Complex variables and applications, McGraw-Hill, 7th Ed., 2003
2. J. M. Howie, Complex analysis, Springer-Verlag, 1st Ed., 2003.
3. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, Alpha Science, 3rd Ed., 2007.
4. Erwin Kreyszig, Advanced Engineering mathematics, John Wiley, 10th Ed., 2015.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100	**Exam Duration: 3 Hrs.**
Part A: 10 questions 3 marks each	30 Marks (40 min)
Part B: 5 questions 6 marks each	30 Marks (50 min)
Part C: 5 questions 8 marks each	40 Marks (90 min)

20CE101T					Element of Civil Engineering and Solid Mechanics					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
4	-	-	4	4	25	50	25	--	--	100

COURSE OBJECTIVES.

- To introduce and explain the basic scope of engineering.
- To understand different types of force systems and apply them to practical engineering applications.
- To develop an understanding of the basic concepts related to tensile, compressive and shear stresses in engineering components.
- To discuss the basic principles of torsion in shafts, shear force and bending moment in beams, Deflection in springs, Columns and Struts.

UNIT 1 INTRODUCTION TO CIVIL ENGINEERING & MECHANICS **14 Hrs.**

Basics and scope of Civil Engineering- Introduction to Civil Engineering- Branches of Civil Engineering- Application of Civil Engineering in other domain different types residential of buildings- green building and smart building.
Introduction to Engineering Mechanics- Resolution of forces- Varignon's – couples- Lami's theorem-
Centroid and Moment of Inertia- Determination of moment of inertia of simple planar laminas like rectangle- triangle- quarter-semi-circle and circle. Theorems of perpendicular and parallel axis-polar moment of inertia- radius of gyration.

UNIT 2. SIMPLE AND COMPOUND STRESSES AND STRAIN **14 Hrs.**

Introduction to stresses and strain – Stress-strain diagram- Elastic constants -relationship between elastic constants and Poisson's ratio – Generalised Hook's law – Strain energy – Deformation of simple and compound bars – thermal stresses. Biaxial state of stress – Stress at a point – stresses on inclined planes – Principal stresses and Principal strains and Mohr's circle of stress, Theories of failure

UNIT 3 SFD- BMD AND STRESSES IN BEAM **12 Hrs.**

Types of beams- Cantilever, Simply supported, Overhanging: Shear Force and Bending Moment Diagrams Theory of simple bending – bending stress and shear stress in beams.
Deflection of beams by Double integration method – Macaulay's method – Area moment theorems for computation of slopes and deflections in beams – Conjugate beam method.

UNIT 4 TORSION AND COLUMNS **12 Hrs.**

Introduction to Torsion – derivation of shear strain – Torsion formula – stresses and deformations in circular and hollow shafts – Stepped shafts – shafts fixed at the both ends – Stresses in helical springs. Theory of columns – Long column and short column – Euler's formula – Rankine's formula - Secant formula - beam column.

Total 52 Hrs

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 –**Describe** the basics and scope of civil engineering, role of civil engineer and sub branches of civil engineering.
CO2 -**Compute** the stress and strain developed due to applied load in any structural member and solve the principal stress & strain at a point of stressed member.
CO3 – **Calculate** the shear force & bending moment diagram under various loading & support condition.
CO4 - **Analyze** bending and shear stresses in the different layers of the beam for various loadings.
CO5 - **Determine** the torsion equation & pure torsion
CO6 - **Explain** the loaded structural members for deflection.

TEXT/REFERENCE BOOKS

1. N.H Dubey, Engineering Mechanics-Statics and Dynamics, Tata McGraw Hill Private limited
2. R. S. Khurmi, Engineering Mechanics, S. Chand Publication
3. S.S. Bhavikatti Elements of Civil Engineering (IV Edition) , Vikas Publishing House Pvt. Ltd., New Delhi.
4. Ferdinand P Beer and E Russel Johnson , Mechanics for Engineers (Statics & Dynamics) McGraw Hill book company, New York
5. Timoshenko and Gere, Mechanics of Materials, CBS Publishers, New Delhi, 1996
6. S. B. Junarkar and Dr. H. J. Shah, Mechanics of Structures, 27th Revised and Enlarged, Charotar Publication.
7. Beer and Johnston, Mechanics of Materials, McGraw Hill International

END SEMESTER EXAMINATION QUESTION PATTERN

Max. Marks: 100 **Exam Duration 3 Hrs.**

Part A: 4 Question from unit-1 – 5 Marks Each 20 Marks
Part B: 8 Numerical Questions from unit 2 to unit 4 – 10 Marks Each 80 Marks

20CE101P					Elements of Civil Engineering & Solid Mechanics Lab					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
-	-	2	1	2	-	-	-	25	25	50

COURSE OBJECTIVES

- To conduct standard tests on construction steel under static load.
- To conduct standard tests on metals under impact load
- To conduct standard tests of flexure and compression on wooden items.
- To conduct standard tests of crushing, impact and abrasion on bricks and tiles.

LIST OF EXPERIMENTS

2. Tension test on mild steel
3. Compression test of ms bar/cost iron
4. Bending test on wooden beam / Steel bars
5. Shear test on steel bar
6. Hardness test
7. Charpy impact test
8. Izod impact test
9. Compression test of on bricks
10. Flexural test on clay roof tiles

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 – **Define** the standard tests of mild steel under tension, compression & shear.
CO2 – **Compute** and use the Charpy impact testing machine to evaluate the performance of metal under impact load.
CO3 – **Compute** Rockwell hardness testing machine to determine the hardness of metals
CO4 – **Illustrate** modulus of rupture of timber and steel bar.
CO5 – **Determine** the compressive and bending strength of clay items.
CO6 – **Explain** the crushing, impact and abrasion values of bricks.

R**EFERENCES:**

1. S. B. Junarkar and Dr. H. J. Shah, Mechanics of Structures, 27th Revised and Enlarged, Charotar Publication.
2. Beer and Johnston, Mechanics of Materials, McGraw Hill International

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100 **Exam Duration: 3Hrs**
Part A : Lab Work – Continuous Assessment 50 Marks
Part B : Lab Exam and Viva 50 Marks

20EE101T					Elements of Electrical Engineering					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
3	0	0	3	3	25	50	25	--	--	100

COURSE OBJECTIVES

- To impart knowledge on DC and AC circuits.
- To learn construction, working principles and characteristics of transformer and induction machines.
- To introduce students to various means for electrical safety and protection of electrical installations.
- To impart knowledge on electric wiring and illumination for domestic and industrial applications.

UNIT 1: DC CIRCUITS **10 Hrs.**

Electrical circuit elements (R, L and C), voltage and current sources, dependent and independent sources, Ohms Law, temperature co-efficient of resistance, Kirchhoff current and voltage laws, voltage and current divider circuit, Thevenin and Norton Theorems and their equivalents, maximum power transfer and superposition theorems, nodal and mesh analysis, star-delta transformation, Time domain analysis/natural response of first order RL and RC Circuit

UNIT 2: AC CIRCUITS **10 Hrs.**

Generation of AC voltage, representation of sinusoidal waveforms, rms values of different sinusoidal waveforms, Rectangular and Polar representation of phasor, Sinusoid representation in time and frequency domain. of Analysis of single-phase ac series circuits consisting of R, L, C, RL, RC, RLC combinations, instantaneous, average power and reactive power, complex power and power factor. AC parallel circuit and its solution in admittance form, resonance in AC series circuit and parallel circuit. Polyphase circuits, star and delta representation of polyphase circuit, power measurement in polyphase circuit

UNIT 3: TRANSFORMERS AND INDUCTION MACHINES **10 Hrs.**

Magnetic material and its B-H characteristic, Faraday's Law of Electromagnetic Induction **Transformers:** ideal transformer, emf equation for transformer, working of practical transformer on no-load and load **Induction Machine:** Types of induction motor, production of rotating magnetic field from 3-phase supply, operation of three phase induction motor, starting and running torque, Torque-slip characteristics of induction motor, Power Stages in IM

UNIT 4: ELECTRICAL INSTALLATION, SAFETY AND PROTECTION **10 Hrs.**

Fuse, MCB, ELCB, MCCB, underground cables. Domestic and Industrial Wiring. Types of lamps, illumination schemes and lumen requirement for domestic and industrial applications, Earthing and it schemes. Electrical safety rules, electric shock and first aid, energy conservation methods, elementary calculation of energy consumptions, tariffs

Max Hrs: 40

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 – Analyze electrical circuits using network theorems.
CO2 – Compare the behavior of R, L and C and their combinations in AC circuits.
CO3 – Analyze balanced polyphase systems in star and delta configuration
CO4 – Understand the construction, working and basic characteristics of transformer and induction machines
CO5 – Recognize the importance of protective devices and electrical safety measures
CO6 – Carry out domestic and industrial electrification

TEXT/REFERENCE BOOKS

1. J. Bird, "Electrical Circuit Theory and Technology", Routledge, Tailor and Francis Group, Sixth Edition, 2017.
2. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
3. B. L. Theraja, "Electrical Technology", Vol. 1, S. Chand Publication, New Delhi
4. Surjit Singh, "Electrical Estimating and Costing", Dhanpat Rai and Co.

20EE101P					Elements of Electrical Engineering - Lab					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
0	0	2	1	2	-	-	-	25	25	50

COURSE OBJECTIVES

- To gain practical knowledge on DC and AC circuits
- To learn operation of electrical instruments and electrical machines
- To develop skills to implement electric wiring

LIST OF EXPERIMENTS

1. Introduction to elements of electrical engineering laboratory and to study different electrical measuring instruments
2. To validate Ohm's law with linear resistors and find power dissipation in resistor
3. To implement voltage divider and current divider circuit
4. To validate Thevenin and Norton theorem for DC circuit
5. To validate Superposition and Maximum Power Transfer theorem for DC circuit
6. To obtain transient response of RL and RC circuit
7. To evaluate performance of AC series circuit
8. To evaluate performance of AC parallel circuit
9. To analyse resonance condition in AC circuit
10. To establish relation between line and phase quantities in star and delta connected polyphase system
11. To measure power in polyphase system
12. To perform load test on 1-phase transformer
13. To perform load test on 3-phase transformer
14. To obtain current time characteristic for domestic protective devices
15. To carry out domestic electric wiring

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 – Operate basic electrical measuring instruments

CO2 – Simulate the basic electrical circuits and obtain results based on electrical laws and network theorem

CO3 – Understand the performance of AC circuit with different connection of R, L and C

CO4 – Formulate star and delta configuration of polyphase system and measure power in polyphase system

CO5 – Operate transformer and induction machines and evaluate its performance

CO6 – Understand the basic wiring and operation of protective devices for domestic application

20PH101T					Engineering Physics					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	Viva	
3	0	0	3	3	25	50	25	--	--	100

COURSE OBJECTIVES

- To understand basic concepts of quantum mechanics and solve the Schrödinger equation for various cases.
- To understand basics concepts of electric and magnetic properties of solids.
- To develop the fundamental understanding of optoelectronic devices.
- To understand the heat transfer mechanism in solids and fluids.

UNIT 1 Introduction to Quantum Mechanics **12 Hrs.**

Inadequacies in Classical Physics, Wave Nature of Matter, Heisenberg's Uncertainty Principle and its applications, zero point energy, Basic Postulates and Formalism of QM: Energy, Momentum and Hamiltonian Operators. Time-independent Schrodinger Wave Equation for Stationary States. Properties and interpretation of Wave Function. Probability Density and Probability. Conditions for Physical Acceptability of Wave Functions, Application of time-independent Schrödinger equation for various potentials.

UNIT 2 Electronic theory of Solids **10 Hrs.**

Elements of crystallography; lattice vibrations of solids; Bloch Theorem and Origin of energy bands, band structure of conductors, type of semiconductors, Free Electron Theory of metals, Wiede-mann Franz Law, Kronig-Penny model, Hall effect. Magnetism and its origin, magnetization and susceptibility, dia-para-ferro-magnetism. Ferromagnetism, Nano magnets and magneto resistance, hard disk drive storage technology. Phenomenology of Superconductors, Meissner effect, BCS theory - high temperature superconductors.

UNIT 3 OPTICS, LASER AND OPTO-ELECTRONICS **08 Hrs.**

Optics: Introduction, division of amplitude, thin film interference, Applications of interference, Laser: The Einstein coefficients, Spontaneous and stimulated emission, Optical amplification and population inversion, meta stable state, optical resonator, the principle of pumping scheme, laser beam characteristics. Types of LASER, Injection Laser Diode (ILD). Quantum Cascade Laser, Comparison between ILD and QCL. Applications of lasers.

UNIT 4 THERMAL PHYSICS **10 Hrs.**

Laws of thermodynamics-basic concepts, closed and open systems-first law. Heat transfer-thermal expansion of solids and liquids –Conduction in solids – thermal conductivity- Forbe's method, Lees' disc method, conduction through compound media, formation of ice on ponds, thermal insulation and its applications. Thermal Convection - properties of radiant heat, sea and land breeze. Thermal Radiation – emission and absorption radiation, emissive power, black body radiation – Kirchoff's, Stefan's laws, wien's law, Newton's law of cooling.

Max. 40 Hrs.

COURSE OUTCOMES

CO1 – Identify and understand the experimental results which require conceptualization of quantum theory.
CO2 – Interpret the solution of Schrödinger equation to obtain physical information about the system.
CO3 - Identify basic concepts in semiconductors, superconductors and magnetism and apply it in engineering applications.
CO4 - To understand concepts of optical interference and LASER, analyse the lasing characteristics to apply in different laser diodes and other applications
CO5 - To understand concepts of thermal physics in terms of laws and modes of heat transfer.
CO6 - To apply knowledge of concepts of engineering physics to solve real world problems.

TEXT/REFERENCE BOOKS

1. N. Zettili, Quantum Mechanics: Concepts and applications, Willey Publications
2. Kittel, Charles. Introduction to Solid State Physics. John Wiley and Sons.
3. W.D. Callister and David Rethwisch, Materials Science & Engineering -An Introduction, 9th edn.,
4. Heat and Thermodynamics BrijLal, N. Subrahmanyam, S. Chand, Limited, 2001.
5. Optics by Ajay Ghatak, Tata macgraw hill publishing.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100 **Exam Duration: 3 Hrs**

Part A/Question: 3 Questions from each unit, each carrying 3 marks 36 Marks
Part B/Question: 2 Questions from each unit, each carrying 8 marks 64 Marks

20PH101P					Engineering Physics - Lab					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	Viva	
0	0	2	1	2	-	-	-	50	50	100

COURSE OBJECTIVES

- To understand the working of various electrical, mechanical and optical instruments in the laboratory.
- To gain practical knowledge in Physics through experiments.
- To understand basics concepts of Physics and be able to apply in performing the experiments.

List of Experiments

1. Introduction to Oscilloscope.
2. Study of Interference using Newton's Ring experiment.
3. Determination of thermal conductivity of different solids.
4. Experiment with solar collector.
5. Experimental to determine linear thermal expansion coefficient of solid bodies.
6. Experiment on reflection of Ultrasonic waves.
7. Experiments with heat pump.
8. Determining Plank's constant and Inverse square law.
9. Experiments on diffraction with He-Ne Laser Kit.
10. Study of Hall Effect.
11. Determining semiconductor energy band gap using four probe method.
12. Experiment to study forced oscillations.
13. Study of charging and discharging of capacitive plates.
14. Study of Bio-Savart's Law
15. Experiments on Fiber Optics.
16. Study of Photoconductivity.
17. Determining e/m by Thomson's method.
18. Study of Polarization of light using LASER.
19. Millikan's oil drop experiment.
20. Study of Holography.

** Any 10 experiments will be conducted relevant to theory course.

COURSE OUTCOMES

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

CO1 - Apply and analyze the concepts of electricity and magnetism.
CO2 - Understand the interaction of light waves and its propagation in different media.
CO3 - Demonstrate and implement the phenomenon of resonance
CO4 - Investigate the electrical properties of a given semiconductor device
CO5 - Examine the charge transport mechanism in different conductors
CO6 - Design and analyze the light propagation for communication application using fibre optics

TEXT/REFERENCE BOOKS

1. Ghatak, Optics, 3rd edition, Tata McGraw Hill (2005).
2. Kittel, Knight and Ruderman, Mechanics - Berkeley Physics Course, Vol. 1, Tata McGraw-Hill.
3. Avadhanulu, A text book of engineering Physics, S. Chand & Company, Ltd.
4. Brij Lal, N. Subrahmanyam, Heat and Thermodynamics, S. Chand & Company, Ltd
5. Halliday, Resnick, Walker, Fundamentals of Physics (Wiley)

Evaluation Pattern

Max. Marks: 100

Continuous evaluation	50 marks
End semester examination and Viva-voce	50 marks

16ME103P					Workshop Practice		
Teaching Scheme					Examination Scheme		
L	T	P	C	Hrs/Week	Practical		Total Marks
					Continuous Evaluation	End Semester	
-	-	2	1	2	25	25	50

COURSE OBJECTIVES

- To impart the machining skills in students
- To develop a skills in precision, safety at work place, team working with right attitude
- To prepare a job by using ability to design and model different prototypes.

Metrology

Semi-Precision tools: Rules and scales, try square. Inside/Outside Calipers, Depth gages etc. Precision Tools: Micrometers, Vernier calipers, Bevel Protractor, Dial indicator, Gage blocks, Surface plates etc.

Carpentry Shop

Timber, Seasoning and Preservation, Plywood and Ply boards, Carpentry Tools, Engineering applications. Different Joints

Bench work and Fitting

Introduction to the familiarization with tools and their uses, Hammers, Hacksaws, choice of blades & sawing techniques, Files with their classification; According to their longitudinal shape & cross section, classification based on cuts; teeth; length of the file, Care of files and hand tool safety rules Vices & their classification, Other hand tools; scribers, chisels, scrapers, center, punch, surface gauge, Universal cribbing block, Trammel, Screw drivers, Drills, Spanners, Pliers, Taps, Dies, Reamers, Screw drivers etc, Fitting Processes : Marking, Chipping, Sawing, Filing, Scrapping, Drilling, Internal Threading (or Trapping), External Threading (or Dieing), Reaming, welding, soldering, brazing

Tin Smithy – Surface development

Shearing and Bending of sheets, Making simple products by Tin Smithy practice.

List of Experiments:

1. Introduction to Workshop and safety.
2. Experiment on measurement of linear, angular and curved dimensions of the object.
3. Fitting job: Detailed drawing of work piece, use of fitting tools and job preparation.
4. Hands on experience on welding, brazing and soldering.
5. Carpentry job: Detailed drawing of work piece, use of carpentry tools and job preparation.
6. Sheet metal job: Detailed drawing of work piece, use of sheet metal working tools and job preparation.
7. Plumbing job: Internal/External threading, piping network using Tees, Elbows, Reducer, Bends etc

COURSE OUTCOMES

CO1: Define fundamentals and principles cutting and enhance the machining skills in students

CO2: Apply principles of machining and develop a skills in dignity of labour, precision, safety at work place, team working and development of right attitude

CO3: Analyse the effect design and model different prototypes in carpentry

CO4: Examine the effect and create and develop ability to design and model different basic prototypes in trade of fitting

CO5: Determine the effect and create and develop ability to design and model different basic prototypes in trade of tin smithy

CO6: Evaluate the performance of different machining and cutting processes such as fitting, carpentry, plumbing etc.

Evaluation Pattern

Max. Marks: 50	**Exam Duration: 2 Hrs**
Continuous evaluation	25 marks
End semester examination and Viva-voce	25 marks

20CP102P					Fundamentals of Python Programming					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
0	0	2	1	2	--	--	--	50	50	100

COURSE OBJECTIVES

- To impart the basic concepts of Python Programming language
- To be familiar with data structures available in Python
- To understand testing and debugging in Python
- To draw different kinds of plots using for scientific research

INTRODUCTION TO PYTHON
The basic elements of Python, Branching programs, Strings and Input, Iteration
FUNCTION, SCOPING AND ABSTRACTION
Functions and Scoping, Specifications, Recursion, Global variables, Modules, Files
TESTING AND DEBUGGING
Testing, Debugging
STRUCTURED TYPES, MUTABILITY AND HIGHER-ORDER FUNCTIONS
Tuples, Lists and Mutability, Functions as Objects, Strings, Tuples and Lists, Dictionaries
EXCEPTIONS AND ASSERTIONS
Handling exceptions, Exceptions as a control flow mechanism, Assertions
SOME SIMPLE ALGORITHMS AND DATA STRUCTURES
Search Algorithms, Sorting Algorithms, Hashtables
PLOTTING
Plotting using PyLab and extended examples

COURSE OUTCOMES

On completion of the course, student will be able to
CO1- Understand the basic concept of programming with python.
CO2- Understand the basics of creating applications.
CO3- Apply various data structures available in Python in solving computational problems.
CO4- Create robust applications for solving computational problems using the Python.
CO5- Test and debug applications written using the Python.
CO6- Draw different kinds of plots using PyLab and generating series.

TEXT/REFERENCE BOOKS

1. John V Guttag. “Introduction to Computation and Programming Using Python”, Prentice Hall of India.
2. Allen Downey, Jeffrey Elkner and Chris Meyers "How to think like a Computer Scientist, Learning with Python", Green Tea Press.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 50 **Exam Duration: 2 Hrs**

Part A/Question: QUIZ/VIVA	25 Marks
Part B/Question: PRACTICAL PERFORMANCE	25 Marks

20HS101P					Communication Skills – I (Semester I/II) (First Year)					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
0	0	2	0	2 hours per week	--	--	--	50	50	100

COURSE OBJECTIVES

- Understand of the fundamental elements of communication in English language.
- Know and understand different practices of verbal and non-verbal communication with inputs to improve basic language skills.
- Students are expected to be better equipped in the following areas:
  - **Listening:** Understanding basic content in lectures and common everyday situations
  - **Speaking:** Correct expression in the English language at a basic level
  - **Reading:** Understanding, retaining, and critically analyzing technical/non-technical content
  - **Writing:** Using appropriate vocabulary, grammar, effective paragraph construction, writing in day-to-day scenarios, including digital platforms

UNIT 1 **21 hrs**

- Structure of English Language, Academic, Research and Technical Vocabulary, Phonetics and Accent

UNIT 2 **3 hrs**

- Listening Skills, Note Taking and Note Making, Collective note-taking and note-making on digital platforms

UNIT 3 **3 hrs**

- Reading: Reading Comprehension, Speed Reading

UNIT 4 **3 hrs**

- The art of introducing oneself, Public speaking and articulation

Max. 30 hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

- CO1 Confidence to listen, speak, read and write in English
- CO2 Being able to produce something new with the help of inputs
- CO3 Learning to critically analyze
- CO4 Preparing reports/critique with the help of collected data
- CO 5 Having a multi-dimensional/disciplinary perspective and approach
- CO6 Better improved and sharpened skills to present, convince and persuade to be an effective and successful professional

TEXT/REFERENCE BOOKS

1. Harmer, Jeremy. The Practice of English Language Teaching. Harlow: Pearson Longman, 2007.
2. Kaul, Asha. Business Communication. Delhi: Prentice-Hall of India, 2006.
3. Maley, A. 'Literature in the Language Classroom', The Cambridge Guide to Teaching ESOL, Cambridge University Press, 2001.
4. Richards, Jack C., and Willy A. Renandya, eds. Methodology in Language Teaching: An Anthology of Current Practice. Cambridge University Press, 2002.
5. Sharma, Sangeeta and Binod Mishra. Communication Skills for Engineers and Scientists. New Delhi: PHI Learning Pvt. Ltd., 2009.

Assessment Tool	Marks	Assignments
Lab Work	50	• Listening and Questionnaire – 15 • Grammar Worksheet – 20 • Short Story/Essay (750 – 1000 words) – 05 • Reading Comprehension – 10
Lab Exam/Viva	50	• Wordsworth – 10 • Narrating a Story along with Self Introduction/Speech – 15 • Reading Aloud – 05 • Vocabulary/Phonetics – 20

16HS109T					Professional Ethics and Human Values					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
1	0	0	1	1	25	50	25	--	--	100

COURSE OBJECTIVES

- Identify the core values that shape the ethical behaviour of an Engineer
- Awareness on professional ethics and human values
- To know their role in technological development
- To appreciate the rights of others
- Improved communication and learn to work in group
- Learn to understand and discuss on issues of social interest

Unit 1: Human Values [5 hrs]

Morals, Values and Ethics - Integrity - work Ethic - Service Learning - Civic Virtue - Respect for others - Living peacefully - Caring - Sharing - Honesty - Courage - Valuing time - Co-operation - Commitment - Empathy - Self-Confidence - Character - Spirituality

Unit 2: Engineering Ethics [4 hrs]

Sense of 'Engineering Ethics' - Variety of moral issued - types of inquiry - moral dilemmas - moral autonomy - Kohlberg's theory - Gilligan's theory - Consensus and controversy - Models of Professional Roles & Professionalism - theories about right action - Self-interest - customs and religion - uses of ethical theories.

Unit 3: Engineering as experimentation [4 hrs]

Engineers as responsible experimenters - Research ethics -Codes of ethics - Industrial Standard - Balanced outlook on law - the challenger case study.

Unit 4: Safety, risk and Global issues [5 hrs]

Safety and risk - assessment of safety and risk - Risk benefit analysis and reducing risk - Threat of Nuclear power - Collegiality and loyalty - respect for authority - Confidentiality - conflicts of interest - professional rights - employees' rights - Intellectual Property rights (IPR) - discrimination. Multinational corporations - Business ethics - Environmental ethics - Role in Technological Development - Weapons development - consulting engineers - engineers as expert witnesses and advisors-Ethics.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1: Find the core values that shape the ethical behaviour of an Engineer
CO2: Students will get aware of the professional ethics and human values
CO3: Develop and understand their role in technological development
CO4: Simplify to the rights of others
CO5: Perceive improved communication with activities and learning to work in group
CO6: Discuss on issues of social interest and make opinions based on logical reasoning

TEXT/REFERENCE BOOKS

1. A Textbook on Professional Ethics and Human Value by Prof. R. S. Nagaarazan, New Age International Limited Publisher, Chennai. 2006
2. A Text book on Professional Ethics and Human Values by M. Govindarajan, S. Natarajan, V. S. Senthilkumar, PHI Learning Pvt. Ltd., 2013.
3. A Text book on Professional Ethics and Human Values by Dinesh Babu, Firewall Media, 2007

16TP110					Civic Services & Social Internship					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
			01	21 days	--	--	--	--	--	100

COURSE OBJECTIVES

- To develop a holistic view of social work and social welfare in the community, with special emphasis on the role of different agencies like Govt. departments and NGOs in human services.
- To enlighten and sensitize students on various types of problems of the people and their diversified cultural background.
- To understand the agency as an organization, its structure, functions, activities and sources of funding.
- To understand and make a commitment to the basic humanistic values and principles of social work practice in a secular democratic society.
- To develop an understanding of the application of the methods of social work practice in the field.
- To develop an understanding of the opportunities in working with diverse populations.
- To develop the self –awareness necessary to assess one's own values, attitudes, feelings, strengths, limitations, and interests and performance.
- To inspire young technocrats to become change makers

UNIT 1: Overview of Civic and Social Service Sector

UNIT 2: Understanding of NGO/Civic Body/Government Body Management and their functioning

UNIT 3: Study of Individual organizational and government projects and schemes where students are interning

UNIT 4: Field visits

COURSE OUTCOMES

On completion of the course, student will be able to

CO1- Become sensitized workforce of enlightened Engineers and Managers who are socially concerned and willing to positively contribute to the society

CO2- Acquire desired work habits and attitudes with the sense of social responsibility and think innovatively to find solutions

CO3- Understand the role of different NGO/civic/government bodies in the service of citizens

CO4- Imbibe basic humanistic values and principles of social work practice in a secular democratic society

CO5- To assess one's own values, attitudes, feelings, strengths, limitations, interests and performance through opportunities of working with diverse populations

CO6- Obtain experiential learning via internship and be sensitive towards issues of modern-day citizenship and democracy

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100

Part A: NGO evaluation 50 Marks

Part B: Internal faculty 50 Marks