

SU/BOS/Sci & Tech/ 488

Date: 26/08/2024

To,

The Principal / Director, All Concerned Affiliated Colleges / Institutions, Shivaji University, Kolhapur.

Subject: Regarding New syllabus of B. Tech. Programme (Affiliated College) Part - I (Sem-I-II) under the Faculty of Science and Technology as per National Education Policy 2020.

Sir/Madam,

With reference to the subject mentioned above, I am directed to inform you that the university authorities have accepted and granted approval to the revised syllabi, Nature of Question paper and equivalence of B. Tech. Part - I (Sem - I & II) under the Faculty of Science & Technology as per National Education Policy 2020.

No.	Affiliated College Course Syllabus
1	Civil Engineering
2	Mechanical Engineering
3	Electrical Engineering and Technology
1	Electronics and Telecommunication Engineering
4	Electronics & Computer Science Engineering
	Computer Science and Engineering
5	Computer Science and Engineering (Artificial Intelligence & Machine Learning)
	Computer Science and Engineering (Data Science)

This Syllabus, shall be implemented from the academic year **2024-25** onwards. A soft copy containing the syllabus is attached herewith and it is available on university website **www.unishivaji.ac.in.** (Student Online Syllabus).

The question papers on the pre-revised syllabi of above-mentioned course will be set for the examinations to be held in October/ November 2024 & March / April 2025. These chances are available for repeater students, if any

You are, therefore, requested to bring this to the notice of all students and teachers concerned.

Thanking you,

Yours faithfully. Registrar

Copy to: for Information and necessary action

	J	· · · ·	
1	The I/c Dean, Faculty of Science & Technology	7	Appointment Section A & B
2	The Chairpersan, Respective Board of Studies	8	Affiliation Section (T.1) (T.2)
3	OE4 Section	9	P.G.Admission Section, /P.G Seminar Section
4	Eligibility Section,	10	Computer Centre (IT Cell)
6	Internal Quality Assorance Cell	11	Eligibility Section

Shivaji University, Kolhapur Faculty of Science and Technology B. Tech. Curriculum Structure as per NEP 2020 From Academic Year: 2024-25

Programme Educational Objectives (PEO):

PEO1	
PEO2	
PEO3	
PEO4	

Programme Outcomes (PO):

Engineering Graduates will be able to:

- 1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- 2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- 3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- 4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- 5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- 6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

- 7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- 8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- 9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- 10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- 11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- 12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Programme Specific Outcomes (PSO):

PSO	

Branch: - Common to all Branches of Engineering

Scheme of Instructions: First Year B. Tech. Common to all Branches of Engineering

Engi	neering Physi	cs Group		Seme	ster–I	(w.e.f	A.Y. 2024-25	5)				
Sr.	Course	Course	Course Title	т	т	р	Contact	Course		EXA	M SCH	EME
No.	Category	Code	Course The	Ľ	1	L	Hrs/Wk	Credits	MSE	ISE/CA	ESE	TOTAL
1	BSC		Engineering Physics	3			3	3	30	10	60	100
2	BSC		Engineering Mathematics –I	3	1		4	4	30	10	60	100
3	ESC		Basic Civil Engineering	2			2	2	30	10	60	100
4	ESC		Engineering Graphics	3			3	3	30	10	60	100
5	ESC		Basic Electrical Engineering	2			2	2	30	10	60	100
6	BSC		Engineering Physics Lab			2	2	1		25		25
7	ESC		Engineering Graphics Lab			2	2	1		25	25	50
8	HSSM		Professional Communication–I			2	2	1		25	50	75
9	VSEC		Skill Enhancement Course-I			2	2	1		25	25	50
10	CCA		Yoga and NSS			4	4	2		50		50
11	VSEC		Programming Languages-I	1		2	3	2		25	25	50
			Total	14	1	14	29	22	150	225	425	800
L-Lectu	-Lecture T-Tutorial P-Practical											

Course Category	Basic Science Courses (BSC)	Engineering Science Courses (ESC)	Programme Core Course (PCC)	Programme Elective Course (PEC)	Open Elective other than Particular Programme (OE/MDM)	Vocational and Skill Enhancement Course (VSEC)	Humanities Social Science and Management (HSSM)	Experiential Learning (EL)	Co-curricular and Extracurricular Activities (CCA)
Semester Credits	08	08				03	01		02
Cumulative Sum	08	08				03	01		02

Branch: - Common to all Branches of Engineering

Scheme of Instructions: First Year B. Tech. Common to all Branches of Engineering

Sr.Course CategoryCourse CodeCourse1BSCEngineering Chemistre	Title L	Т	1	Semester-I (w.e.f. A.Y. 2024-25)						
No. Category Code 1 BSC Engineering Chemistre		-	P	Contact	Course]	EXAM SCH	EME		
1 BSC Engineering Chemistr				Hrs/Wk	Credits	MSE	ISE/CA	ESE	TOTAL	
	у 3			3	3	30	10	60	100	
2 BSC Engineering Mathema	tics –I 3	1		4	4	30	10	60	100	
3 ESC Basic Mechanical Eng	gineering 2			2	2	30	10	60	100	
4 ESC Engineering Mechanic	cs 3			3	3	30	10	60	100	
5 ESC Basic Electronics Eng	ineering 2			2	2	30	10	60	100	
6 BSC Engineering Chemistr	y Lab		2	2	1		25	-	25	
7 ESC Engineering Mechanic	cs Lab		2	2	1		25	25	50	
8 HSSM Professional Commun	ication–I		2	2	1		25	50	75	
9 VSEC Skill Enhancement Co	ourse-I		2	2	1		25	25	50	
10 CCA Yoga and NSS			4	4	2		50	-	50	
11 VSEC Programming Langua	ges-I 1		2	3	2		25	25	50	
Total	14	1	14	29	22	150	225	425	800	

Semester_I (w o f A V 2024-25)

L-Lecture

T-Tutorial

P-Practical

Course Category	Basic Science Courses (BSC)	Engineering Science Courses (ESC)	Programme Core Course (PCC)	Programme Elective Course (PEC)	Open Elective other than Particular Programme (OE/MDM)	Vocational and Skill Enhancement Course (VSEC)	Humanities Social Science and Management (HSSM)	Experiential Learning (EL)	Co-curricular and Extracurricular Activities (CCA)
Semester Credits	08	08			-	03	01		02
Cumulative Sum	08	08				03	01		02

Branch: - Common to all Branches of Engineering

Scheme of Instructions: First Year B. Tech. Common to all Branches of Engineering

Engineering Physics Group

Semester-II (w.e.f. A.Y. 2024-25)

Sr.	Course	Course	Course Title	L	Т	Р	Contact	Course]	EXAM SCH	EME	
No.	Category	Code					Hrs/Wk	Credits	MSE	ISE/CA	ESE	TOTAL
1	BSC		Engineering Physics	3			3	3	30	10	60	100
2	BSC		Engineering Mathematics –II	3	1		4	4	30	10	60	100
3	ESC		Basic Civil Engineering	2	-		2	2	30	10	60	100
4	ESC		Engineering Graphics	3			3	3	30	10	60	100
5	ESC		Basic Electrical Engineering	2			2	2	30	10	60	100
6	BSC		Engineering Physics Lab			2	2	1		25		25
7	ESC		Engineering Graphics Lab			2	2	1		25	25	50
8	HSSM		Professional Communication–II			2	2	1		25	50	75
9	VSEC		Skill Enhancement Course-II			2	2	1		25	25	50
10	HSSM		Indian Knowledge Systems (IKS)	2			2	2		50		50
11	VSEC		Programming Languages-II			2	3	2		25	25	50
		Total		16	1	10	27	22	150	225	425	800

L-Lecture

T-Tutorial

P-Practical

Course Category	Basic Science Courses (BSC)	Engineering Science Courses (ESC)	Programme Core Course (PCC)	Programme Elective Course (PEC)	Open Elective other than Particular Programme (OE/MDM)	Vocational and Skill Enhancement Course (VSEC)	Humanities Social Science and Management (HSSM)	Experiential Learning (EL)	Co-curricular and Extracurricular Activities (CCA)
Last Sem. Cumulative Sum	08	08				03	01		02
Semester Credits	08	08				03	03		
Cumulative Sum	16	16				06	04		02

Branch: - Common to all Branches of Engineering

Scheme of Instructions: First Year B. Tech. Common to all Branches of Engineering

Engineering Chemistry Group

Semester-II (w.e.f. A.Y. 2024-25)

Sr.	Course	Course	Course Title	L	Т	Р	Contact	Course]	EXAM SCH	EME	
No.	Category	Code					Hrs/Wk	Credits	MSE	ISE/CA	ESE	TOTAL
1	BSC		Engineering Chemistry	3			3	3	30	10	60	100
2	BSC		Engineering Mathematics –II	3	1		4	4	30	10	60	100
3	ESC		Basic Mechanical Engineering	2	-		2	2	30	10	60	100
4	ESC		Engineering Mechanics	3	-		3	3	30	10	60	100
5	ESC		Basic Electronics Engineering				2	2	30	10	60	100
6	BSC		Engineering Chemistry Lab			2	2	1		25		25
7	ESC		Engineering Mechanics Lab		-	2	2	1		25	25	50
8	HSSM		Professional Communication–II			2	2	1		25	50	75
9	VSEC		Skill Enhancement Course-II			2	2	1		25	25	50
10	HSSM	Indian Knowledge Systems (IKS)		2			2	2		50		50
11	VSEC	Programming Languages-II		1		2	3	2		25	25	50
			Total	16	1	10	27	22	150	225	425	800

L-Lecture

T-Tutorial

P-Practical

Course Category	Basic Science Courses (BSC)	Engineering Science Courses (ESC)	Programme Core Course (PCC)	Programme Elective Course (PEC)	Open Elective other than Particular Programme (OE/MDM)	Vocational and Skill Enhancement Course (VSEC)	Humanities Social Science and Management (HSSM)	Experiential Learning (EL)	Co-curricular and Extracurricular Activities (CCA)
Last Sem. Cumulative Sum	08	08				03	01		02
Semester Credits	08	08				03	03		
Cumulative Sum	16	16				06	04		02

Engin	eering	Phy	vsics

Lectures	:	3 Hrs/Week
Credit	:	3

Evaluation SchemeMSE:30 MarksISE/CA:10 MarksESE:60 Marks

Course Objectives: The objective of the course is to

1) To provide the useful fundamental concepts of Physics to Engineering discipline.

2) To introduce the student with new techniques of modern physics relevant to engineering.

3) To empower the student to comprehend technological advances.

Course	Outcomes:	
COs	At the end of successful completion of the course, the student will be	Blooms
	able to	Taxonomy
CO1	Explain the concepts of diffraction and polarization for engineering applications.	Understand
CO2	Explain basics of lasers and optical fibers and their use in some applications.	Understand
CO3	Illustrate the basic requirement of acoustical good hall and solve problems on sabines formula	Understand
CO4	Apply the knowledge of Quantum Mechanics to solve related problem	Apply
CO5	Apply peculiar properties of crystallography to solve engineering problems.	Apply
CO6	Comprehend use of concepts of physics and some properties of nanomaterials and their application.	Apply

Description:

Engineering Physics course is offered as the basic science course. This course contains different phenomena of light, concepts of Laser and fiber optics, basics of sound, wave –particle dualism and uncertainty principle, crystal structures and their properties, approaches and techniques of nanomaterials. These are useful fundamental concepts of Physics to Engineering disciplines and to make the student aware of new techniques in Physics applicable to engineering practices.

Unit No	Content	Hours			
	Wave Optics				
Unit 1	Introduction, Interference of light and types, Diffraction of light and types,				
	construction of diffraction grating, Resolving power of plane transmission grating,				
	Polarization of light, double refraction, Huygens' theory of double refraction,	07 Hrs			
	specific rotation, Laurent's half shade polarimeter, Numerical.				
	LASER and Fiber Optics				
	LASER: Introduction, absorption, spontaneous emission and stimulated emission of				
	radiations, Population inversion, Pumping energy, characteristics and engineering				
Unit 2	applications of laser, Ruby laser, He –Ne Laser.				
Unit 2	Fiber Optics: Introduction principle, construction, propagation of light through an	07 Hrs			
	optical fiber, block diagram of fibre optic communication system, acceptance angle,				
	critical angle, Numerical aperture (No derivation), fractional Refractive Index				
	change, Types of optical fibers, advantages and applications of optical fiber.				
	Sound				
Unit 3	Absorption coefficient, Reverberation, Reverberation time, Sabine's formula for				
CIIII S	reverberation time (no derivation), Conditions for good acoustics, Factors affecting 07				
	architectural acoustics and their remedy.				
	Wave Mechanics				
	Introduction, Wave-particle dualism , De-Broglie's Hypothesis -light and matter,				
Unit 4	De-Broglie's wavelength in terms of Kinetic Energy, Potential Difference and				
	Temperature, Properties of matter waves, Heisenberg's uncertainty principle for	07 Hrs			
	position and momentum, Compton Effect, Compton shift (No Derivation) and its	07 1115			
	experimental verification, Numerical.				
	Crystallography				
	Introduction, Basics of crystal structure -Space Lattice, Basis, crystalline solid and				
TT	Unit cell (geometry and types), Seven crystal system, Analysis of unit cell for SC,				
Unit 5	BCC and FCC, Relation between density and lattice constant, Miller indices	07 Hrs			
	(procedure and sketches for planes), Symmetry elements in cube, Bragg's x-ray				
	spectrometer, Numerical.				
	Nanotechnology				
	Introduction, Nanomaterials, Nanoscience and Nanotechnology, Top down and				
	bottom up approaches, Production techniques - Ball milling and Colloidal, Types of				
Unit 6	nanomaterial, Surface to Volume ratio and Quantum confinement effect,	07 Hrs			
	Characterizations - Scanning Tunneling Microscope and Atomic Force				
	Microscope, properties of material at nanoscale, applications of nanomaterials.				

References:

Ref	erence Books
1	M. N. Avadhanulu and P. G. Kshirsagar, "A Text book of Engineering Physics", S. Chand and
	Company, New Delhi.
2	R. K. Gaur and S. L. Gupta "Engineering Physics", Dhanpat Rai Publications, New Delhi.
3	R. K. Gaur & Gupta S. L, Engineering Physics – Dhanapat Rai Publication
4	B. L. Theraja -Modern Physics - S. Chand & Company Ltd., Delhi
5	Subramanyam & Brij Lal, A Text Book of Optics –S. Chand & Company (P.) Ltd.
6	M. N. Avadhanulu & P. G. Kshirsagar - A Text Book of Engineering Physics -S. Chand
	Publication.
7	B. K. Pandey and S. Chaturvedi- Engineering Physics, Cengage Learning

Engineering Physics Lab

Practical	: 2 Hrs/Week	Evaluation Scheme						
Credit	: 1	ISE/CA : 25 Marks						
Sr. No	TITLE OF EXPE	ERIMENT						
01	Diffraction at Cylindrical obstacle.							
02	Calculation of divergence of LASER bea	ım.						
03	Determination of wavelength of LASER	using diffraction grating.						
04	Wavelength of different spectral lines of	Wavelength of different spectral lines of mercury using grating.						
05	Polarimeter.							
06	Optical fiber characteristic setup							
07	Study of crystal structure.							
08	Study of symmetry elements of cubic crystal.							
09	Determination of 'd' (interplaner distance) using XRD pattern.							
10	Study of Planes with the help of models related Miller Indices.							
11	Measurement of band gap energy.							
12	R. P. of grating							

Note: - Out of the above, minimum of 8 experiments are to be performed.

Engineering Mathematics - I

Lectures	: 3 Hrs/Week	Evaluation Scheme		
Tutorial	: 1	MSE : 30 Marks		
Credit	: 4	ISE/CA : 10 Marks		
		ESE : 60 Marks		

Course	Basics of matrices, complex algebra, derivative and its properties.				
Pre-Requisite					
	1	Γο develop mathematical skills and enhance thinking power of students.			
		To give knowledge to the students of matrices, complex numbers,			
Course Objective	2	differential calculus, numerical methods with an emphasis on the application			
		of solving engineering problem.			
	3	To prepare students to formulate a mathematical model using engineering			
		skills & interpret the solution in real world.			
	After competition of this course Students will be able to				
	CO1	Calculate roots of complex numbers, separation into real and imaginary			
		parts of complex numbers by using De Moivre's Theorem.			
Course Outcomes	CO2	Apply Taylor's and Maclaurin's series to find expansion of functions.			
	CO3	Find partial derivatives and use it to find Maxima and minima, Jacobian.			
	CO4	Solve the system of linear equations by using matrix method.			
	CO5	Calculate Eigen values and eigen vectors of matrix and higher powers of			
		matrix using Cayley Hamilton theorem.			
	CO6	Solve linear simultaneous equations by using numerical methods.			

	CO PO Mapping											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2										
CO2	3	2										
CO3	3	2										
CO4	3	2										
CO5	3	2										
CO6	3	2										
Level of Mapping as: Low 1, Moderate 2, High 3												

Marking Scheme

In Semester Evaluation/ Continuous Assessment (ISE/CA)has 10 Marks Parameters for ISE/CA

could be: Attendance, Assignments etc.

Mid Semester Examination (MSE) has 30 Marks

MSE will be based on 50% syllabus from beginning (First Three Units)

End Semester Examination (ESE) has 60 Marks

ESE will be 25% on syllabus covered for MSE (First Three Units) and 75% on remaining syllabus (Last Three Units)

Unit No.	Content	Hours				
	Complex Numbers					
Unit 1	De Moivre's Theorem (Without proof), Roots of complex numbers by using De					
	Moivre's Theorem, Expansion of sin θ and cosn θ in powers of sin θ and /or cos θ ,	07 II.ma				
	Circular functions of a complex variable - definitions, Hyperbolic and Inverse	07 1115				
	Hyperbolic Functions- definitions.					
	Expansion of Functions and Indeterminate forms					
Unit 2	Maclaurin's theorem, Standard expansions, Taylor's theorem, Indeterminate forms					
	and L' Hospital's rule.	07 1115				
	Partial Differentiation					
Unit 3	Partial derivatives: Introduction, Total derivatives, Differentiation of implicit					
Omt 5	function, Euler's theorem on homogeneous function of two variables, Jacobian					
	andits Properties, Maxima and Minima of functions of two variables.					
	Matrices and Solution of Linear System Equations					
Unit 4	Rank of matrix: definition, normal form and echelon form, Consistency of linear					
Cint 4	system equations, System of linear homogeneous equations, System of linear	07 Hrs				
	non-homogeneous equations.	07 1115				
	Eigen Values and Eigen vectors					
Unit 5	Eigen Values, Properties of Eigen Values, Eigen vectors, Properties of Eigen	07 IIna				
	vectors, Cayley-Hamilton's theorem (Without proof).					
	Numerical Solution of linear simultaneous equations					
Unit 6	Gauss elimination method, Gauss-Jordan method, Jacobi's iteration method,					
	Gauss-Seidel iteration method.					

Guidelines for Tutorials

- 1. Batchwise tutorials are to be conducted. The number of students per batch should be as per the university pattern for practical batches.
- 2. Minimum number of assignments should be six covering all topics.

Textbooks						
Sr. No.	Title	Author	Edition/Publication			
01	A Text Book of Applied Mathematics	P. N. Wartikar	Pune Vidyarthi Griha			
	Volume I	J. N. Wartikar	Prakashan, Pune			
02	Higher Engineering Mathematics	Dr. B. S. Grewal	Khanna Publishers, Delhi			

Reference Books							
Sr. No.	Title	Author	Edition/Publication				
01	Advanced Engineering Mathematics	H. K. Dass	S. Chand, New Delhi				
02	Advanced Engineering Mathematics	Erwin Kreyszig	Wiley India Pvt.				
03	A Text Book of Engineering Mathematics Volume I	Peter V. O'Neil and Santosh K. Sengar	Cengage Learning				
04	A Text Book of Engineering Mathematics	N. P. Bali, Iyengar	Laxmi Publication (p)Ltd. New Delhi				
05	Numerical Methods	Dr. B. S. Grewal	Khanna Publishers, Delhi				
06	Mathematical methods of Science andEngineering	Kanti B. Datta	Cengage Learning				

Basic Civil Engineering

Lectures	: 2 Hrs/Week	Evaluation Scheme	
		MSE : 30 Marks	
Credit	: 2	ISE/CA : 10 Marks	
		ESE : 60 Marks	

Desire	Desired Requisites: Physics, Mathematics		
Cours	se Outcomes (CO) with Bloom's Taxonomy Level		
At the	end of the course, the students will be able to,		
со	Course Outcome Statement/s	Bloom's Taxonomy Level	Bloom's Taxonomy Description
CO1	Explain the role of Civil Engineers in infrastructure development.	II	Understand
CO2	Identify and explain the various building components, construction materials, and services	II	Understand
CO3	Apply the linear, angular measurement and levelling techniques.	Ш	Apply
CO4	Explain the components and need of water supply, drainage, and hydraulic systems	II	Understand
CO5	Describe the modes of transport, types and structure of road.	II	Understand

Unit No.	Content	Hours
	Introduction to Civil Engineering	
Unit 1	Scope of Civil Engineering, Disciplines of Civil Engineering, Role of Civil	03 Hrs
	Engineers in infrastructure development	
	Construction Materials and Services	
	Components in buildings and their functions, Load bearing and framed structures,	
	General principles of building planning, Typical building layout, Construction	
Unit 2	materials, Properties and uses of stone, brick, tile, timber, cement, sand, lime, mortar,	
	icrete, bitumen and steel,	
	Building Services: Types of building services, Plumbing & sanitation, water supply&	
	drainage system.	
	Surveying	
Unit 3	Introduction, Fundamental principles, Classification. Linear measurement: Instruments	
Omt 5	used, Angular measurement: Compass and Local attraction. Levelling: Instrument 04	
	used, Terminology, Types of levelling, and Methods of levelling, Contour	

	Modern tools: Total Station, Introduction to GPS, GIS & RS	
	Water Supply and Drainage	
	Water Supply: Sources of water, Need for water supply, Components of water supply	
Unit 4	scheme, Conventional water treatment plant, Package drinking water plant	
	Drainage: Need, Sewerage system, Types of sewerage system, Sewage treatment plant,	04 Hrs
	Septic tank.	
	Transportation Engineering	
Unit 5	Modes of Transportation, Types of Roads, Types of Pavements, Typical cross section	
Unit 5	of road, Road Patterns, Traffic control and signals	04 Hrs
	Rail transport, Permanent Way: Components, functions, Metro	
	Water Resource Engineering	
Unit 6	Introduction to Hydraulic structures: Dam, Barrage, Weirs, Canal, Reservoir, Irrigation	04 Hrs
	systems, Rain water harvesting, Water shed management	V7 111 5

Ref	Reference and Text Books	
1	Surveying and leveling N. N. Basak Tata McGraw Hill Education	
2	Building Construction Dr. B. C. Punmia Laxmi Pub. Delhi	
3	Building planning, designing and scheduling Gurucharan Singh Standard Publisher	
4	Basic Civil Engineering S. Ramamrutham Dhanpatrai Publication	

Engineering Graphics

Lectures	: 3 Hrs/Week	Evaluation Scheme	
		MSE : 30 Marks	
Credit	: 3	ISE/CA : 10 Marks	
		ESE : 60 Marks	

Course Objectives: The objective of the course is to

Project line, plane and solids by using 1st angle method of projections and also orthographic and isometric projections of various objects.

Course	Outcomes:	
COs	At the end of successful completion of the course, the student will be	Blooms
	able to	Taxonomy
CO1	Draw the neat drawings of Engineering Curves.	Remember
CO2	Understand the Projection of Point, Straight lines, Plane.	Understand
CO3	Understand the Projection of Solids.	Understand
CO4	Construct neat Sketch of Orthographic Projection.	Apply
CO5	Construct neat Sketch of Isometric Drawings.	Apply
CO6	Develop lateral surfaces of solid cut sections and their projections	Create

Unit No.	Content
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Unit No.	Content	Hours
	Introduction to Engineering Drawing & Engineering Curves	
	Introduction to drawing instruments and their uses, Different types of lines used in	
	drawing practice, Lettering & Numbering, Dimensioning system as per BIS,	
	Geometric constructions, Construction of regular polygons. Introduction to	
	Computer Aided Drafting software, Co-ordinate system and reference planes HP,	
Unit 1	VP, and RPP& LPP of 2D/3D environment. Selection of drawing sheet size and	
	scale. Commands and creation of Lines, coordinate points, axes, polylines, square,	07 11
	rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror,	07 Hrs
	rotate, trim, extend, break, chamfer, fillet and curves.	
	Conic sections: Construction of Ellipse -(Focus- directrix method, Rectangle	
	method, Arcs of circle), Parabola-(Focus-directrix method, Rectangle Method),	
	Hyperbola-(Directrix-Focus & Rectangular Method), Involutes, Spiral and Cycloid	
	only.	
Unit 2	Projections of Straight Lines & Planes	

	Principles & theory of Projections, Introduction to First angle and third angle	
	methods of projection, symbol of first angle and third angle. Projections of points	
	on regular reference planes. Projections of horizontal, frontal and Profile lines on	
	regular and auxiliary reference planes. Projection of oblique lines it's True length	AQ Hrs
	and angle with reference planes by rotation method. Concept of grade and bearing	071115
	of line.	
	Types of planes, Projections of planes, Projections on regular and on auxiliary	
	reference planes, Edge view and True shape of a Plane. Angles made by the plane	
	with Principle reference planes. Projections of plane figures inclined to both the	
	planes.	
	Projections of Regular solids	
Unit 3	Types of Solids, Projection of simple solids, Projections of Prisms, Pyramids,	
Unit 5	Cylinder and Cones inclined to both reference planes (Excluding frustum and	05 Hrs
	sphere).	
Orthographic Projections		
Unit A	Selection of views, spacing of views, dimensioning and sections. Drawing required	
	views (any two views) from given pictorial views (Conversion of pictorial view	07 Hrs
	into orthographic view) including sectional orthographic view.	07 1115
	Isometric projections	
	Principles of Isometric projection - Terminology, Isometric Scale, Isometric	
Unit 5	Views of standard shapes & standard solids, Isometric projections and Isometric	06 IIma
	views / drawings. Circles in isometric view. Isometric views of simple solids and	UO HIS
	objects.	
	Development of plane and curved surfaces	
	Introduction, methods of development, parallel line development, Radial line	
Unit 6	development only.Development of plane and curved surfaces of the solids, Prisms,	07 Urs
	Pyramids, Cylinders and Cones along with cutting planes (Solids in simple	0/1115
	position only).	

Note: The above syllabus is to be covered according to the first angle method of projection.

Engineering Graphics Lab

Practical	: 2 Hrs/Week	Evaluation Scheme	
		ISE/CA	: 25 Marks
Credit	: 1	ESE	: 25 Marks

The following six sheets are to be drawn based on the above topics. All these sheets should be drawn on half imperial (A3 size) drawing sheets only.

Sr. No	TITLE OF SHEET
01	Engineering Curves
02	Projections of Straight lines and planes
03	Projections of solids
04	Orthographic projections
05	Isometric projections
06	Development of surfaces
	Commands and creation of Lines, coordinate points, axes, polylines, square,
07	rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate,
	trim, extend, break, chamfer, fillet and curves By using CAD Software

Ref	Reference Books		
1	Engineering Drawing by N. D. Bhatt, Charotor Publication House, Bombay		
2	Fundamentals of Engineering by W. J. Luzadder, Drawing, Prentice Hall of India.		
3	Engineering Design and Visualization by Jon M. Duff, William A. Ross, CENGAGE Learning		
4	Machine Drawing by N. D. Bhatt, Charotor Publication House, Bombay.		
5	Graphic Science by French and Vierck, Mc-Graw Hill International.		
6	Engineering Drawing and Graphics by K. Venugopal, New Age Publication		
7	A textbook of Engineering Drawing by R. K. Dhawan, S. Chand and Co.		
8	Machine Drawing by K. L. Narayana, New Age Publication		
9	Engineering Drawing by N. B. Shaha and B. C. Rana, Pearson Education.		
10	Engineering Drawing and Graphics Using Auto CAD by T. Jeyapoovan, Vikas Publication.		
11	Engineering Drawing by Prof. Amar Pathak, WIELY India Publication		

Basic Electrical Engineering

Lectures	: 2 Hrs/Week	Evaluation Scheme		
		MSE : 30 Marks		
Credit	: 2	ISE/CA : 10 Marks		
		ESE : 60 Marks		

Unit No.	Content	Hours				
	D.C. circuits:					
Unit 1	Concept of E.M.F, Potential Difference, Current, Resistance, Ohm's Law					
Omt I	Kirchhoff's laws, mesh and node analysis. Star Delta, Delta star conversion,	04 Hrs				
	Voltage and Current Sources, Source conversion					
	Magnetic Circuits:					
Unit 2	Concept of MMF, Reluctance, Magnetic flux, Magnetic Flux density, Magnetic					
Onit 2	Field Strength, BH Curve, Magnetic Leakage, Fringing, Comparison of Electric					
	and Magnetic Circuit, Series magnetic circuits.					
	Single phase AC Circuits:					
	Fundamentals of Alternating Quantities, Faraday's Law, Types of Induced, E.M.F					
Unit 3	Generation of Sinusoidal Voltage, Concept of R.M.S. & Average Value, Form					
	Factor, Peak Factor, Pure Resistive, Inductive, Capacitive , R-L, R-C, R-L-C					
	Series Circuits, Series Resonance, Power triangle, Significance of Power Factor.					
	Three Phase A.C. Circuits					
Unit 4	Generation of 3 Phase AC supply, Advantages of 3 Phase System, Balanced 3Phase					
	Load, Relation between Line and Phase quantities for Star and Delta Connected					
	Circuit, Power in three phase circuit	•				
	Electrical Machines:					
	Single phase Transformer: Construction, Operating Principle, Types and					
Unit 5	Applications, EMFEquation, Ratios of Voltage and Current, Losses, Efficiency					
	and Voltage Regulation					
	Single Phase Motors: Principle of Single phase AC motors, BLDC motors.					
	Earthing and Batteries:					
Unit 6	Necessity of Earthing, Earthing Methods, Fuse requirement, Fuse, MCB, ELCB,					
	LED Lamp principal and types, Types of batteries and their characteristics, Study	y 04 Hrs				
	of domestic energy bill.					

Ref	Reference and Text Books		
1	B. L. Theraja – Electrical Technology vol.1. – S. Chand.		
2	B. L. Theraja – Electrical Technology vol.2. – S. Chand.		
3	Bharati Dwivedi and Anurasg Tripathi – Fundamentals of Electrical Engineering – Willey Precise		
4	NagrathI. J. and D. P. Kothari – Basic Electrical Engineering – Tata McGraw Hill.		
5	V.K Mehta- Principles of Power Systems – S. Chand.		
6	Er. R. K. Rajput-Utilisation of Electrical Power-Laxmi Publications Pvt Limited		
7	P. V. Prasad and S. Shivan Raju – Electrical Engineering concepts and Applications – Cengage		
	learning.		

Professional Communication -I

Lectures	:	Evaluation Scheme
Practical	: 2 Hrs/Week	MSE :
Credit	: 1	ISE/CA : 25 Marks
		ESE : 50 Marks

Course Objectives: The objective of the course is to

1) Provide a learning environment to practice listening, speaking, reading and writing skills

2) Adapt communication strategies based on audience, context, and cultural diversity.

3) Utilize digital tools effectively for professional communication.

4) Equip learner with Professional skills by giving training through various tasks.

Course	Course Outcomes:				
COs	At the end of successful completion of the course, the student will be Blooms				
	able to	Taxonomy			
CO1	Communicate effectively in various formal and informal situations	Understand			
	minimizing the barriers.				
CO2	Construct grammatically correct sentences and use contextual words in	Understand			
	English.				
CO3	Use phonetically transcription to pronounce words correctly.	Apply			
CO4	Use different formats of formal written skills.	Apply			

Description:

Communication is key to smooth and efficient functioning of any industry or business .Professional communication is the need of every organization to maintain ethics, quality and standards. The efficacy of business communication skills are essential for engineering professionals to instruct, guide and motivate peers/ subordinates to achieve desired goals at work place. Strong Communication skills are highly valued in the professional world and contribute to career growth and opportunities. Thus, this course has been designed to enhance the professional communication skills for effective presentation both in written and oral forms at workplace.

Unit No.	Content	Hours			
	Understanding Communication				
	Definition of communication				
Unit 1	• Process of communication				
	• Types of communication Formal, Informal, Verbal, Nonverbal, Vertical,				
	Horizontal, Diagonal				
	Barriers in the communication process				
	Grammar and Vocabulary				
Unit 2	Forms of Tenses				
Unit 2	• LSRW skills				
	Vocabulary Building				
	Phonetics				
Unit 3	Understanding Phonetics and its alphabets				
	Transcription Practices				
	Developing Oral Skills				
Unit 4	Importance and Techniques of spoken language				
	• Techniques of formal speech, Meeting, Elocution, Extempore				
	Professional Correspondence				
Unit 5	• Letter Writing- Application letter, Seeking leave, Permission letter				
CIIIC D	etc.				
	• Preparation of technical events, information broacher and manuals.				

Sr. No	TITLE OF EXPERIMENT
01	Elocution
02	Extempore
03	Phonetics-Listen and Repeat
04	Active listening / Practice of listening
05	Effective Reading /Practice of reading
06	Story telling/Incident narration.
07	Employment skill-Application writing
08	Verbal Aptitude/Grammar Application
09	Manual /Broacher preparation.
10	Vocabulary Utilization/Vocabulary Building

11	Situational Conversation
12	Fluency tips

Note: Minimum Eight should be performed from the above list.

Ref	Reference Books		
1	AICTE's Prescribed Textbook: English (with Lab Manual), Khanna Book Publishing Co.		
2	Kul Bhushan Kumar, Effective Communication Skills, Khanna Book Publishing, 2022.		
3	Practical English Usage. Michael Swan. OUP. 1995. 4. Remedial English Grammar. F. T.		
	Wood. Macmillan.20075. On Writing Well. William Zinsser. Harper Resource Book.		
	20016. Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press.		
	2006.https://www.coursera.org/specializations/improve-english		
4	International Phonetic Association (IPA) Website		

Skill Enhancement Course-I

Teaching Scheme	Examination Scheme					
Credits- 01	MSE	ISE/CA	ESE	PR – ISE/CA	PR-ESE	Total
Lectures (L): 00 hrs /Week Practical: 2 hrs/week	**	**	**	25	25	50

Course Objectives: The objective of the course is				
Mechanical	1. To acquire skills in basic mechanical engineering practice.			
Engineering Group	2. To provide practical experience in Smithy, Fitting, Plumbing.			
Civil	1. To introduce students to basic civil engineering and its procedure.			
Engineering Group	2. To develop practical skills in handling civil engineering equipments and			
	instruments.			
Electrical	1. To introduce students to fundamental of electrical engineering and its			
Engineering Group	procedure.			
	2. To develop practical skills in handling electrical engineering equipment and			
	instruments.			
Computer Science	1. To introduce fundamental knowledge of basics of computer.			
and Engineering	2. To develop skills in using various I/O devices.			
Group				
Electronics and	1. To use various commands, functions, and arrays required for programming			
Telecommunication				
Engineering Group	2. To write programs using functions and looping statements and plot graphs.			

Course Outcomes

СО	After the completion of the course the student should be able to	Bloom's	
	After the completion of the course the student should be able to	Cognitive	
Mechan	Mechanical Engineering Group		
CO-1	Describe the methods, operations and processes used in Smithy, fitting, Plumbing.	Understanding	
CO-2	Use the techniques, skills, and modern engineering tools necessary in fitting, smithy and plumbing operations.	Applying	
Civil Engineering Group			
CO-1	Study of different building materials and drawings.	Understanding	
CO-2	Use surveying equipments to measure distance and levels.	Applying	

Electrical Engineering Group		
CO-1	Understand the electrical tools and equipment's/components	Understanding
CO-2	Utilize the know-how of basic electrical concepts in wiring installation	Applying
Computer Science and Engineering Group		
CO-1	Understand Basics of Computer Engineering.	Understanding
CO-2	Apply skills to analyse I/O devices.	Applying
Electronics and Telecommunication Engineering Group		
CO-1	Use the different commands, functions, arrays required for programming in MATLAB.	Understanding
CO-2	Apply the knowledge of programming to plot graph and write program for simple applications.	Applying

List of experiments: Common to all Programmes

Sr. No.	Details	
Mechanical Engineering Group (Any TWO)		
	Tin Smithy	
1	One job in smithy involving upsetting, Drawing, bending such as Rectangular Tray,	
	Cylinder ,Square box without lid ,funnel	
	Black Smithy	
2	One job in black smithy such as Round rod to Square, S-Hook, Round Rod to Flat Ring	
	Round Rod to Square headed bolt	
	Fitting	
3	One job Male/Female fitting with operations- Marking, cutting, drilling, tapping filing	
	etc.	
4	Plumbing	
4	One job on Joining GI pipes by threading, PVC pipes by gluing and cementing.	
Civil Engineering Group (Any TWO)		
1	Measurement of horizontal distances by using tape and pedometer	
2	Measurement of horizontal angles by using prismatic compass	
3	Measurement of area by tape and planimeter for regular and irregular shapes.	
	Study of Field test of Civil engineering materials like Cement, Brick, Sand and	
4	Aggregate	
Electrical Engineering Group (Any TWO)		
1	Introduction to electrical tools, their uses, and safety	

2	Study of wiring components (Wires, Switches, Fuses, Sockets, Plug, Lamps and Lamp
	holders etc.)
2	Study of electrical equipment's/components such as Resistor, Inductor, Capacitor,
5	Transformer, Motor, Variac / Auto-Transformer etc.
4	Study of House Wiring (Batten, Cleat, Casing-Caping And Conduit Wirings)
Compute	er Science and Engineering Group (Any TWO)
	Computer Basics:
1	Algorithms, Simple Model of a Computer, Characteristics of Computers, Problem
1	Solving Using Computers, Flowchart, Working of a Computer, Stored Program
	Concept, Hardware and Software
	Data Representation:
2	Representation of Characters in Computers, Representation of Integers, Representation
	of fractions, Hexadecimal Representation of Numbers, Decimal to Binary Conversion
	Input Output Units:
3	Traditional Computer Input/Output Units: Keyboard, Display Unit, Computer Mouse
5	Other Input Technologies: Touch Pad, Touch Screen, Bar Code
	Computer Output Devices: CRT, Flat Panel Display Technology
4	Printers:
-	Inkjet Printers, Laser Printers, Dot Matrix Printers, Line Printers, Plotters
Electron	ics and Telecommunication Engineering Group (Any TWO)
	MATLAB/SCILAB brief introduction, installation, and basics of variables and arrays
1	Multidimensional sub-arrays, special values, displaying output data, data files, and
	scalar array operations.
2	MATLAB/SCILAB branching, statements and logical data types, branches, while and
2	for loop, logical arrays, and vectorization.
	User-defined and I/O functions, introduction to MATLAB/ SCILAB functions,
3	Variable passing, sharing data using global memory, preserving data between calls to a
	function or sub-function in MATLAB/ SCILAB.
	Plotting simple graphs; Basic 2D plots, Style Options - labels, title, and legend- axis
4	control, zoom in and zoom out; - using a plot editor - overlay plots: specialized 2D
	using MATLAB/SCILAB.
L	

	Reference/Text Books
Mechanical Engineering Group	
1	Workshop Technology by V. S. Raghuwanshi by Dhanpat Rai & Co.

2	Elements of Workshop Technology, Vol. I and II by Hajara Choudhari, Media Promoters	
3	Workshop Technology, Vol – I by Gupta and Kaushik, New Heights	
4	Workshop Technology, Vol – I by Chapman, The English Language Book Society.	
Civil Engineering Group		
1	Hirasakar G. K., "Basic Civil Engineering", Dhanpat Rai publications, 1st Edition,2007	
2	Gole L.G., "Introduction to Civil Engineering", Mahu Publisher House, 4th Edition, 2005	
3	Bhavikatti S.S., "Basic Civil Engineering", New Age Publications, 2010	
4	Duggal S. K., "Surveying (Vol I)", Tata McGraw Hill, 4th edition 2013	
5	Bindra S. P., Arora S. P., "Building Construction", Dhanpat Rai publication, 5th edition, 2012	
Electrica	l Engineering Group	
1	B. L. Theraja – Electrical Technology vol.1. – S. Chand	
2	B. L. Theraja – Electrical Technology vol.2. – S. Chand	
3	Nagrath I. J. and D. P. Kothari – Basic Electrical Engineering (2001) – McGraw Hill.	
1	P. V. Prasad and S. Shivan Raju - Electrical Engineering concepts and Applications -	
4	Cengage learning	
5	Bharati Dwivedi and Anurasg Tripathi – Fundamentals of Electrical Engineering – Willey	
	Precise	
Compute	er Science and Engineering Group	
1	Computer Fundamentals Architecture and Organization by B.Ram New Age International	
	Publishers.	
2	Fundamentals of Computers by V. Rajaram, PHI Publications.	
3	Introduction to Information Technology, ITL Education Solutions LTD. Pearson Education	
4	UNIX concepts and applications by Sunitabha Das, TMGH.	
Electronics and Telecommunication Engineering Group		
1	Introduction To Digital Signal Processing Using MATLAB and SCILAB By Mohammad	
	Atique & Amol Prakash Bhagat	
2	Introduction To MATLAB by Rudra Pratap Singh	
3	Handbook on MATLAB and SCILAB	

Yoga and NSS

Lectures	:	Evaluation Scheme	
Practicals	: 4 Hrs/Week	MSE :	
Credit	: 2	ISE/CA : 50 Marks	
		ESE :	

Yoga:

Unit	Content	Hours
	Practice warming up for Yoga.	
Unit 1	Introduction to Yoga.	
	History of Yogabhyas.	
	Practice Surya Namaskar	
Unit 2	• All the postures of Surya Namaskar with mantra	
	• Shavasana for self-relaxation	
	Practice basic Asanas	
	• Sarvangasna, Halasana, Kandharasana (setu bandhasana)	
Unit 3	 hujangasana, Naukasana, Mandukasana 	
	Paschimottasana, Baddhakonasana, Bharadwajasana	
	• Veera Bhadrasana, Vrukshasana, Trikonasana.	
	Practice basic pranayama and meditation	
	Bhastrika, Anulom Vilom Pranayam Kriya	
Unit 1	Kapalbhati (Shuddhikriya) Pranayam Kriya	
Unit 4	Bhramary Pranayam.	
	• Explain the benefits of Meditation	
	Dhyan Mudra and meditation	

Sr. No	TITLE OF EXPERIMENT
01	Perform warming up exercises to prepare the body from head to toe for Yoga.
02	Perform all the postures of Surya Namaskar one by one in a very slow pace, after warm up.
03	Perform multiple Surya Namaskar (Starting with three and gradually increasing it to twelve) in one go.
04	Perform Sarvangasna, Halasana, Kandharasana (setubandhasana)
05	Perform Bhujangasana, Naukasana, Mandukasana
06	Perform Paschimottasana, Baddhakonasana, Bharadwajasana.
07	Perform Veera Bhadrasana, Vrukshasana, Trikonasana.
08	Perform Bhastrika, Anulom Vilom Pranayam Kriya

09	Practice Kapalbhati Pranayam Kriya
10	Practice Bhramary Pranayam.
11	Perform sitting in Dhyan Mudra and meditating. Start with five minute and
11	slowly increasing to higher durations.

Ref	Reference Books	
1	Swami Vivekananda -Patanjalis Yoga Sutras	
	Fingerprint Publishing (2023) Prakash Books India Pvt Ltd, New Delhi ISBN-13?: ? 978-	
	9354407017	
2	Swami Saradananda - Mudras for Modern Living: 49 inspiring cards to boost your health,	
	enhance your yoga and deepen your	
	Watkins Publishing (2019) ISBN-13?: ? 978-1786782786	
3	Luisa Ray, Angus Sutherland Yoga for Every Body: A beginner's guide to the practice of	
	yoga postures, breathing exercises and me	
	Vital Life Books (2022) ISBN-13?: ? 978-1739737009	
4	Ann Swanson Science of Yoga: Understand the Anatomy and Physiology to Perfect Your	
	Practice	
	ISBN-13?: ? 978-1465479358	
5	B.K.S. Iyengar, Light On Yoga.	

Cou	Course Outcomes (CO): Students will be able to		
1.	Understand the community in which they work and relation to Community.		
2.	Identify the needs & problems of the Community and involve them in problem solving process.		
3.	Develop capacity to meet emergencies and natural disasters		
4.	Acquire leadership qualities and democratic attitude.		
5.	Practice national integration and social harmony.		
6.	Utilize their knowledge in finding practical solutions to individual and community problems.		

Course Contents		СО	Hrs
National Service Scheme:		CO1	30
The NSS activities and allotted hours are mentioned below:		CO2	
1. Blood donation Camp	4Hrs.	CO3	
2. Tree Plantation	4Hrs.	CO4	
3. Internal Cleanliness Drive	4Hrs.	CO5	
4. External Cleanliness Drive	4Hrs	CO6	
5. Arranging Lectures on Social Issues in schools or villages	4Hrs.		
6. NSS Foundation Day Celebration	2Hrs.		
7. Gandhi jayanti & Communal Harmony Day	4Hrs.		
8. Arranging Rally on Social issues	4Hrs		
(Anti-Tobacco, Vysan Mukti etc.).			
9. Celebration of National Days (As per NSS list)	8Hrs.		
10. Arrangement of free medical checkup camp in villages	4Hrs.		
11. Arrangement of National Integration Day.	2Hrs.		
12. Arrangement of veterinary awareness camp	4 Hrs.		
13. Participation in disaster management training	8 Hrs.		
14. Arrangement of water conservations awareness camp	8Hrs.		
15. Arrangement of rain water harvesting awareness camp	8Hrs.		
16. Arrangement of National Youth week 2Hrs.			
17. Any other activity as decided by Hon. Principal/Program Of	ficer 8Hrs		
From time to time.			
Instructions:			
1. The Students will have to complete for a total period of 3			
(in one Semester) OR Participation in seven days residen	tial camp with		
completion certificate of NSS camp.			
2. NSS Volunteer has to complete 30 hours NSS activities mer	tioned in above		
curriculum. NSS volunteer has to prepare and submit NSS a	ctivity report of		

30 hours to NSS Coordinator.

3.	The In Sem Term work Evaluation will be conducted by NSS Coordinator	1
	based on the attendance, overall performance and the report.	

Refe	erence Books:
1	National Service Scheme Manual, Government of India.
2	Training Programme on National Programme scheme, TISS.
3	Orientation Courses for N.S.S. Programme officers, TISS.
4	Case material as Training Aid for field workers, Gurmeet Hans.
5	Social service opportunities in Hospitals, Kapil K. Krishan, TISS.
6	Social Problems in India, Ram Ahuja.
7	National Service Scheme Manual (Revised), 2006 Government of India, Ministry of Youth
	Affairs and Sports, New Delhi.
8	University of Mumbai National Service Scheme Manual, 2009
9	Avhan Chancellor"s Brigade-NSS Wing, Training Campon Disaster Preparedness
	Guidelines, March, 2012.
10	Rashtriya SevaYojana Sankalpana - Prof. Dr. Sankey Chakane, Dr. Pramod / Pabrekar,
	Diamond Publication, Pune.
11	National Service Scheme Manual for NSS District Coordinators, National Service Scheme
	Cell, Dept.of Higher and Technical Education, Mantralaya.
12	Annual Report of National Service Scheme (NSS) published by Dept.of Higher and
	Technical Education, Mantralaya.
13	NSS Cell, Dept. of Higher and Technical Education, Mantralaya, UTKARSHA-Socio and
	Cultural Guidelines.
14	Purushottam Sheth, Dr. Shailaja Mane, National Service Scheme
Usef	ful Links
1	https://www.youtube.com/watch?v=3o40NbNLoWQ
2	https://www.youtube.com/watch?v=paJK5X6zqI8&list=PLp4YWOW_llESHogw-
	coZo7PQdYliF-msj
3	https://www.youtube.com/watch?v=paJK5X6zqI8&list=PLp4YWOW_llESHogw-
	coZo7PQdYliF-msj&index=1

Year and Semester	First Year B. Tech (All Programme) Semester I								
Course Category		Engineering Science (ESC)							
Title of Course	Programming Languages-I Course Code								
Teaching Scheme	L T P Co		Contact Hrs/Week	Credits					
	01		02	03	02				
Examination	MSE	ISE/CA	ESE	Total					
Scheme		25	25	50					

Course	Basics	of Operating System, Basic Math Skills, Basic Problem-Solving Skills.				
Pre-Requisite						
	1	Mastering Fundamentals of C Programming				
Course	2	Understanding Program Flow				
Objective	3	Effective Problem-Solving Skills to develop programming logic in C				
	4	Debugging and Error Handling in C				
	After competition of this course Students will be able to					
	CO1	Understand basic Programming concepts.				
Course	CO2	Design C Programs using various Operators.				
Outcomes	CO3	Apply programming logic using Conditional and Looping statements in C.				
	CO4	Understand fundamentals of Arrays and Strings in C.				

	CO PO Mapping											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3										
CO2	2	3										
CO3	2	3										
CO4	2	3										
Level of Mapping as: Low 1, Moderate 2, High 3												

Marking Scheme

In Semester Evaluation/ Continuous Assessment has 25 Marks

Parameters for In Semester Evaluation could be: Attendance, Assignments, Unit Tests,

Presentation, Online Activities like (Virtual Labs, NPTEL) etc.

Lab File should be prepared and should be assessed continuously during academic.

End Semester Evaluation has 25 Marks

External Practical Examination with Performance and Oral Examination

Unit No.	Title and Content of Unit	Hours
	Overview and fundamentals of Programming	
	Basic Structure of C Program, Executing a C Program, Character Set, C Tokens,	
Unit 1	Keywords and Identifiers, Constants, Data Types, Variable Declaration and	
	Initialization.	
	Formatted Input and Output statements in C (getchar(), putchar(), scanf(), printf())	
	Operators and Expressions	
	Operators in C	
	Arithmetic Operators, Relational Operators, Logical Operators, Assignment	
Unit 2	Operator, Increment and Decrement Operator, Conditional Operator (? :),	5 Hrs
	BitwiseOperators, Special Operators	
	Type Conversion in Expression, Mathematical Functions.	
	Decision Making: Branching and Looping	
	Decision Making Statements:	
	Simple if, The if else Statement, Nesting of if else statements, The else if	
Unit 3	ladder,	5 Hrs
	The Switch Statement.	
	Loping Statements:	
	The While Statement, The Do Statement, The FOR Statement. Jumps in Loop	
	(breakand continue statement)	
	Arrays and Strings in C	
	Introduction to Array, One Dimensional Array – Declaration and Initialization,	
Unit 4	Two-Dimensional Array – Declaration and Initialization.	5 Hrs
	Introduction to String in C, Reading and Writing String (gets(), puts(),	
	<pre>scanf(),printf()), String Functions: strlen(), strcmp(), strcpy(), strcat(),</pre>	

	User Defined Functions	
	Introduction, Multifunction Program, Elements of User Defined Function	
Unit 5	(Function Declaration, Function Call, Function Definition), Categories of	4 Hrs
	Functions (Function with and Without Return value, Function with and Without	
	Arguments), Recursion, Passing array to Functions.	

Guidelines for Practical Performance

Faculty can create Experiment list based on following listed topics.

Minimum 12 to 15 Experiments should get performed along with flow chart and Execution.

Topic No.	Title of Experiment/ Problem Statement
1	Formulate areas of different Geometric shapes and design C program for same.
2	Illustration various Mathematical functions in C
3	Demonstration of Operators in C
4	Using Decision Making Statements in Programming Logic
5	Using Looping Statements in Programming Logic
6	Implementation of One-Dimensional Array.
7	Implementation of Two-Dimensional Array
8	Performing various String Operations in C
9	Implementation of function with all categories.
10	Demonstrate Recursive Function

Textbooks								
Sr. No.	Title	Author	Edition/Publication					
01	Programming with ANSI C	E Balguruswamy	Mc Graw Hill					
02	Let Us C	Yashwant Kanitkar	BPB Publication					

Reference Books								
Sr. No.	Title	Author	Edition/Publication					
01	The C Programming Language	Kernighan and Richie	(PHI)/Pearson					
			Education					
02	Complete 'C' Reference		Herbert Schildt					

Engineering Chemistry

Lectures	:	3 Hrs/Week	Evaluation Scheme				
Credit	:	3	MSE	: 30 Marks			
			ISE/CA	:	10 Marks		
			ESE	:	60 Marks		

Course Objectives: The objective of the course is to

1. To provide the useful fundamental concepts of Chemistry to Engineering discipline.

2. To impart knowledge on the principle of chemistry involving the different application oriented topics required for relevant to engineering.

Course Outcomes:				
COs	At the end of successful completion of the course, the student will be	Blooms		
	able to	Taxonomy		
CO1	Select the properties of metallic and advanced material.	Understand		
CO2	Explain the basic principles of instrumental methods for chemical Analysis	Understand		
CO3	Select water treatment process to solve engineering problem.	Apply		
CO4	Make use of relevant fuel in engineering application.	Apply		
CO5	Make use of corrosion preventive method	Apply		
CO6	Use various types of polymers in engineering field.	Apply		

Unit No.	Content	Hours
Unit 1	Chemistry of Metallic And Composite Materials	
	A) Metallic materials: Introduction, Alloy- definition and classification, purposes of	
	making alloys. Ferrous alloys: Plain carbon steels (mild, medium and high), stainless	
	steels. Nonferrous alloys: Copper alloy (Brass), Nickel alloy (Nichrome), Aluminum alloy	07 11
	(Duralumin and Alnico).	07 Hrs
	B) Composite materials: Introduction, Composition, properties and uses of fiber	
	reinforced plastics (FRP) and glass reinforced plastic (GRP).	
	Instrumental methods of chemical analysis	
Unit 2	Introduction, advantages and disadvantages of instrumental methods	
	A)Spectrometry: Introduction, Laws of spectrometry (Lamberts and Beer-Lambert's	
	law), Single beam spectrophotometer (schematic, working and applications).	07 Hrs
	B) Chromatography: Introduction, types, gas-liquid chromatography (GLC), basic	
	principle, instrumentation and applications	

Unit 3	Water	
	Introduction, impurities in natural water, water quality parameters total solids, acidity,	
	alkalinity, chlorides, and dissolved oxygen (definition, causes, significance), hardness of	
	water types of hardness, units of hardness, ill effects of hard water in steam generation in	07 Hrs
	boilers (scale & sludge formation), numerical on hardness, treatment of hard water (ion	
	exchange and reverse osmosis).	
Unit 4	Fuels	
	Introduction, classification, calorific value, definition, units (calorie, kcal, joules,	
	kilojoules), characteristics of good fuels, comparison between solid, liquid and gaseous	
	fuels, types of calorific value (higher and lower), Bomb calorimeter and Boy's	07 Hrs
	calorimeter. Numerical problems on Bomb and Boy's calorimeter.	
Unit 5	Corrosion	
	Introduction, causes, classification, atmospheric corrosion (oxidation corrosion),	
	electrochemical corrosion (hydrogen evolution and oxygen absorption mechanism),	
	factors affecting rate of corrosion. Prevention of corrosion by proper design and material	07 Hrs
	selection, cathodic protection, Protective coatings-hot dipping (galvanizing and tinning,),	
	electroplating.	
Unit 6	Chemistry of Polymers	
	Polymers and Polymerization. Types of polymerization (addition and condensation).	
	Plastics, types (thermo softening and thermosetting plastics), properties and applications	07 Hrs
	of polythene, polystyrene, Bakelite, urea formaldehyde plastics, epoxy resin.	

Reference Books		
1	Engineering Chemistry by Jain and Jain, Dhanpat Rai Publishing Company Ltd., New Delhi.	
2	A Textbook of Engineering Chemistry by S. S. Dara and S. S. Umare, S. Chand & Company Ltd., New Delhi.	
3	A Textbook of Engineering Chemistry by C. P. Murthy, C. V. Agarwal and A. Naidu, BS Publications, Hyderabad.	
4	Chatwal and Anand, Instrumental Methods of Chemical Analysis, Himalaya Publishing House, New Delhi.	
5	Engineering Chemistry by Dr. A. K. Pahari and Dr. B. S. Chauhan, Laxmi Publications (P) Ltd, New Delhi.	
6	A text Book of Engineering Chemistry by Shashi Chawla, Dhanpat Rai & Co. (Pvt.) Ltd, Delhi.	
7	Engineering Chemistry by Wiley India.	
8	Engineering Chemistry by Renu Bapna and Renu Gupta, MacMillan Publishers (India) Ltd, Delhi.	
Engineering Chemistry Lab

Practical	:	2 Hrs/Week
Credit	:	1

Sr. No	TITLE OF EXPERIMENT
01	Determination of acidity of water.
02	Determination of alkalinity of water.
03	Determination of chloride content of water by Mohr's method.
04	Determination of total hardness of water by EDTA method.
05	Determination of moisture, volatile and ash content in a given coal sample by proximate analysis.
06	Preparation of urea-formaldehyde resin.
07	Preparation of phenol-formaldehyde resin.
08	Determination of percentage of copper in brass.
09	Estimation of zinc in brass solution.
10	Determination of rate of corrosion of aluminium in acidic and basic medium.
11	Demonstration of pH meter.
12	Demonstration of photo-colorimeter / spectrophotometer.
13	Demonstration of paper chromatography.

Note: - Out of the above, minimum of 8 experiments are to be performed

Basic Mechanical Engineering

Lectures	: 2 Hrs/Week	Evaluation Scheme		
		MSE : 30 Marks		
Credit	: 2	ISE/CA : 10 Marks		
		ESE : 60 Marks		

Course Objectives: The objective of the course is to

Make students familiar with the basic concepts of Mechanical system and engineering and enable them to carry out elementary analysis of mechanical systems.

Course Outcomes:		
COs	At the end of successful completion of the course, the student will be	Blooms
	able to	Taxonomy
CO1	Understand the basic concepts of thermodynamics and I.C. Engine.	Understand
CO2	Understand principle of energy conversion system and power plants	Understand
CO3	Understand and identify power transmission devices with their functions	Understand
CO4	Identify and elaborate different mechanisms and mobility systems	Understand
CO5	Identify and elaborate different manufacturing process	Understand
CO6	Describe the scope of mechanical engineering in multidisciplinary industries	Understand

Unit No.	Content	Hours
	Introduction to Thermodynamics and I. C. Engine	
Unit 1	A: Introduction to Thermodynamics, Laws of thermodynamics,	05 Hrs
	B: Introduction to IC Engines, Construction and Working of C.I. and S.I. Engines.	05 1115
	Energy Sources and power plants	
Unit 2	A: Introduction and applications of Energy sources like Fossil fuels, Nuclear fuels, Hydro,	
	Solar, Wind, and Bio-fuels	05 Hrs
	B: Environmental issues like Global warming and Ozone depletion	
	Mechanical Power Transmission and Energy conversion devices	
Unit 3	A: Type of Belt and belt drives, chain drive, Types of gears and gear Trains	05 Hrs
	B:Introduction to Pumps, Compressors and Turbines	00 1115
	Introduction to Mechanism and Mobility System	
Unit 4	A: Introduction to Links, kinematic pair, Kinematic chain, Mechanism, inversion.	
	B: Introduction to Automobile, Introduction to Electric and hybrid vehicles	05 Hrs
Unit 5	Manufacturing Processes	
Unit 5	A:Introduction to manufacturing processes - Casting Process, Metal removing processes,	05 Hrs

	Metal Joining Processes – Arc welding, soldering and brazing and their applications	
	B: Introduction to Advanced Manufacturing Systems, Introduction and components of	
	CNC, advantages and applications of CNC, 3D printing.	
	Introduction to Mechatronics and Robotics	
	A: Introduction to Mechatronics, Mechatronics systems, Sensor and its types and its	
Unit 6	applications	05 Ung
	B: Introduction to Robotics, Joints & links, Robot anatomy, Applications of Robots in	05 118
	material handling, processing and assembly and inspection.	

Ref	erence Books
1	Solar Energy by Dr. S. P. Sukathame, Tata Mc-Graw Hill Publication
2	Non-Conventional Sources of Energy by G.D. Rai, Khanna Publication
3	Engineering Thermodynamics by R. Joel, The English Language Book Society
4	Automobile Engineering by Dr. Kripal Singh, standard publish distributors
5	Thermal Engineering by R. K. Rajput, Laxmi Publication, Delhi
6	Elements of Heat Engine Vol. I, II, III by Patel and Karamchandani, Acharya Book Depot
7	Power Plant Engineering by Arora and Domkunwar, Dhanpat Rai and Sons
8	Manufacturing Technology Volume I and II by P. N. Rao, Tata Mc-Graw Hill Publication
9	Elements of Workshop Technology, Vol.I and II by Hajara Choudhari, Media Promoters
10	Basic Mechanical Engineering by Basant Agrawal & C. M. Agrwal, Wiley India Pvt. Ltd.
11	Energy Technology by S. Rao and Dr. B. B. Parulekar, Khanna Publication.
12	Mechatronics – W. Bolton, Pearson education
13	"Robotics for Engineers", Koren, Yoram, Tata McGraw Hill.,(2003)
14	"Theory of Machines", Ratan S.S, Tata McGraw Hill New Delhi, 2nd Edition.

Engineering Mechanics

Lectures	: 3 Hrs/Week	Evaluation Scheme		
Tutorial	:	MSE : 30 Marks		
Credit	: 3	ISE/CA : 10 Marks		
		ESE : 60 Marks		

Desired Requisites: Physics, Mathematics			
Cours	se Outcomes (CO) with Bloom's Taxonomy Level		
At the	e end of the course, the students will be able to,		
со	Course Outcome Statement/s	Bloom's Taxonomy Level	Bloom's Taxonomy Description
CO1	Identify and explain different types of force systems and laws of forces.	II	Understand
CO2	Analyze and draw the Free body diagram of objects and determine the support reactions of determinate beams using conditions of Equilibrium.	III, IV	Apply and Analyse
CO3	Analyze the motion of particle or object to solve the problems of rectilinear and projectile motions in kinematics	III	Apply and Analyse
CO4	Apply the concepts of Newton's laws of motion, D'Alembert's principles to solve problems related in dynamics	III	Analyse
CO5	Explain the concepts of stress-strain and engineering properties of materials.	II	Understand

Unit No.	Content	Hours	
	Forces	1	
Unit 1	Fundamentals, Systems, Types of force systems, Composition and Resolution,		
	Resultant of planar force systems. Free Body Diagram, Lami's Theorem, Laws		
	of Forces, Moment of force, Varignon's Theorem		
	Equilibrium	•	
	Equilibrium conditions, Definition of equilibrium, Support reaction, Types of	07 Hrs	
Unit 2	loads, Types of supports, Types of beams, Concept of determinacy and	07 HIS	
	indeterminacy, Principle of Virtual Work, Determination of reaction of		
	determinate beams using VW principle		
Unit 3	Centroid and Moment of Inertia		
	Centre of gravity and Centroid, Moment of Inertia of Plane figure, Composite	04 Hrs	

	Sections, Radius of gyration, Mass-Moment of Inertia	
	Kinematics of Particles	
Unit 4	Rectilinear motion of particle, Equations of motion, Motion under gravity, Relative Motion, Projectile Motion,	06 Hrs
	Kinetics of Particles	
Unit 5	Friction: Laws of friction, Wedge friction, Newton's laws of motion, D'Alembert's principle, Applications to rough inclined plane, lift, and connected bodies, Work Energy principle, Impulse Momentum principle, Collisions: Impact, Collision of bodies, Coefficient of Restitution, Loss of Kinetic Energy due to Impact	08 Hrs
	Introduction to stress and strains	
Unit 6	Engineering properties of materials, Homogenous and isotropic materials, Stress and its types, Strain and its types, Stress strain curve, Hooke's law, Elastic Constants,	05 Hrs

Textbooks	
	Ramamrutham., S. "Textbook of Applied Mechanics", Dhanpat Rai Publishing
1	Company Limited, 2008.
2	Bhavikatti., S. S. and Rajashekarappa., K. G. "Engineering Mechanics", New Age
	International Publishers, 2015, 5 th Edition.
3	Beer, F. P. and Johnston, E. R. "Vector Mechanics for Engineers Vol. I and II",
5	McGraw Hill Company Publication, 2011, 9 th Edition.
Refere	ence Books
1	Singer, F. L. "Engineering Mechanics Statics & Dynamics", B. S. Publications, 2011.
2	Timoshenko, S. and Young, D. H. "Engineering Mechanics", McGraw Hill
	Companies, 2008, 4 th Edition.
2	Meriam, L. and L.G. Kraige, "Engineering Mechanics - Dynamics", John Wiley &
5	Sons, 2002, 6 th Edition.
4	F. P. Beer and E. R. Johnston, Mechanics of materials, McGraw-Hill International
Useful	Links
1	https://nptel.ac.in/courses/112106286
2	https://www.youtube.com/watch?v=9Yt3I4bP-90

Engineering Mechanics Lab

Practical	: 2 Hrs/Week	Evaluation Scheme
		ISE/CA : 25 Marks
Credit	: 1	ESE : 25 Marks

Desir	Desired Requisites: Engineering Mechanics							
Cours	Course Outcomes (CO) with Bloom's Taxonomy Level							
At the	e end of the course, the students will be able to,							
	Bloom's Bloom's							
CO	Course Outcome Statement/s	Taxonomy	Taxonomy					
		Level	Description					
CO1	Demonstrate the verification of different laws of forces and moments.	III	Applying					
CO2	Apply graphical method to analyse determinate beams and trusses.	III	Applying					
CO3	Determine the values of coefficients of friction and restitution.	III	Applying					
List of Experiments / Lab Activities/Topics								
List o 1. Vei	List of Experiments : 1. Verification of Triangle law of forces (Lami's theorem) using Jib Crane							

- 2. Verification of Law of polygon of forces
- 3. Determination support reactions in Simply Supported Beam
- 4. Verification of Principle of moments using Bell crank lever apparatus
- 5. Determination of Coefficient of static friction for motion on horizontal
- 6. Determination of Coefficient of kinetic friction for motion on horizontal and inclined plane
- 7. Determination of Support reaction of statically determinate beams by graphical method
- 8. Determination of coefficient of restitution.
- 9. Determination of Mass moment of Inertia (Fly wheel)
- 10. Determination of centroid of various shapes of plates.

Textbooks 1 Lab Manual Link - https://atifmohd077.files.wordpress.com/2019/03/em-lab-manual 1.pdf Lab Manual Links - https://jecassam.ac.in/wp-content/uploads/2018/10/1_Engineering 2 Mechanics-Laboratory-2nd-SEM-DU-Old-Course.pdf

2	Bhavikatti., S. S. and Rajashekarappa., K. G. "Engineering Mechanics", New Age							
5	International Publishers, 2015, 5 th Edition.							
Refe	rences							
1	Ramamrutham., S. "Textbook of Applied Mechanics", Dhanpat Rai Publishing Company							
	Limited, 2008.							
2	Beer, F. P. and Johnston, E. R. "Vector Mechanics for Engineers Vol. I and II", McGraw							
	Hill Company Publication, 2011, 9 th Edition.							
3	R. K. Bansal "Engineering Mechanics" Laxmi Publications, ltd.							
Usef	ul Links							
1	https://nptel.ac.in/courses/112106286							
2	https://www.youtube.com/watch?v=9Yt3I4bP-90							
3	https://www.vlab.co.in/broad-area-civil-engineering							
4	Virtual Lab link by IIT Mumbai - http://vlabs.iitb.ac.in/vlab/labsme.html							

Basic Electronics Engineering

Lectures	: 2 Hrs/Week	Evaluation Scheme				
		MSE : 30 Marks				
Credit	: 2	ISE/CA : 10 Marks				
		ESE : 60 Marks				

Prerequisite Course: Physics, Mathematics, Basic Science and Fundamentals of Electronics								
	Course Outcomes:							
CO	After the completion of the course the student should be able to	Bloom's Cognitive						
CO-1	Understand passive semiconductor devices applications	Understand						
CO-2	Understand active semiconductor devices applications	Understand						
CO-3	Analyze different biasing circuits and low frequency response of an amplifier	Analyze						
CO-4	Gain knowledge about fundamentals of Operational amplifiers and various applications.	Remember						
CO-5	Apply fundamental techniques of digital design	Apply						

Unit No.	Content	Hours					
	Semiconductor Diode						
Unit 1	Intrinsic & extrinsic semiconductors, Construction of PN Junction diode, working						
	and V-I characteristics of diode.						
	Special purpose diodes- characteristics, construction and advantages,	05 Hrs					
	disadvantages and applications of Zener diode LED						
	Rectifiers & Filters						
	Need of rectifiers, definition, types of rectifiers- half wave rectifiers, full wave						
	rectifiers (bridge and center tapped), circuit operation, input and output waveforms						
Unit 2	for voltage & current, comparison of three rectifiers.						
	Need of filters and definition, types of filters-shunt capacitor, series inductor, \prod						
	filter, circuit operation, input and output waveforms, limitations and advantages.						
	Transistor						
	Bipolar junction transistor- symbol, types and working principle of NPN and PNP						
Unit 3	transistors, Transistor configuration-CB,CE & CC, Input & output characteristic,						
	biasing of transistor of transistors- fixed bias, voltage divider bias, emitter bias, DC						
	load line and thermal runaway.						

	Amplifiers					
	Concept of amplification, small signal amplifier using BJT, single stage CE					
Unit 4	amplifier, working and frequency response, multistage amplifier- need and types of					
	amplifier coupling- RC coupling, transformer coupling, direct coupling, merits and	05 Hrs				
	demerits of each and applications.					
	Operational Amplifier (IC-741)					
	Introduction to op-amp, block diagram of op-amp, ideal and practical specifications					
Unit 5	of op-amp, Applications of op-amp as inverting amplifier, non- inverting amplifier,	04 Hrs				
	integrator, differentiator and comparator.					
	Digital Electronics					
	Logic gates and Boolean algebra, combinational logic circuits- adder, subtractor and					
Unit 6	its types, Multiplexer and de-multiplexer, Number system and its types- binary,	04 Hrs				
	octal, decimal, hexadecimal, conversions in number system.					

Tex	t Books
1	A Text Book of Applied Electronics by R. S. Sedha
2	Basic Electronics Engineering by Vijay Baru
3	Digital Principles & Applications by Albert Malvino
4	Principle of Electronics by V.K. Mehata
Re	ference Books
1	Fundamental of Digital Circuits by A. Anand Kumar (PHI-Publication).
2	Fundamental of Electronics Engineering by R. Prasad (CENGAGE- Learning).
3	Electronics Circuits And Systems by Owen Bishop.
4	Integrated Electronics Analog And Digital & System by Jacob Millman. Christos C. Halkias.
5	Electronics Devices and Circuit theory by Robert Boylestad, Louis Mashlsky (Peerson-Publication).

Engineering Mathematics-II

Lectures	: 3 Hrs/Week	Evaluation Scheme				
Tutorial	: 1	MSE : 30 Marks				
Credit	: 4	ISE/CA : 10 Marks				
		ESE : 60 Marks				

Course	Basics	of differential equations, Integration and its properties.
Pre-Requisite		
	1	To develop mathematical skills and enhance thinking power of students.
		To give knowledge to the students of differential equation, integral calculus,
Course	2	numerical methods with an emphasis on the application of solving
Objective		engineering problem.
	3	To prepare students to formulate a mathematical model using engineering
		skills & interpret the solution in real world.
	After	competition of this course Students will be able to
	CO1	Solve ordinary differential equations of first order and first degree.
		Apply Ordinary differential equation of first order and first degree to solve
	CO2	simple electric circuit problems, Newton's law of cooling and find
		orthogonal trajectories of given curves.
Course	CO3	Solve ordinary differential equations of first order and first degree
Outcomes		numerically.
	CO4	Find Numerical Solutions of Algebraic and Transcendental Equations.
	CO5	Evaluate definite integrals by using special functions.
	CO6	Evaluate double integral and use it to find area enclosed by plane curves,
		mass of plane lamina.

	CO PO Mapping											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2										
CO2	3	2										
CO3	3	2										
CO4	3	2										
CO5	3	2										
CO6	3	2										
	Level of Mapping as: Low 1, Moderate 2, High 3											

Marking Scheme

In Semester Evaluation/ Continuous Assessment (ISE/CA)has 10 Marks Parameters for ISE/CA

could be: Attendance, Assignments etc.

Mid Semester Examination (MSE) has 30 Marks

MSE will be based on 50% syllabus from beginning (First Three Units)

End Semester Examination (ESE) has 60 Marks

ESE will be 25% on syllabus covered for MSE (First Three Units) and 75% on remaining syllabus (Last Three Units)

Unit No.	Content	Hours				
	Ordinary Differential Equations of First Order and First Degree					
Unit 1	Linear differential equations, Reducible to Linear differential equations, Exact	07 Hrs				
	differential equations, Reducible to Exact differential equations.	07 1115				
	Applications of Ordinary Differential Equations of First Order and First					
Unit 2	Degree					
Cint 2	Applications to Orthogonal trajectories (Cartesian and Polar equations), Applications					
	to Simple Electrical Circuits, Newton's law of cooling.					
	Numerical Solution of Ordinary Differential Equations of First Order and First Degree					
Unit 3	Taylor's series method, Euler's method, Modified Euler's method, Runge-Kutta					
	fourth order formula.					
Unit 4	Numerical Solutions of Algebraic and Transcendental Equations					
	Bisection Method, Secant Method, Newton Raphson Method.	07 Hrs				
	Special Functions					
Unit 5	Gamma function and its properties, Beta function and its properties, Error function					
	and its properties.	07 1115				
	Multiple Integration and its applications					
Unit 6	Double Integrals and evaluation, Change of order of integration,					
	Change into Polar Coordinates, Area enclosed by plane curves, Mass of a plane lamina.					

Guidelines for Tutorials

- 1. Batchwise tutorials are to be conducted. The number of students per batch should be as per the university pattern for practical batches.
- 2. Minimum number of assignments should be six covering all topics.

Textbooks					
Sr. No.	Title	Author	Edition/Publication		
01	A Text Book of Applied Mathematics	P. N. Wartikar	Pune Vidyarthi Griha		
	Volume I and Volume II	J. N. Wartikar	Prakashan, Pune		
02	Higher Engineering Mathematics	Dr. B. S. Grewal	Khanna Publishers,		
			Delhi		

Refere	Reference Books				
Sr. No.	Title	Author	Edition/Publication		
01	Advanced Engineering Mathematics	H. K. Dass	S.Chand ,New Delhi		
02	Advanced Engineering Mathematics	Erwin Kreyszig	Wiley India Pvt.		
03	A Text Book of Engineering	Peter V. O'Neil and	Cengage Learning		
	Mathematics Volume I	Santosh K. Sengar			
04	A Text Book of Engineering	N. P. Bali, Iyengar	Laxmi Publication (P)		
	Mathematics		Ltd. New Delhi		
05	Numerical Methods	Dr. B. S. Grewal	Khanna Publishers,		
			Delhi		
06	Mathematical methods of Science and	Kanti B. Datta	Cengage Learning		
	Engineering				

Professional Communication –II

Lectures	:	Evaluation Scheme		
Practical	: 2 Hrs/Week	MSE :		
Credit	: 1	ISE/CA : 25 Marks		
		ESE : 50 Marks		

Course Objectives: The objective of the course is to					
1) In	1) Inculcate Technical writing skill to enhance professional efficiency.				
2) T	o familiarize the various behavioral skills for personality development.				
3) U	tilize digital tools effectively for professional communication.				
4) E	quip learner with Professional skills by giving training through various tasks.				
Course	Outcomes:				
COs	At the end of successful completion of the course, the student will be	Blooms			
	able to	Taxonomy			
CO1	able to Construct Technical paragraph writing.	Taxonomy Apply			
CO1 CO2	able to Construct Technical paragraph writing. Understand the role of behavioral skills in career building.	TaxonomyApplyUnderstand			
CO1 CO2 CO3	able toConstruct Technical paragraph writing.Understand the role of behavioral skills in career building.Deliver presentation effectively.	TaxonomyApplyUnderstandApply			

Description:

This course explores the fundamentals of professional communication, emphasizing clear, concise written and oral skills, effective listening, and digital literacy. Designed for emerging professionals, it covers important behavioral skills, interpersonal communication skills, presentation skills, Leadership skills, E-mail etiquette, and cross-cultural communication strategies for a diverse workplace.

Unit No.	Content	Hours
	Developing Writing Skills	
	Importance of Technical writing	
	Report Writing:	
Unit 1	a. Techniques of Report Writing	
	b. Methods of data collection	
	c. Types of Report Writing- Survey, Inspection and Investigation	
	• Techniques of Note taking and summarizing.	

	Behavioral Skills		
	• Understanding self(SWOT analysis)		
	• Attitude building / developing positive attitude.		
Unit 2	• Decision making skills.		
	• Leadership Skills.		
	• Stress Management.		
	• Time Management.		
	• Team work.		
	Presentation Skills		
Unit 3	Importance and Techniques.		
	Presenting yourself professionally		
	Career Skills		
	Corporate Manners and Etiquettes		
Unit 1	Planning and Managing career.		
Omt 4	• Job application and Resume building.		
	• Interview: Techniques and Skills		
	Group Discussion		
	Professional Correspondence		
Unit 5	• Letter Writing- Application letter, Seeking leave, Permission letter etc.		
	• Preparation of technical events, information broacher and manuals.		

Sr. No	TITLE OF EXPERIMENT
01	Technical paragraph writing.
02	Group Discussion- Do's and Don'ts
03	Watch Ted Talk and summarize it.
04	Interview Techniques and skills(Lab Session)
05	Report writing.
06	Case study- Practice of Case study
07	Resume writing Techniques -Do's and Don'ts
08	Computer aided presentation of Project report.
09	Smart use of modern communication techniques/tools.
10	Developing professional telephonic skills- Do's & Don'ts.
11	Computer assisted language learning e.g. Effective E – mail writing
12	SWOT analysis

Note: Minimum Eight should be performed from the above list.

Ref	erence Books
1	Menasha Raman, Sangeeta Sharma Technical Communication, Principles and Practice Oxford
	University Press -ISBN 978-13-16640-08-1
2	K. K. Sinha Business Communication Galgotiya Publishing company, New Delhi -ISBN
	9789356227064
3	Technical Communication -Fourth Edition -Meenakshi Raman and Sangeeta Sharma -OUP
	Publication 2013
4	Communication Skills for Professionals -First Edition –Nira Konar -PHI Learning Publication
	2011

Skill Enhancement Course-II

Teaching Scheme	Examination Scheme					
Credits- 01	MSE	ISE/CA	ESE	PR – ISE/CA	PR-ESE	Total
Lectures (L): 00 hrs /Week Practical: 2 hrs/week	**	**	**	25	25	50

Course Objectives	Course Objectives: The objective of the course is			
Mechanical	1. To impart training to help the students develop mechanical engineering skills.			
Engineering	2. To carry out the various operations to make a finished product in welding, carpentry,			
Group	sheet metal works.			
Civil	1. To develop practical skills in handling civil engineering equipment and			
Engineering	instruments.			
Group	2. To promote teamwork, problem-solving, and analytical skills while			
	conducting experiments and interpreting results.			
Electrical	1. To introduce students to fundamental of electrical engineering experiments			
Engineering	and procedures.			
Group	2. To develop practical skills in handling electrical engineering equipment and			
	instruments.			
Computer Science	1. To introduce fundamentals of logic circuits.			
and Engineering	2. To introduce basics of memory and programming languages.			
Group				
Electronics and	1. To select of soldering technique, fault finding and use of simulation			
Telecommunicati	software.			
on Engineering	2. To create a printed circuit board and make use of simulation tools.			
Group				

Course Outcomes

СО	After the completion of the course the student should be able to	Bloom's Cognitive		
Mechan	Mechanical Engineering Group			
CO-1	Understand report of procedures followed for a given task in welding, carpentry, and sheet metal work.	Understanding		
CO-2	Learn the techniques, skills, and modern engineering tools necessary for welding, carpentry and sheet metal work	Applying		
Civil Engineering Group				

CO-1	Demonstrate identification and reading ability of elements in building drawing.	Understanding		
CO-2	Use surveying equipment to measure distance and levels.	Applying		
Electric	al Engineering Group			
CO-1	Demonstrate the knowledge of theorems/laws to analyze the simple electrical circuits.	Understanding		
CO-2	Apply the knowledge of RL and RLC circuits for the measurement of active and reactive power.	Applying		
Computer Science and Engineering Group				
CO-1	Understand Basics of Computer Engineering.	Understanding		
CO-2	Apply skills to analyse memory hierarchy and compilers.	Applying		
Electronics and Telecommunication Engineering Group				
CO-1	Use proper soldering technique, fault finding in circuit board components connection.	Understanding		
CO-2	Apply skills to simulate a simple electronics circuit and design a printed circuit board.	Applying		

List of experiments: Common to all Programmes

Sr. No.	Details				
Mechanio	Mechanical Engineering Group (Any TWO)				
1	Welding:				
1	One job on Arc welding- Stool, Small Table, Bench etc				
2	Carpentry:				
	One composite job involving Birdhouses, Pooja Chowk, Table Stand etc				
3	Sheet metal Work:				
5	One job on commercial items such as Dust bin, funnel, tray etc.				
	House wiring				
Λ	One job on				
4	One lamp controlled by one switch, Parallel and Series connections, Fluorescent lamp				
	fitting, etc				
Civil Engineering Group (Any TWO)					
1	Site visit to study various construction processes, building components, building				
1	materials and principles of planning				
2	Study and identify basic elements in				

	(i) Site plan,						
	(ii) Plan, elevation and section of a residential building						
3	Study water supply and sanitation plan of a residential building						
4	Drawing sheet showing 1. various sign conventions 2. various building elements						
Electrica	l Engineering Group (Any TWO)						
1	Verification of Kirchhoff's Voltage Law and Kirchhoff's Current Law.						
2	Measurement of various characteristic values of a sinusoidal waveform with the help of						
2	CRO.						
2	Measurement of voltage, current and power in RL and RLC circuits and verification of						
5	phase angle and power factor concept.						
4	Determine the efficiency of single phase transformer by direct loading test.						
Compute	er Science and Engineering Group (Any TWO)						
	Computer Memory:						
1	Memory Cell, Memory Organization, Read Only Memory, Magnetic Hard Disk, Solid						
1	State Disks,						
	Memory Hierarchy.						
	Binary Arithmetic:						
2	Binary Addition, Binary Subtraction, Signed Numbers, Two's Complement						
	Representation of Numbers, Addition/Subtraction of Numbers in 2's Complement						
	Notation						
	Logic Circuits:						
3	Switching Circuits, OR, NOT Operation, Boolean Functions, Precedence of Operators,						
	Venn Diagram, Truth Table, Logic Circuits.						
	Programming Languages:						
4	Why Programming Language, Assembly Language, Higher Level Programming						
	Languages, Compiling A High-Level Language Program, Tools to Build Compilers.						
Electroni	cs and Telecommunication Engineering Group (Any TWO)						
1	Inter-connection methods on the breadboard for any electronic circuit. [Bread board,						
1	wrapping, crimping].						
2	Soldering practice on electronics circuit using general-purpose PCBs.						
3	Testing of electronics circuit using simulation tools (such as Multisim, Proteus, etc.)						
	Printed circuit boards (PCB) [Types, Single-sided, Double-sided, and Processing						
4	Methods]: testing and fabrication of a single-sided PCB for a simple electronics circuit						
	with manual etching [Ferric chloride and drilling].						

Reference/Text Books				
Mechani	ical Engineering Group			
1	Manufacturing Technology Volume I and II by P. N. Rao, Tata Mc-Graw Hill			
1	Publication			
	Elements of Workshop Technology, Vol. I and II by Hajara Choudhari, Media			
2	Promoters			
3	Workshop technology, VolI by H.S. Bawa, TMH Publications, New Delhi.			
4	Workshop Technology, Vol – I by Chapman, The English Language Book Society			
Civil En	gineering Group			
1	Hirasakar G. K., "Basic Civil Engineering", Dhanpat Rai publications, 1st			
1	Edition,2007			
2	Gole L.G., "Introduction to Civil Engineering", Mahu Publisher House, 4th Edition,			
	2005			
3	Bhavikatti S. S., "Basic Civil Engineering", New Age Publications, 2010			
4	Duggal S. K., "Surveying (Vol I)", Tata McGraw Hill, 4th edition 2013			
5	Bindra S. P., Arora S. P., "Building Construction", Dhanpat Rai publication, 5th			
5	edition, 2012			
Electrica	al Engineering Group			
1	B. L. Theraja – Electrical Technology vol.1. – S. Chand			
2	B. L. Theraja – Electrical Technology vol.2. – S. Chand			
3	Nagrath I. J. and D. P. Kothari – Basic Electrical Engineering (2001) – McGraw Hill.			
1	P. V. Prasad and S. Shivan Raju – Electrical Engineering Concepts and Applications –			
4	Cengage learning			
5	Bharati Dwivedi and Anurasg Tripathi – Fundamentals of Electrical Engineering –			
5	Willey Precise			
Comput	er Science and Engineering Group			
1	Electronics Devices and Circuit Theory by Robert L. Boylestad and Louis Nashelsky			
1	(Pearson Education Publication)			
2	Fundamental of Digital Circuits by A. Anand Kumar (PHI- Publication)			
3	Fundamental of Electronics Engineering by R. Prasad (CENGAGE- Learning)			
4	Digital Principles & Applications by Albert Malvino, Donald Leach, TMGH			
4	Publication.			
Electronics and Telecommunication Engineering Group				
1	Principle of Electronics by V.K. Mehata, S. Chand			
2	Electronic Instrumentation by H. S. Kalasi, Tata McGraw Hills Publication			

3	A Text Book of Applied Electronics by R S Sedha, S. Chand						
4	Basic Electronics Engineering by Vijay Baru, Rajendra Kaduskar, S T Gaikwad (Wiley/DREAMTECH)						
5	Digital Principles & Applications by Albert Malvino, Donald Leach, TMGH Publication.						

Indian Knowledge Systems (IKS)

Lectures	: 2 Hrs/Week	Evaluation Scheme		
		MSE :		
Credit	: 2	ISE/CA : 50 Marks		
		ESE :		

Course Objectives: The students will be able to

- 1. Understand concepts of Indian traditional knowledge and to make them understand the Importance of roots of knowledge system.
- 2. Understand the traditional knowledge and analyse it and apply it to their day-to-day life.

	Course Outcomes:	
СО	After the completion of the course the student should be able to	Bloom's Cognitive
CO-1	Understand the concept of the Indian Knowledge System and its importance.	Understand
CO-2	Understand the relevance of Traditional knowledge in different domains.	Understand

Unit No	Title and Content	Hours		
	Indian Knowledge System: An Introduction			
	Overview: What is IKS?, Why do we need IKS?, Organization of IKS, Historicity of			
	IKS, Some salient aspects of IKS			
Unit 1	The Vedic Corpus: Introduction to Vedas, A synopsis of the four Vedas, Sub-			
Unit 1	classification of Vedas, Messages in Vedas, Introduction to Vedāngas, Prologue on Śikṣā			
	and Vyākaraņa, Basics of Nirukta and Chandas, Introduction to Kalpa and Jyotişa, Vedic			
	Life: A Distinctive Features.			
	Traditional knowledge vs. western knowledge			
	Traditional Knowledge in Humanities and Ayurveda			
	[A] Linguistics: Introduction to Linguistics, Astādhyāyī, Phonetics, Word generation,	-		
	Computational aspects, Mnemonics, Recursive operations, Rule based operations,			
	Sentence formation, Verbs and prefixes, Role of Sanskrit in natural language processing			
Unit 2	[B] Āyurveda: Introduction to health, Āyurveda: approach to health, Sapta-dhātavaḥ:	5 Hrs		
	seven-tissues, Role of agni in health, Tri-doșas, Ayurveda: definition of health,			
	Psychological aspects of health, Disease management elements, Dinacaryā: daily regimen			
	for health & wellness, Importance of sleep, Food intake methods and drugs, Approach to			
	lead a healthy life.			
	Traditional Knowledge in Sciences			
Unit 3	[A] Number Systems and Units of Measurement: Number systems in India - Historical	1 Hrs		
Unit 3	evidence, Salient aspects of Indian Mathematics, Bhūta-Samkhyā system, Katapayādi			
	system, Measurements for time, distance, and weight, Pingala and the Binary system			

	[B] Astronomy: Introduction to Indian astronomy, Indian contributions in astronomy, The				
	celestial coordinate system, Elements of the Indian calendar, Notion of years and months,				
	Pañcānga - The Indian calendar system, Astronomical Instruments (Yantras), Jantar				
	Mantar of Rājā Jai Singh Sawai				
Unit 4	Traditional Knowledge in Indian Mathematics				
	Introduction to Indian Mathematics, Salient features of the Indian numeral system				
	Importance of decimal representation - The discovery of zero and its importance - Unique				
	approaches to represent numbers.	4 11			
	Unique aspects of Indian Mathematics, Indian Mathematicians and their Contributions in				
	the area of Algebra, Geometry, Trigonometry, Binary mathematics and combinatorial				
	problems in Chandah Śāstra, Magic squares in India				
	Traditional Knowledge in Engineering and Technology				
	[A] Metals and Metalworking: Wootz Steel: The rise and fall of a great Indian				
	technology, The Indian S & T heritage, Mining and ore extraction, Metals and				
	metalworking technology, Iron and steel in India, Lost wax casting of idols and artefacts,				
Unit 5	Apparatuses used for extraction of metallic components.				
	[B] Town Planning and Architecture: Perspective of Arthaśāstra on town planning,	5 Hrs			
	Vāstu-śāstra - The science of architecture, Eight limbs of Vāstu, Town planning, Temples				
	in India: marvelous stone architecture for eternity, Temple architecture in India,				
	Iconography.				
	Traditional Applications in Science and Technology				
	Irrigation systems and practices in South India, Literary sources for science and				
Unit 6	technology, Physical structures in India, Irrigation and water management, Dyes and	4 Hrs			
	painting technology, The art of making perfumes, Surgical techniques, Shipbuilding,				
	Sixty-four art forms (64 Kalās), Status of Indigenous S & T.				

Evaluation Pattern	In the form of Quizzes, Tests, Group Discussion, Presentations, Seminars, Assignments,
	Attendance

Booł	ks and References:
1	Mahadevan, B., Bhat Vinayak Rajat, Nagendra Pavana R.N. (2022), "Introduction to Indian Knowledge System: Concepts and Applications", PHI Learning Private Ltd. Delhi.
2	Pride of India: A Glimpse into India's Scientific Heritage, Samskrita Bharati, New Delhi.
3	Sampad and Vijay (2011). "The Wonder that is Sanskrit", Sri Aurobindo Society, Puducherry.
4	Bag, A.K. (1979). Mathematics in Ancient and Medieval India, Chaukhamba Orientalia, New Delhi.

_	Datta, B. and Singh, A.N. (1962). History of Hindu Mathematics: Parts I and II, Asia Publishing House,
5	Mumbai.
6	Kak, S.C. (1987). "On Astronomy in Ancient India", Indian Journal of History of Science, 22(3), pp. 205–221.
7	Subbarayappa, B. V. and Sarma, K. V. (1985). Indian Astronomy: A Source Book, Nehru Centre, Mumbai.
8	Bag, A.K. (1997). History of Technology in India, Vol. I, Indian National Science Academy, New Delhi.
9	Acarya, P.K. (1996). Indian Architecture, Munshiram Manoharlal Publishers, New Delhi.
10	Lad, V., & Frawley, D. (1986). The Yoga of Herbs: An Ayurvedic Guide to Herbal Medicine. Lotus Press.
11	Kapoor Kapil, Singh Avadhesh (2021). "Indian Knowledge Systems Vol - I & II", Indian Institute of
11	Advanced Study, Shimla, H. P.
10	Traditional Knowledge System in India, Amit Jha, 2009, Atlantic Publishers and Distributors (P) Ltd., ISBN-
12	13: 978-8126912230.
10	Knowledge Traditions and Practices of India, Kapil Kapoor, Avadesh Kumar Singh, Vol. 1, 2005, DK Print
13	World (P) Ltd., ISBN 81-246-0334,
14	Frawley, D., & Ranade, S. (2001). Ayurveda, Nature's Medicine. Lotus Press.
	Web Links
1	Web Links https://www.youtube.com/watch?v=LZP1StpYEPM
1 2	Web Links https://www.youtube.com/watch?v=LZP1StpYEPM http://nptel.ac.in/courses/121106003/
1 2	Web Links https://www.youtube.com/watch?v=LZP1StpYEPM http://nptel.ac.in/courses/121106003/ http://www.iitkgp.ac.in/department/KS;jsessionid=C5042785F727F6EB46CBF432D7683B63 (Centre of
1 2 3	Web Links https://www.youtube.com/watch?v=LZP1StpYEPM http://nptel.ac.in/courses/121106003/ http://www.iitkgp.ac.in/department/KS;jsessionid=C5042785F727F6EB46CBF432D7683B63 (Centre of Excellence for Indian Knowledge System, IIT Kharagpur)
1 2 3 4	Web Links https://www.youtube.com/watch?v=LZP1StpYEPM http://nptel.ac.in/courses/121106003/ http://www.iitkgp.ac.in/department/KS;jsessionid=C5042785F727F6EB46CBF432D7683B63 (Centre of Excellence for Indian Knowledge System, IIT Kharagpur) https://www.wipo.int/pressroom/en/briefs/tk_ip.html
1 2 3 4 5	Web Links https://www.youtube.com/watch?v=LZP1StpYEPM http://nptel.ac.in/courses/121106003/ http://www.iitkgp.ac.in/department/KS;jsessionid=C5042785F727F6EB46CBF432D7683B63 (Centre of Excellence for Indian Knowledge System, IIT Kharagpur) https://www.wipo.int/pressroom/en/briefs/tk_ip.html https://unctad.org/system/files/official-document/ditcted10_en.pdf
1 2 3 4 5 6	Web Links https://www.youtube.com/watch?v=LZP1StpYEPM http://nptel.ac.in/courses/121106003/ http://www.iitkgp.ac.in/department/KS;jsessionid=C5042785F727F6EB46CBF432D7683B63 (Centre of Excellence for Indian Knowledge System, IIT Kharagpur) https://www.wipo.int/pressroom/en/briefs/tk_ip.html https://unctad.org/system/files/official-document/ditcted10_en.pdf http://nbaindia.org/uploaded/docs/traditionalknowledge_190707.pdf
1 2 3 4 5 6	Web Links https://www.youtube.com/watch?v=LZP1StpYEPM http://nptel.ac.in/courses/121106003/ http://www.iitkgp.ac.in/department/KS;jsessionid=C5042785F727F6EB46CBF432D7683B63 (Centre of Excellence for Indian Knowledge System, IIT Kharagpur) https://www.wipo.int/pressroom/en/briefs/tk_ip.html https://unctad.org/system/files/official-document/ditcted10_en.pdf http://nbaindia.org/uploaded/docs/traditionalknowledge_190707.pdf https://unfoundation.org/what-we-do/issues/sustainable-development-goals/?gclid=EAIaIQobChMInp-
1 2 3 4 5 6 7	Web Links https://www.youtube.com/watch?v=LZP1StpYEPM http://nptel.ac.in/courses/121106003/ http://nptel.ac.in/courses/121106003/ http://www.iitkgp.ac.in/department/KS;jsessionid=C5042785F727F6EB46CBF432D7683B63 (Centre of Excellence for Indian Knowledge System, IIT Kharagpur) https://www.wipo.int/pressroom/en/briefs/tk_ip.html https://unctad.org/system/files/official-document/ditcted10_en.pdf http://nbaindia.org/uploaded/docs/traditionalknowledge_190707.pdf https://unfoundation.org/what-we-do/issues/sustainable-development-goals/?gclid=EAIaIQobChMInp-Jtb_p8gIVTeN3Ch27LAmPEAAYASAAEgIm1vD_BwE
1 2 3 4 5 6 7 8	Web Links https://www.youtube.com/watch?v=LZP1StpYEPM http://nptel.ac.in/courses/121106003/ http://mww.iitkgp.ac.in/department/KS;jsessionid=C5042785F727F6EB46CBF432D7683B63 (Centre of Excellence for Indian Knowledge System, IIT Kharagpur) https://www.wipo.int/pressroom/en/briefs/tk_ip.html https://unctad.org/system/files/official-document/ditcted10_en.pdf http://nbaindia.org/uploaded/docs/traditionalknowledge_190707.pdf https://unfoundation.org/what-we-do/issues/sustainable-development-goals/?gclid=EAIaIQobChMInp-Jtb_p8gIVTeN3Ch27LAmPEAAYASAAEgIm1vD_BwE https://onlinecourses.swayam2.ac.in/imb23_mg53/preview.
1 2 3 4 5 6 7 8 9	Web Links https://www.youtube.com/watch?v=LZP1StpYEPM https://nptel.ac.in/courses/121106003/ http://nptel.ac.in/courses/121106003/ http://www.iitkgp.ac.in/department/KS;jsessionid=C5042785F727F6EB46CBF432D7683B63 (Centre of Excellence for Indian Knowledge System, IIT Kharagpur) https://www.wipo.int/pressroom/en/briefs/tk_ip.html https://unctad.org/system/files/official-document/ditcted10_en.pdf https://unfoundation.org/what-we-do/issues/sustainable-development-goals/?gclid=EAIaIQobChMInp-Jtb_P8gIVTeN3Ch27LAmPEAAYASAAEgIm1vD_BwE https://onlinecourses.swayam2.ac.in/imb23_mg53/preview https://onlinecourses.swayam2.ac.in/imb23_mg54/preview

Year and	First Year B. Tech (All Programme) Semester II				
Semester					
Course Category	Engineering Science (ESC)				
Title of Course	Pro	gramming L	anguages-II	Course Code	
Teaching Scheme	L	Т	Р	Contact Hrs/Week	Credits
Teaching Scheme	01		02	03	02
Examination Scheme	MSE	ISE/CA	ESE	Total	
Scheme		25	25	50	

Course	Basics	of Operating System, Basic Math Skills, Basic Problem-Solving Skills.
Pre-Requisite		
Course	1	Effective Problem-Solving Skills to develop programming logic in Python
Objective	2	Understanding and Implementing Programming concepts of Python
	3	Develop simulations using python SimPy package
	After	competition of this course Students will be able to
	CO1	Understand the python programming basics
	CO2	Solve programs on decision making & looping statements in python
Course	CO3	Understand python list, tuple, and dictionary collection concepts
Outcomes	CO4	Understand simulation programs using SimPy Library
	CO5	Design & Apply Simpy library functions to model real time problems.

	CO PO Mapping												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	
CO1	2	3											
CO2	2	3											
CO3	2	3											
CO4	CO4 2 3												
	Level of Mapping as: Low 1, Moderate 2, High 3												

Marking Scheme

In Semester Evaluation/ Continuous Assessment has 25 Marks

Parameters for In Semester Evaluation could be: Attendance, Assignments, Unit Tests, Presentation,

Online Activities like (Virtual Labs, NPTEL) etc.

Lab File should be prepared and should be assessed continuously during academic.

End Semester Evaluation has 25 Marks

External Practical Examination with Performance and Oral Examination

Unit No.	Title and Content of Unit	Hours						
	Introduction to Python							
	Why high-level language, Scope of python, interactive mode and script mode.							
	o. Title and Content of Unit Introduction to Python Introduction to Python Why high-level language, Scope of python, interactive mode and script mode. Variables, Operators and Operands in Python. Arithmetic, relational and logical operators, Operator precedence, Taking input using raw input() and input() method and displaying output - print statement, Comments in Python. Conditional and Looping if - else statement and nested if - else while, for, use of range function in for, Nested loops, break, continue, pass statement Use of compound expression in conditional constructs, Nested conditional statements, Nested Looping structures Functions Built-In Function, Functions from math, random, time & date module. Composition User Define Function: Defining, invoking functions, passing parameters, Intra-package References, Packages in Multiple Directories List List concept of mutable lists, creating, initializing and accessing the elements of list, List operations, Concatenation, Membership, list slices, List comprehensions List functions & methods: len, insert, append, extend, sort, remove, reverse, pop functions Tuples & sets Immutable concept, creating, initializing and accessing the elements in a tuple;							
Unit 1	operators, Operator precedence, Taking input using raw input() and input() method	4 Hrs						
	and displaying output - print statement, Comments in Python.							
	Conditional and Looping							
	if - else statement and nested if - else while, for, use of range function in for,							
Unit 2	Nested loops, break, continue, pass statement Use of compound expression in	4 Hrs						
	conditional constructs, Nested conditional statements, Nested Looping structures							
	Functions							
	Built-In Function, Functions from math, random, time & date module.							
Unit 3	Composition User Define Function: Defining, invoking functions, passing	4 Hrs						
	parameters, Intra-package References, Packages in Multiple Directories							
	List							
	Lists Concept of mutable lists, creating, initializing and accessing the elements of							
	list, List operations, Concatenation, Membership, list slices, List comprehensions							
Unit 4	List functions & methods: len, insert, append, extend, sort, remove, reverse, pop	4 Hrs						
	functions							
	Tuples & sets							
	Immutable concept, creating, initializing and accessing the elements in a tuple;							
	Tuple functions: cmp(), len(), max(), min(), tuple()							
	Sets Concept of Sets, creating, initializing and accessing the elements of Sets							
Unit 5	operation Membership, union, intersection, difference, and symmetric difference	4 Hrs						
	Dictionaries Concept of key-value pair, creating, initializing and accessing the							
	elements in a dictionary, Traversing, appending, updating and deleting elements							

Unit 6	Simulations using Simpy	
Unit 6	Basic Concepts, understanding of SimPy"s capabilities, Process Interaction, waiting	4 Hrs
	for a Process, Interrupting Another Process, Real-time simulations.	

	Guidelines for Practical Performance								
Faculty can	Faculty can create Experiment list based on following listed topics.								
Minimum 1	2 to 15 Experiments should get performed along with flow chart and Execution.								
Topic No.	Title of Experiment/ Problem Statement								
1	Write python programs to demonstrate basic data types in python								
2	Write python program to study Arithmetic, relational and logical operators and Operands								
	in Python.								
3	Write python programs to study if, if else, if else if statements								
4	Write python programs to study looping statements while & for								
5	Write python programs to study built in functions of string and math packages								
6	Write python programs to study list access using membership operators.								
7	Write python programs to study tuple using inbuilt functions								
8	Write python programs to study set operations and dictionary traversing								
9	Write python programs to study Discrete event simulation using SimPy								

Textbo	Textbooks										
Sr. No.	Title	Author	Edition/Publication								
01	Python: The Complete Reference	Martin C. Brown	Tata McGraw Hill								
			Publication								
02	Learning Python	Mark Lutz	O"Reilly Publication								
	Python Programming for Absolute	Michael Dawson	Cengage Learning								
03	Beginner										

Referen	Reference Books											
Sr. No.	Title	Author	Edition/Publication									
01	Python Essential Reference	David Beazley	4th edition, Developers library.									
02	SimPy: https://simpy.readthedocs.io/	Web reference										

Exit Course for Civil Engineering after 1st Year

Exit op	xit option : Award of UG Certificate in Major with 44 credits and an additional 8 credits from following Exit Courses										
Sr. No	Course Code	Course Title	Mode	Credits							
1		Building Plumbing System	Analogous Online/offline certification Course or	8							
		OR	project of total 8 credits								
2		Any Drafting software for Building Planning		8							

Earning of additional 2 mandatory credits for direct second year admitted students to Civil Engineering branch.

Sr. No.	Semester	Subject	Credit
1	III	Civil Engineering Infrastructure	2

Name of Programme: Civil Engineering

Scheme of Instructions: Second Year B. Tech. Civil Engineering

Semester – III

Sr.	Course	Course	Course Title	L	т	р	Contact	Course	EXAM SCHEME			
No.	Category	Code	Course The	L	I		Hrs/Wk	Credits	MSE	ISE/CA	ESE	TOTAL
1	PCC	CE0231	Engineering Mathematics - III	3	1		4	4	30	10	60	100
2	PCC	CE0232	Building Construction	3			3	3	30	10	60	100
3	PCC	CE0233	Strength of Materials	3			3	3	30	10	60	100
4	CEP	CE0234	Building Construction Lab			2	2	1		50	25	75
5	MDM	CE0235	Multi-disciplinary Minor – 01	2			2	2	30	10	60	100
6	OE	CE0236	Open Elective -01	3			3	3	30	10	60	100
7	HSSM	CE0237	Universal Human Values	2			2	2		50		50
8	CEP	CE0238	Strength of Materials Lab			2	2	1		50	25	75
9	HSSM	CE0239	Economics for Engineers	2		-	2	2		50		50
10	OE	CE02310	Open Elective -01 Lab			2	2	1		25	25	50
			Total	18	1	6	25	22	150	275	375	800

L-Lecture

T-Tutorial

P-Practical

MSE-Mid Semester Examination ISE/CA-In Semester Evaluation/Continuous Assessment ESE-End Semester Examination (For Laboratory End Semester performance)

Course Category	Basic Science Courses (BSC)	Engineering Science Courses (ESC)	Programme Core Course (PCC)	Programme Elective Course (PEC)	Open Elective other than particular Programme (OE/MDM)	Vocational and Skill Enhancement Course (VSEC)	Humanities Social Science and Management (HSSM)	Experiential Learning (EL)	Co-curricular and Extracurricular Activities (CCA)
Last Sem. Cumulative Sum	16	16				06	04		02
Semester Credits			10		06		04	02	
Cumulative Sum	16	16	10		06	06	08	02	02

PROGRESSIVE TOTAL CREDITS : 44 + 22 = 66

Name of Programme: Civil Engineering

Scheme of Instructions: Second Year B. Tech. Civil Engineering

Semester-IV

Sr.	Course	Course	Course Title	т	т	р	Contact	Course		EXAM SCH	EME	
No.	Category	Code	Course The	L	1	r	Hrs/Wk	Credits	MSE	ISE/CA	ESE	TOTAL
1	PCC	CE0241	Surveying	3			3	3	30	10	60	100
2	PCC	CE0242	Structural Mechanics	3			3	3	30	10	60	100
3	PCC	CE0243	Fluid Mechanics	3			3	3	30	10	60	100
4	MDM	CE0244	Multi-disciplinary Minor - 02	2			2	2	30	10	60	100
5	OE	CE0245	Open Elective -02	2			2	2	30	10	60	100
6	HSSM	CE0246	Strategic Management	2			2	2		50		50
7	HSSM	CE0247	Professional Ethics	2			2	2		25		25
8	VEC	CE0248	Surveying lab			2	2	1		50	25	75
9	PCC	CE0249	Fluid Mechanics Lab			2	2	1		25	25	50
10	VEC	CE02410	Building Planning and Design	2			2	2		25	25	50
11	BSC	CE02411	Environmental Science	2			2	Audit	30	10	60	100
12	VSEC	CE02412	Building Drawing			2	2	1		50		50
			Total	21		6	28	22	180	285	435	800+100(Audit)
L-Lect	ıre		T-Tutor	ial			P-Practica	1				

L-Lecture

MSE-Mid Semester Examination ISE/CA-In Semester Evaluation/Continuous Assessment ESE-End Semester Examination (For Laboratory End Semester performance)

Course	Basic Science	Engineering	Programme	Programme	Open Elective	Vocational and	Humanities Social	Experiential	Co-curricular and
Category	Courses	Science Courses	Core	Elective	Other than	Skill	Science and	Learning	Extracurricular
	(BSC)	(ESC)	Course	Course	Particular Programme	Enhancement	Management (HSSM)	(EL)	Activities
			(PCC)	(PEC)	(OE/MDM)	Course (VSEC)			(CCA)
Last Sem. Cumulative Sum	16	16	10		06	06	08	02	02
Semester Credits			10		04	01	07		
Cumulative Sum	16	16	20		10	07	15	02	02

PROGRESSIVE TOTAL CREDITS :66 + 22 = 88

Exit Course for Civil Engineering After 2nd Year

	Exit option: Award of UG Diploma in Major with 88 credits and an additional 8 credits from Following Exit Courses											
Sr. No	Course Code	Course Title	Mode	Credits								
1	CE-EC-0203	Concrete Technology	Online/offline	3								
2	CE-EC-0204	Design of Concrete Structures	certification Course or	3								
3	CE-EC-0205	Soil and Water Quality Analysis Lab	project of total 8 credits	2								

Name of Programme: Civil Engineering

Scheme of Instructions: Third Year B. Tech. Civil Engineering

Semester-V

Sr.	Course	Course	Course Title	т	т	р	Contact	Course		EXAM SCH	IEME	
No.	Category	Code	Course The	L	1	P	Hrs/Wk	Credits	MSE	ISE/CA	ESE	TOTAL
1	PCC	CE0251	Theory of Structures	3			3	3	30	10	60	100
2	PCC	CE0252	Geotechnical Engineering	3			3	3	30	10	60	100
3	PCC	CE0253	Environmental Engineering	3			3	3	30	10	60	100
4	PEC	CE0254	Programme Elective - 01	3			3	3	30	10	60	100
5	MDM	CE0255	Multi-disciplinary Minor – 03	3			3	3	30	10	60	100
6	OE	CE0256	Open Elective -03	2			2	2	30	10	60	100
7	PCC	CE0257	Geotechnical Engineering Lab			2	2	1		25	25	50
8	PCC	CE0258	Environmental Engineering Lab			2	2	1		25	25	50
9	PEC	CE0259	Programme Elective – 01 Lab			2	2	1		25		25
10	MDM	CE02510	Multi-disciplinary Minor-03 Lab			2	2	1		50		50
11	EL	CE02511	Minor Project 01			2	2	1		25		25
			Total	17		10	27	22	180	210	410	800

L-Lecture

T-Tutorial

P-Practical

MSE- Mid Semester Examination ISE/CA- In Semester Evaluation/Continuous Assessment ESE-End Semester Examination (For Laboratory End Semester performance)

Course Category	Basic Science Courses (BSC)	Engineering Science Courses (ESC)	Programme Core Course (PCC)	Programme Elective Course (PEC)	Open Elective other than Particular Programme (OE/MDM)	Vocational and Skill Enhancement Course (VSEC)	Humanities Social Science and Management (HSSM)	Experiential Learning (EL)	Co-curricular and Extracurricular Activities (CCA)
Last Sem. Cumulative Sum	16	16	20		10	07	15	02	02
Semester Credits			11	04	06			01	
Cumulative Sum	16	16	31	04	16	07	15	03	02

PROGRESSIVE TOTAL CREDITS : 88 + 22 = 110

Name of Programme: Civil Engineering

Scheme of Instructions: Third Year B. Tech. Civil Engineering

Semester-VI

Sr.	Course	Course	Course Title	т	т	р	Contact	Course		EXAM SCI	HEME	
No.	Category	Code	Course The	L			Hrs/Wk	Credits	MSE	ISE/CA	ESE	TOTAL
1	PCC	CE0261	Design of Concrete Structures -I	3			3	3	30	10	60	100
2	PCC	CE0262	Concrete Technology	3			3	3	30	10	60	100
3	PCC	CE0263	Transportation Engineering	3	1		4	4	30	10	60	100
4	PEC	CE0264	Programme Elective - 02	3			3	3	30	10	60	100
5	PEC	CE0265	Programme Elective - 03	3			3	3	30	10	60	100
6	MDM	CE0266	Multi-disciplinary Minor – 04	2			2	2	30	10	60	100
7	PCC	CE0267	Structural Design and Drawing I Lab			2	2	1		50	25	75
8	PCC	CE0268	Transportation Engineering Lab			2	2	1		50	25	75
9	EL	CE0269	Industrial Training*			4	4	2		50		50
			Total	17	1	8	26	22	180	210	410	800

L-Lecture

T-Tutorial

P-Practical

MSE-Mid Semester Examination ISE/CA-In Semester Evaluation/Continuous Assessment ESE-End Semester Examination (For Laboratory End Semester performance)

Course Category	Basic Science Courses (BSC)	Engineering Science Courses (ESC)	Programme Core Course (PCC)	Programme Elective Course (PEC)	Open Elective other than particular Programme (OE/MDM)	Vocational and Skill Enhancement Course (VSEC)	Humanities Social Science and Management (HSSM)	Experiential Learning (EL)	Co-curricular and Extra curricular Activities (CCA)
Last Sem. Cumulative Sum	16	16	31	04	16	07	15	03	02
Semester Credits			12	06	02			02	
Cumulative Sum	16	16	43	10	18	07	15	05	02

PROGRESSIVE TOTAL CREDITS : 110 + 22 = 132

Exit Course for Civil Engineering After 3rd Year

Exit option : Award of B. Vocational in Major with 132 credits and an additional 8 credits from following Exit Courses											
Sr. No	Course Code	Course Title	Mode	Credits							
1	CE-EC-0205	Reinforced and Pre-stressed Concrete	Online/offline certification	3							
2	CE-EC-0206	Construction Project Management	Course or project of total 8	3							
3	CE-EC-0207	Project	credits	2							

Name of Programme: Civil Engineering

Scheme of Instructions: Final Year B. Tech. Civil Engineering

Semester-VII

Sr.	Course	Course		т	т	р	Contact	Course		EXAM S	CHEME	
No.	Category	Code	Course Thie	L	I	P	Hrs/Wk	Credits	MSE	ISE/CA	ESE	TOTAL
1	PCC	CE0271	Quantity Survey and Valuation	3	-		3	3	30	10	60	100
2	PCC	CE0272	Design of Concrete Structures - II	3	-		3	3	30	10	60	100
3	PEC	CE0273	Programme Elective - 04	3	-		3	3	30	10	60	100
4	EL	CE0274	Construction Project Management	3			3	3	30	10	60	100
5	MDM	CE0275	Multi-disciplinary Minor – 05	2	-		2	2	30	10	60	100
6	PCC	CE0276	Quantity Survey and Valuation Lab			2	2	1		25	25	50
7	PCC	CE0277	Structural Design and Drawing II Lab			2	2	1		25	25	50
8	EL	CE0278	Project Phase I			12	12	6		100	100	200
			Total	14		16	30	22	150	200	450	800

L-Lecture

T-Tutorial

P-Practical

MSE-Mid Semester Examination ISE/CA-In Semester Evaluation/Continuous Assessment ESE-End Semester Examination (For Laboratory End Semester performance)

Course Category	Basic Science Courses (BSC)	Engineering Science Courses (ESC)	Programme Core Course (PCC)	Programme Elective Course (PEC)	Open Elective other than Particular Programme (OE/MDM)	Vocational and Skill Enhancement Course (VSEC)	Humanities Social Science and Management (HSSM)	Experiential Learning (EL)	Co-curricular and Extracurricular Activities (CCA)
Last Sem. Cumulative Sum	16	16	43	10	18	07	15	05	02
Semester Credits			08	03	02			09	
Cumulative Sum	16	16	51	13	20	07	15	14	02

PROGRESSIVE TOTAL CREDITS : 132 + 22 = 154

Name of Programme: Civil Engineering

Scheme of Instructions: Final Year B. Tech. Civil Engineering

Semester-VIII

Sr.	Course	Course	Course Tide	т	т	р	Contact	Course	EXAM SCHEME				
No.	Category	Code	Course The	L	I	P	Hrs/Wk	Credits	MSE	ISE/CA	ESE	TOTAL	
1	PCC	CE0281	Design of Steel Structures	3			3	3	30	10	60	100	
2	PCC	CE0282	Water Resources Engineering	3			3	3	30	10	60	100	
3	PEC	CE0283	Programme Elective - 05	3			3	3	30	10	60	100	
4	PEC	CE0284	Programme Elective - 06	3			3	3	30	10	60	100	
5	MDM	CE0285	Multi-disciplinary Minor-06	2			2	2	30	10	60	100	
6	PCC	CE0286	Steel Structures Lab			2	2	1		50	50	100	
7	EL	CE0287	Research Methodology	3			3	3	30	10	60	100	
8	EL	CE0288	Project Phase II			8	8	4		100	100	200	
			Total	17		10	27	22	180	210	510	900	

L-Lecture

T-Tutorial

P-Practical

MSE-Mid Semester Examination ISE/CA-In Semester Evaluation/Continuous Assessment ESE-End Semester Examination (For Laboratory End Semester performance)

Course Category	Basic Science Courses (BSC)	Engineering Science Courses (ESC)	Programme Core Course (PCC)	Programme Elective Course (PEC)	Open Elective other than Particular Programme (OE/MDM)	Vocational and Skill Enhancement Course (VSEC)	Humanities Social Science and Management (HSSM)	Experiential Learning (EL)	Co-curricular and Extracurricular Activities (CCA)
Last Sem. Cumulative Sum	16	16	51	13	20	07	15	14	02
Semester Credits			07	06	02			07	
Cumulative Sum	16	16	58	19	22	07	15	21	02

PROGRESSIVE TOTAL CREDITS = 176

Following Degrees will begin with effectfromAcademicYear2026-27.

- A) Bachelor's Engg./Tech. Honours Degree in chosen Major Engg./Tech. Discipline with Multidisciplinary Minor (194 credits)
- B) Bachelor's Engg./Tech. Honours with Research Degree in chosen Major Engg./Tech. Discipline with Multidisciplinary Minor (194 credits)
- C) Bachelor's Engg./Tech. Degree in chosen Major Engg./Tech. Discipline with Double Minor (Multidisciplinary and Specialisation Minor (194 credits)

[I] <u>List of Electives:</u> Verticals

Specialization	Structural Engg	Water Resources and Environmental Engg	Geotechnical and Construction Engg	Transportation Engg
Elective-I	Advanced Structural Analysis	Municipal Solid Waste Management	Construction Methods and Equipment Management, Engineering Geology	Bridge and Tunnel Engineering
Elective-II	Advanced Design of RC Structures	Air Pollution and Control	Foundation Engineering	Airport Engineering
Elective-III	Design of Bridges	Open Channel Hydraulics	Smart City, Green Building	Traffic Engineering
Elective-IV	Design of Water Tanks	Environmental Management System	Ground Improvement Techniques, Advanced Engineering Geology.	Pavement Design
Elective-V	Prestressed Concrete Structures	Industrial Wastewater Management	Soil Exploration and Investigations Techniques	Docks, Harbours and Offshore Structures
Elective-VI	Earthquake Engineering	Design of Hydraulic Structures; Surface and Groundwater Hydrology	Soil Dynamics and Structures	

[II] List of Open Electives

Open Elective-I	
Open Elective-II	
Open Elective-III	
[III] List of MDM Courses in Civil Engg.,

Semester	Multi-disciplinary Minor	Course Offered	Credits
III	Multi-disciplinary Minor-01	Building Construction	2
IV	Multi-disciplinary Minor-02	Waste Management	2
V	Multi-disciplinary Minor-03	Infrastructure Engineering	3
	Multi-disciplinary Minor-03 Lab	Material Testing Lab	1
VI	Multi-disciplinary Minor-04	Concrete Technology	2
VII	Multi-disciplinary Minor-05	Soil and Water Engineering	2
VIII	Multi-disciplinary Minor-06	Field Project	2

[IV] Minor in Emerging Area (Waste Management)

Sr. No.	Semester	Subject	Credit
1	III	Wastewater Treatment and Recycling	3
2	IV	Integrated waste management for a smart city	3
3	V	Plastic waste management	3
4	VI	Decentralized Waste Treatment	3
5	VII	Electronic waste management	3
6	VIII	Waste to Energy Conversion	3

Instructions regarding Examinations:

- 1. Compulsory passing with 40% marks is mandatory in ESE examinations and combined passing marks (MSE+ISE/CA+ESE) for theory course is 40%
- 2. Mid sem. examination will be based on 50% syllabus from beginning (First Three Units).
- 3. No compulsory passing for MSE.
- 4. ESE paper setting weightage will be 25% on syllabus covered for MSE (First Three Units) and 75% on remaining syllabus (Last Three Units).
- 5. Passing percentage for ESE practical examination 40%.