

(Approved by A.I.C.T.E & Permanently Affiliated to JNTU, Kakinada) Accredited by NAAC with "A" Grade on NH 16, Telaprolu, Krishna Dist – 521109

B.TECH CIVIL ENGINEERING

COURSE STRUCTURE & SYLLABUS

(Applicable for the batches admitted from the Academic Year 2019-20)

DEPARTMENT OF CIVIL ENGINEERING

	I SEMESTER								
S. No	Course Category	Course Code	Course Title	L	Т	Р	Cont Hrs/ Wk	Cr	
1	HMC	UR19HM101	Communicative English	2	0	0	2	2	
2	BSC	UR19BSC101	Linear Algebra and Calculus	3	1	0	4	4	
3	BSC	UR19BSC107	Engineering Physics	3	0	0	3	3	
4	ESC	UR19ESC107	Engineering Mechanics	3	0	0	3	3	
5	ESC	UR19ESC108	Engineering Graphics & Drafting	1	0	3	4	2.5	
6	HMC	UR19HML101	Communicative English Lab	0	0	2	2	1	
7	BSC	UR19BSCL101	Engineering Physics Lab	0	0	3	3	1.5	
8	ESC	UR19ESCL101	Engineering Workshop & IT workshop	0	0	3	3	1.5	
			MANDATORY COURSE	6				-	
9	MC	UR19MC101	Engineering Physics Virtual Lab*	0	0	0	2	0	
	Total				1	11	26	18.5	
*Inte	ernal Evalu	uation							

	II EMESTER								
S. No	Course Category	Course code	Course Title	L	Т	Р	Cont Hrs/ Wk	Cr	
1	HMC	UR19HM202	Professional English	2	0	0	2	2	
2	BSC	UR19BSC205	Differential Equations and Vector Calculus	3	0	0	3	3	
3	BSC	UR19BSC209	Engineering Chemistry	3	0	0	3	3	
4	ESC	UR19ESC201	Elements of Civil Engineering	3	0	0	3	3	
5	ESC	UR19ESC205	Basic Electrical and Mechanical Engineering	3	0	0	3	3	
6	ESC	UR19ESC210	Problem Solving & Programming using –C	3	0	0	3	3	
7	HMC	UR19HML202	Professional English Lab	0	0	3	3	1.5	
8	BSC	UR19BSCL203	Engineering and Applied Chemistry Lab	0	0	3	3	1.5	
9	ESC	UR19ESCL202	Problem Solving and Programming using-C Lab	0	0	3	3	1.5	
			MANDATORY COURSE	s					
10	MC	UR19MC200	Engineering Exploration Project	0	0	0	1	0	
11	MC	UR19MC203	Constitution of India	0	0	0	2	0	
Total				17	0	9	29	21.5	

	III SEMESTER								
S. No	Course Category	Course code	Course Title	L	Т	Р	Cont Hrs/ Wk	Cr	
1	BSC	UR19BSC301	Numerical Methods and Transforms	3	0	0	3	3	
2	PCC	UR19PCCE301	Strength of Materials	3	0	0	3	3	
3	PCC	UR19PCCE302	Fluid Mechanics and Hydraulic Machinery	3	0	0	3	3	
4	PCC	UR19PCCE303	Surveying	3	0	0	3	3	
5	HMC	UR19HM301	Managerial Economics and Financial Analysis	2	0	0	2	2	
6	PCC	UR19PCCEL301	Material Testing Lab	0	0	3	3	1.5	
7	PCC	UR19PCCEL302	Fluid Mechanics& Hydraulic Machinery Lab	0	0	3	3	1.5	
8	PCC	UR19PCCEL303	Survey Lab [Field Work]	0	0	3	3	1.5	
			MANDATORY COUR	RSE				•	
9	MC	UR19MC301	Environmental Studies	0	0	0	2	0	
Total 14 0 9							25	18.5	
Employability Skills-I*						2	0		
Self Learning Course*						2	0		
*Inter	nal Evalua	tion							

IV SEMESTER								
S. No	Course Category	Course code	Course Title	L	Т	Р	Cont Hrs/ Wk	Cr
1	BSC	UR19BSC406	Probability and Statistics	3	0	0	3	3
2	PCC	UR19PCCE401	Engineering Geology	3	0	0	3	3
3	PCC	UR19PCCE402	Construction Materials and Concrete Technology	3	0	0	3	3
4	PCC	UR19PCCE403	Geotechnical Engineering	3	0	0	3	3
5	PCC	UR19PCCE404	Mechanics of Solids	3	0	0	3	3
6	НМС	UR19HM405	Professional Ethics and Human Values	2	0	0	2	2
7	PCC	UR19PCCEL401	Engineering Geology Lab	0	0	3	3	1.5
8	PCC	UR19PCCEL402	Concrete Technology Lab	0	0	3	3	1.5
9	PCC	UR19PCCEL403	Geotechnical Engg Lab	0	0	3	3	1.5
			MANDATORY COURSE					
10	PROJ	UR19MPROJCE 401	Socially Relevant Mini Project	0	0	0	2	0
Total 17 0 9						9	28	21.5
Self Learning Course*						2	0	
*Inter	rnal Evalu	ation						

	V SEMESTER								
S. No	Course Category	Course code	Course Title	L	Т	Р	Cont Hrs/ Wk	Cr	
1	PCC	UR19PCCE501	Environmental Engineering	3	0	0	3	3	
2	PCC	UR19PCCE502	Transportation Engineering	3	0	0	3	3	
3	PCC	UR19PCCE503	Design Of RCC Structures	3	0	0	3	3	
4	PCC	UR19PCCE504	Structural Analysis	3	0	0	3	3	
5	PCC	UR19PCCE505	Water Resources Engineering	3	0	0	3	3	
6	HMC	UR19HM506	Management Science	3	0	0	3	3	
7	PCC	UR19 PCCEL501	Environmental Engineering Lab	0	0	3	3	1.5	
8	PCC	UR19 PCCEL502	Transportation Engineering Lab	0	0	3	3	1.5	
9	PCC	UR19 PCCEL503	Computer Aided Civil Engineering Drawing Lab	0	0	3	3	1.5	
]	MANDATORY COURSE						
10	MC	UR19MCL501	CAD-Virtual Lab	0	0	0	2	0	
Total 18 0 9							29	22.5	
Employability Skills-II*							2	0	
Self Learning Course*							2	0	
*Inter	rnal Evalu	ation							

VI SEMESTER									
S. No	Course Category	Course code	Course Title	L	Т	Р	Cont Hrs/ Wk	Cr	
1	PCC	UR19PCCE601	Theory of Structures	3	0	0	3	3	
2	PCC	UR19PCCE602	Remote Sensing and Geographic Information Systems Applications	3	0	0	3	3	
3	PCC	UR19PCCE603	Design of Steel Structures	3	0	0	3	3	
4	OEC	-	OPEN ELECTIVE-I	3	0	0	3	3	
		PRO	DFESSIONAL ELECTIVE-I						
5		UR19PECE601	Pre-Stressed Concrete Structures					3	
	PEC	UR19PECE602	Advanced Foundation Engineering						
		UR19PECE603	Advanced Environmental Engineering	3	0	0	3		
		UR19PECE604	Airports, Docks& Harbour Engineering						
		UR19PECE605	Water Resources System Analysis						
PROFESSIONAL ELECTIVE-II									
		UR19PECE606	Advanced Structural Design						
C	DEC	UR19PECE607	Ground Improvement Techniques						
0	PEC	UR19PECE608	Air Pollution Engineering	3	0	0	3	3	
		UR19PECE609	Traffic Engineering						
		UR19PECE610	Hydropower Development						
7	PCC	UR19PCCEL601	Computer Aided Structural Analysis and Design Lab	0	0	3	3	1.5	
8	PCC	UR19PCCEL602	Geographic Information Systems Lab	0	0	3	3	1.5	
]	MANDATORY COURSE						
9	PROJ	UR19MPROJCE 601	Socially Relevant Mini Project /Survey Camp	0	0	0	2	0	
	-	Total		18	0	6	26	21.0	
Self L	earning C	Course*		1			2	0	
*Inte	rnal Eval	uation							

VII SEMESTER								
S. No	Course Category	Course code	Course Title	L	Т	Р	Cont Hrs/ Wk	Cr
1	PCC	UR19PCCE701	Estimation, Specifications and Contracts	3	0	0	3	3
2	OEC	-	OPEN ELECTIVE-II	3	0	0	3	3
			PROFESSIONAL ELECTIVE-III					
3		UR19PECE701	Earthquake Resistance Design					
	PEC	UR19PECE702	Soil Dynamics and Machine Foundations	3	0	0	3	3
		UR19PECE703	Industrial Waste &Waste Water Engineering	0	Ū	U		5
		UR19PECE704	Intelligent Transportation Systems					
		UR19PECE705	Watershed Management					
PROFESSIONAL ELECTIVE-IV								
		UR19PECE706	Finite Element Methods					3
4	PEC	UR19PECE707	Foundations on Expansive Soils	3	0	0	3	
	120	UR19PECE708	Solid waste Management	0		Ū		
		UR19PECE709	Urban Transportation Planning					
		UR19PECE710	Integrated Water Resources Management					
5	PCC	UR19PCCEL701	Construction Project Estimation Lab	0	0	3	3	1.5
6	PROJ	UR19PROJ701	Internship	0	0	0	0	2
7	PROJ	UR19PROJ702	Project Stage-I	0	0	3	3	1.5
			MANDATORY					
			COURSE	_		-		
8	MC	UR19MCL701	Geographic Information Systems Virtual Lab*	0	0	0	2	0
	■	Total		12	0	6	20	17
*Inte	rnal Evalu	lation						

	VIII SEMESTER								
S. No	Course Category	Course code	Course Title	L	Т	Р	Cont Hrs/ Wk	Cr	
1	PCC	UR19PCCE801	Construction Technology and Project Management	3	0	0	3	3	
2	OEC	-	OPEN ELECTIVE-III	3	0	0	3	3	
	PROFESSIONAL ELECTIVE-V								
3		UR19PECE801	Civil Infrastructure for Smart City Development						
	PEC	UR19PECE802	Engineering with Geo- synthetics	3 0	0	0	3	3	
		UR19PECE803	Environmental Impact Assessment			Ū			
		UR19PECE804	Road Transport Management and Economics						
		UR19PECE805	Urban Hydrology						
4	PCC	UR19PCCEL801	Project Management Lab	0	0	3	3	1.5	
5	PROJ	UR19PROJ801	Project Stage-II	0	0	18	18	9	
			MANDATORY COURSE	-		-			
6	MC	UR19MC801	Essence Of Indian	0	0	0	2	0	
			Traditional						
		Total	Interneuge	09	0	21	32	19.5	

Total Credits = 40 + 40 + 43.5 + 36.5 = 160

List of Open Electives

S.No.	Course Code	Open Elective-I
1.	UR190ECE 601	Introduction To GIS
2.	UR190ECE 602	Environmental Pollution Control
3	UR190ECE 603	Conservation of Water Resources
	Course Code	Open Elective-II
4.	UR19OECE701	Metro Systems and Engineering
5.	UR19OECE702	Natural Disaster Mitigation and Management
6.	UR190ECE 703	Total Quality Management
	Course Code	Open Elective-III
7.	UR19OECE801	Sanitary and Public Health Engineering
8.	UR19OECE802	Environmental and Industrial Hygiene
9.	UR19OECE803	Green Buildings

Open Electives offered by the Dept. of CE

Open Electives offered by the Dept. of EEE

S.No.	Course Code	Open Elective-I
1.	UR19OEEE601	Neural Networks and Fuzzy Logic
2.	UR19OEEE602	Linear Control Systems
3.	UR19OEEE603	Electrical Safety Management
	Course Code	Open Elective – II
4.	UR190EEE701	Programmable Logic Controllers
5.	UR190EEE702	Energy Audit and Conservation Management
6.	UR190EEE703	Electrical Technology
	Course Code	Open Elective – III
7.	UR190EEE801	Non Conventional Energy Sources
8.	UR190EEE802	Industrial Electrical Operation
9.	UR19OEEE803	Hybrid Electric Vehicles

S.No.	Course Code	Open Elective-I
1.	UR19OEME601	Nano Technology
2.	UR19OEME602	Robotics
3.	UR19OEME603	Power Plant Engineering
	Course Code	Open Elective-II
4.	UR19OEME701	Operations Research
5.	UR19OEME702	Industrial Engineering & Quality control
6.	UR19OEME703	Advanced materials
	Course Code	Open Elective-III
7.	UR19OEME801	Optimization Techniques
8.	UR19OEME802	Green Engineering systems
9.	UR19OEME803	Mechatronics

Open Electives offered by the Dept. of ME

Open Electives offered by the Dept. of ECE

S.No.	Course Code	Open Elective-I
1	UR19OEEC601	Consumer Electronics
2	UR19OEEC602	Digital Electronics
3	UR19OEEC603	Analog and Digital I.C. Applications
	Course Code	Open Elective-II
4	UR190EEC701	Embedded Systems
5	UR190EEC702	Internet of Things (IoT)
6	UR19OEEC703	Principles of Computer Communications and Networks
	Course Code	Open Elective-III
7	UR19OEEC801	Microcontrollers
8	UR19OEEC802	Principles of Electronic Communications
9	UR190EEC803	Electronic Measurements and Instrumentation

S.No.	Course Code	Open Elective-I
1.	UR190ECS601	Java Programming
2.	UR190ECS602	Data Base Management Systems
3.	UR19OECS603	C++ Programming
	Course Code	Open Elective-II
4.	UR190ECS701	Distributed Computing
5.	UR190ECS702	Deep Learning
6.	UR19OECS703	AI and ML for Robotics
	Course Code	Open Elective-III
7.	UR19OECS801	AI Tools & Techniques
8.	UR190ECS802	Information Security
9.	UR19OECS803	Big Data

Open Electives offered by the Dept. of CSE

Open Electives offered by the Dept. of IT

S.No.	Course Code	Open Elective-I
1.	UR19OEIT101	Data Structures
2.	UR190EIT102	Computer Graphics
3.	UR19OEIT103	Data Science
	Course Code	Open Elective – II
4.	UR190EIT201	Operating Systems
5.	UR19OEIT202	Python Programming
6.	UR19OEIT203	Web Technologies
	Course Code	Open Elective – III
7.	UR19OEIT301	Information Security
8.	UR19OEIT302	Mobile Application Development
9.	UR19OEIT303	Block Chain Technologies

1-Year Syllabus-B.Tech Civil

I Year - I Semester Course Code : UR19HM101 L T P C 2 0 0 2

Internal: 30 Marks External: 70 Marks

COMMUNICATIVE ENGLISH

(Common to all branches)

Course Objectives:

- Recall and improve the language proficiency of the students in English
- Paraphrase and interpret the ideas and thoughts in a dynamic way
- Prioritize the importance of practical learning of English
- Distinguish the various levels of Listening, Speaking, Reading and writing skills

- Construct statements in writing and speaking in professional manner $\ensuremath{\textbf{UNIT}}$ – $\ensuremath{\textbf{I}}$

Poem: "Life" by Sarojini Naidu **Grammar:** Articles **Vocabulary:** Prefixes and Suffixes **Writing:** Paragraph Writing **Life-Skills:** Attitude

UNIT – II

Essay: A Drawer full of Happiness **Grammar:** Prepositions **Vocabulary:** Homonyms, Homophones, Homographs **Writing:** Letter of Request and Apology **Life-Skills:** Self- Management

UNIT – III Short Story: "Half a Rupee Worth" by R.K. Narayan Grammar: Tenses Vocabulary: Idiomatic Expressions; Phrasal Verbs Writing: Letter of Complaint and Appreciation Life-Skills: Body Language

UNIT – IV Text: Stephen Hawking – Positivity 'Benchmark' Grammar: Question Tags, Conjunctions Vocabulary: One - Word Substitutes, Collocations Writing: Dialogue and Speech Writing Life-Skills: Being Assertive

UNIT – V
Poem: Once Upon a Time by Gabriel Okara
Grammar: Degrees of Comparison
Vocabulary: Technical Abbreviations
Writing: E-mail Writing, Preparation of Resume and Letter of application

Life-Skills: Goal Setting, Working in a Team

TEXT BOOK:

'InfoTech English' - Maruti Publications

REFERENCE BOOKS:

 Raymond Murphy, "Murphy's Essential English Grammar" with CD, Cambridge University Press
 Practical English Usage, Michael Swan, OUP, 1995

NPTEL ONLINE COURSE:

'Enhancing Soft skills & Personality Development

Course Outcomes:

CO1: Apply critical-thinking to develop writing skills
CO2: Understand and evaluate different kinds of prose tests.
CO3: Describe distinct literary characteristics of poems.
CO4: Analyze the major and minor details of a biography.
CO5: Develop grammar and vocabulary skills
CO6: Evaluate the effectiveness in improving life-skills.

I Year - I Semester

Course Code : UR19BSC101

L	Т	Ρ	С
3	1	0	4

Internal: 30 Marks External: 70 Marks

LINEAR ALGEBRA & CALCULUS

(Common to all branches)

Course Objectives:

- This course will illuminate the students in the concepts of calculus and linear algebra.
- To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real world problems and their applications.

UNIT – I

Matrices: Solving system of homogeneous and non-homogeneous linear equations by Gauss elimination method. Eigen values and Eigen vectors and their properties, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem.

UNIT – II

Sequences and Series: Convergence and divergence, Ratio test - Comparison test -Cauchy's root test-. Fourier series, Euler's formulae, conditions for Fourier expansion, Even and Odd functions.

UNIT – III

Mean Value Theorems: Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Taylor's and Maclaurin theorems with remainders (single variable & without proofs).

$\mathbf{UNIT} - \mathbf{IV}$

Multivariable calculus: Partial derivatives, total derivatives, chain rule, change of variables, Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers.

UNIT – V

Multiple Integrals: Double integrals, change of order of integration, double integration in polar coordinates. Evaluation of triple integrals, change of variables.

TEXT BOOK:

1. Higher Engineering Mathematics, B.S.Grewal, Khanna Publishers

Course Outcomes:

CO1: Develop the use of matrix algebra techniques that is needed by engineers for practical Applications

CO2: Find or compute the Fourier series of Fourier series periodic signals. **CO3:** Utilize mean value theorems to real life problems.

CO4: Translate the given function as series of Taylor's and Maclaurin's with remainders.

CO5: Familiarize with functions of several variables which are useful in optimization.

CO6: Apply Double integration in evaluating areas bounded by regions.

Internal: 30 Marks External: 70 Marks ENGINEERING PHYSICS

(CIVIL)

Course Objectives:

- Impart Knowledge of Physical Optics phenomena like Interference and Diffraction involving required designing instruments with higher resolution.
- Teach Concepts of coherent sources, its realization and utility optical instrumentation.
- Study the Structure-property relationship exhibited by solid crystal materials for their utility.
- Tap the Simple harmonic motion and its adaptability for improved acoustic quality of concert halls.
- To explore the Nuclear Power as a reliable source required to run industries
- To impart the knowledge of materials with characteristic utility in appliances.
- Understand the physics of Semiconductors and their working mechanism for their utility in sensors.

UNIT – I

INTERFERENCE: Principle of Superposition – Coherent Sources – Interference in thin films (reflection geometry) – Newton's rings.

DIFFRACTION: Diffraction - Fraunhofer Diffraction - Diffraction due to Single slit (quantitative), Double slit, N -slits and circular aperture (qualitative) – Intensity distribution curves - Diffraction Grating – Grating spectrum – missing order – resolving power – Rayleigh's criterion – Resolving powers of Microscope, Telescope and grating (qualitative).

UNIT – II

LASERS: Characteristics–Spontaneous and Stimulated emission of radiation – population inversion - Einstein's coefficients & Relation between them and their significance - Pumping Mechanisms - Ruby laser – Helium Neon laser – Applications.

SENSORS (qualitative description only): Different types of sensors and applications; Strain and Pressure sensors- Piezoelectric, magnetostrictive sensors, Temperature sensor - bimetallic strip, pyroelectric detectors.

UNIT – III

ELASTICITY:, stress, strain, Hooke's law, stress-strain curve, generalized Hooke's law with and without thermal strains for isotropic materials, different types of moduli and their relations, bending of beams – Bending moment of a beam – Depression of cantilever.

UNIT – IV

ACOUSTICS & ULTRASONICS: Introduction – Reverberation – Reverberation time - Sabine's formula (Derivation using growth and

decay method)-absorption coefficient and its determination- factors affecting acoustics of buildings and their remedies.

Production of ultrasonics by Magnetostriction and piezoelectric methods – Detection of ultrasonics - acoustic grating - Non-Destructive Testing- pulse echo system through transmission and reflection modes - Applications

$\mathbf{UNIT} - \mathbf{V}$

MAGNETISM & DIELECTRICS: Introduction – Magnetic dipole moment – Magnetization-Magnetic susceptibility and permeability – Origin of permanent magnetic moment – Bohr Magneton - Classification of magnetic materials (Dia, Para and Ferro) – Domain concept of Ferromagnetism - Hysteresis – soft and hard magnetic materials – Applications of Ferromagnetic materials.

Introduction - Dielectric polarization – Dielectric polarizability, Susceptibility and Dielectric constant- types of polarizations: Electronic and Ionic (Quantitative), Orientational polarizations (qualitative)- Lorentz internal field – Claussius_Mossoti equation- Frequency dependence of polarization - Applications of dielectrics

TEXT BOOKS:

- "Engineering Mechanics" by Manoj K Harbola, Cengage Publications 2nd Eds.
- 2. "A text book of Engineering Physics" by P G Kshirsagar & M N Avadhanulu, S Chand & Company Ltd.
- 3. "Engineering Physics" by R K Gaur and S L Gupta, Dhanpat Rai Publications.
- 4. "Sensor and Transducers" by Ian R Sinclair, Elsevier (Newnes) 3rd Eds.

REFERENCE BOOKS:

- 1. "Engineering Physics" by M R Srinivasan, New Age International Publishers.
- 2. "Lectures on Physics" by Richard P Feynman, Pearson Publishers, New Millennium Eds.
- 3. "Lasers and Non-linear Optics" by B. B .Laud, New Age International Publishers (3rd Eds.).

Course Outcomes:

- **CO1:** Explain the need of coherent sources and the conditions for sustained interference and illustrate the resolving power of various optical instruments.
- **CO2:** Understand the basic concepts of LASER light Sources and identify different types of sensors and their working principles.
- **CO3:** Understand the elasticity & plasticity concepts and study different types of moduli.
- **CO4:** Explain how sound is propagated in buildings and analyze acoustic properties of typically used materials in buildings.

CO5: A conceptual understanding of the physics of ultrasound and a perspective of areas of applicability to apply in different industries.

CO6: Explain the concept of dielectric constant & polarization in dielectric materials and explain the applications of dielectric and magnetic materials.

L	Т	Ρ	С
3	0	0	3

Internal: 30 Marks External: 70 Marks ENGINEERING MECHANICS (CIVIL)

Course Objectives:

- Explain the effect of force and moment in the different engineering applications.
- Teach centre of gravity and moment of inertia of solids and surfaces.
- Familiarize frictional forces in mechanical applications.
- Analysis of rigid bodies under dynamic conditions.

UNIT – I

Resultant of Force systems: Basic Concepts, Introduction to Engineering Mechanics – Composition and Resolution of Forces, Moment of a Force, Couple, Principle of Transmissibility, Systems of forces., Varignon"s theorem. Resultant of Force Systems: Concurrent and non concurrent coplanar force systems.

Equilibrium of Force systems: Free Body Diagram, Conditions for equilibrium of two force system and three force system. Lami's Theorem - Equilibrium equations Equilibrium of Force systems: Concurrent and non concurrent coplanar force systems.

Friction: Introduction, limiting friction and impending motion - Coefficient of friction, Laws of static friction, cone of static friction, applications of friction.

UNIT – II

Properties of Surfaces and Volumes: Centroid and center of gravity, derivation of centroids from first moment of area, centroids of composite sections, center of gravity of common volumes - cylinder, cone, sphere, theorem of Pappus.

Moment of Inertia: Area moment of inertia of plane and composite shapes, parallel axis theorem, perpendicular axis theorem, polar moment of inertia, mass moment of inertia of common volumes - thin plates, thin rod, cylinder, cone, sphere, rectangular prism, radius of gyration.

UNIT – III

Rectilinear Translation: Kinematics of rectilinear motion, principle of dynamics, rectilinear motion displacement, velocity and acceleration, graphical representation, motion with uniform & variable accelerations.

Kinetics: Differential equation of rectilinear motion, differential equation of dynamics equilibrium: D'Alembert's principle, principle of work energy, potential energy, conservation of energy, impulse and moment, conversation of moment and angular moment, impact.

$\mathbf{UNIT} - \mathbf{IV}$

Curvilinear Translation: Kinematics of Curvilinear motion, position vector, velocity and acceleration, components of motion rectangular, radial and transverse, normal and tangential.

Kinetics: Differential equation rectangle, tangential and normal components, differential equation of dynamics equilibrium: D'Alembert's principle, working concepts: motion of vehicles.

UNIT – V

Motion of Projectiles: trajectory, motion of projectile thrown horizontal, vertical and inclined plane. **Rigid Bodies:** Rotation, linear and angular velocity, acceleration, absolute and relative velocity, instantaneous centre of rotation in plane motion, location.

Force and Acceleration: D'Alembert's principle in plane motion.

Work and energy: kinetic energy, work of the force, principle of work and energy, principle of

conversation of energy

TEXT BOOKS:

1. Engineering Mechanics, Timoshenko, Young and J.V. Rao, Tata Mc Graw –Hill education (India) Pvt. Ltd.

2 Engineering Mechanics, R.K.Bansal, Laxmi publications Pvt. Ltd.

REFERENCE BOOKS:

- 1. 1. Engineering Mechanics statics and dynamics R.C.Hibbeler, 11th Edn Pearson Publ.
- 2. Engineering Mechanics, statics J.L.Meriam, 6th Edn Wiley India Pvt Ltd.
- 3. Engineering Mechanics, statics and dynamics I.H.Shames, Pearson Publ.
- 4. Singer's Engineering Mechanics: Statics and Dynamics, K. Vijay Kumar Reddy, J. Suresh Kumar, Bs Publications.
- 5. Engineering Mechanics, Fedinand. L. Singer, Harper Collins.

Course Outcomes:

CO1: To impart the basic concepts of force systems, free body diagram an equilibrium conditions

CO2: To familiarize on calculating the geometric properties like Centroid, moment of inertia of Various Sectional areas and masses.

CO3: Understand the concepts of friction and lifting machines and virtual work its applications.

CO4: To develop the knowledge on basic principles of kinematics and kinetics with simple Applications.

CO5: To introduce applications on using motion of projectiles and workenergy principle.

CO6: To understand the concepts of Kinematics of Curvilinear motion

L	Т	Р	С
1	0	3	2.5

Internal: 30 Marks External: 70 Marks ENGINEERING GRAPHICS & DRAFTING (CIVIL/EEE/ECE)

PRE-REQUISITES: Mathematics, Physics

COURSE OBJECTIVE

• Engineering drawing being the principle method of communication for engineers, the objective is to introduce the students, the techniques of constructing the various types of polygons, curves and scales. The objective is also to visualize and represent the 3D objects in 2D planes with proper dimensioning, scaling etc.

UNIT – I INTRODUCTION TO ENGINEERING DRAWING:

Introduction: Principles of Engineering Graphics and their significance -Drawing Instruments - Geometrical Constructions.

Polygons: Constructing regular polygons by general methods,

inscribing and describing polygons on circles.

Curves: Ellipse ,Parabola and Hyperbola by general methods, **Scales**: Diagonal scales and Vernier scales

UNIT – II

ORTHOGRAPHIC PROJECTIONS: Principle of orthographic projection-Method of Projections – First and third angle projection methods Projections of Points – Projections of straight lines of different orientations - True lengths and traces.

UNIT – III

PROJECTIONS OF PLANES & SOLIDS: Regular planes perpendicular/parallel to one plane and inclined to the other reference plane; inclined to both the reference planes. Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the planes.

UNIT – IV

ISOMETRIC VIEWS: Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

$\mathbf{UNIT} - \mathbf{V}$

COMPUTER AIDED DRAFTING: Introduction – Computer Aided drafting system –Advantages, Applications of AUTOCAD, Drafting software-AUTOCAD-Advantages, Initial setup commands, utility commands, Drawing Aids, Entity Draw commands, Display commands, Edit commands, Lettering & Dimensioning

TEXT BOOKS:

1.N. D. Bhatt, Engineering Drawing, Revised and Enlarged Edition, Charotar publishers,

- 2. Engineering Drawing by Agarwal & Agarwal, Tata McGraw Hill Publishers
- 3. Engineering Drawing + AutoCad K Venugopal, V. Prabhu Raja, New Age

REFERENCE BOOKS:

- 1. Engineering Drawing by K.L.Narayana & P. Kannaiah, Scitech Publishers
- 2. Engineering Graphics for Degree by K.C. John, PHI Publishers
- 3. Engineering Graphics by PI Varghese, McGrawHill Publishers

Course Outcomes:

CO1: Represent the geometrical objects considering BIS standards. **CO2:** Comprehend the basics of orthographic projections and deduce orthographic projections

of a point and a line at different orientations.

CO3: Visualize geometrical planes of different positions in real life environment

CO4: Draw the projection of various of types of solids.

CO5: Imagine orthographic views of various solid objects at different orientations

CO6: Recognize the significance of isometric drawing to relate 2D environment with 3D environment. Learn basics of CAD.

L	Т	Р	С
0	0	2	1

Internal: 20 Marks External: 30 Marks

COMMUNICATIVE ENGLISH LAB

(Common to all branches)

Course Objectives:

To enable the students to learn through practice the communication skills of listening, speaking, reading and writing.

List of Activities

- 1) Introducing yourself
- 2) Greeting
- 3) Thanking and Responding to thanks
- 4) Requesting and Responding to requests
- 5) Making and Responding to complaints
- 6) Apologising and accepting apologies
- 7) Consonants : Plosives, Affricates and Nasals
- 8) Consonants: Fricatives, Liquids and Glides
- 9) Vowels: Pure vowels
- 10) Vowels :Dipthongs
- 11) Consonant clusters
- 12) Word Accent
- 13) Word Stress
- 14) Intonation

Note: Minimum 12 experiments of duration 3 periods must be completed for the eligibility to appear for the semester end examinations. In case if the student fails to get eligibility for semester end exams in the current semester, he has to take the permission of HOD and complete the required number of experiments and appear for semester end exam as and when conducted.

REFERENCE MANUALS:

'INTERACT: English Lab Manual for Undergraduate Students' Published by Orient Blackswan Pvt Ltd 'Strengthen Your Communication Skills' published by Maruthi Publications

Course Outcomes:

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

- CO1 Apply expressions in day to day life
- CO2 Build language proficiency by using patterns
- CO3 Develop communication skills through various language activities CO4 Outline of Letters and Sounds
- CO5 Identify consonants and vowel sounds in phonetic scriptCO6 Understand pronunciation, stress and intonation

I Year - I Semester

Course Code : UR19BSCL101

LTPC 0 0 3 1.5

Internal: 20 Marks External: 30 Marks ENGINEERING PHYSICS LAB

Course objectives:

- To gain practical knowledge by applying the experimental methods to correlate with the Physics theory.
- To learn the usage of electrical and optical systems for various measurements.
- Apply the analytical techniques and graphical analysis to the experimental data.
- To develop intellectual communication skills and discuss the basic principles of scientific concepts in a group.

List of Experiments

- 1. Determination of wavelength of a source-Diffraction Grating-Normal incidence
- 2. Newton's rings -Radius of Curvature of Plano Convex Lens.
- 3. Determination of thickness of a thin object using parallel interference fringes.
- 4. Determination of Rigidity modulus of a material- Torsional Pendulum.
- 5. Determination of Young's modulus by method of single cantilever oscillations.
- 6. Determination of Acceleration due to Gravity and Radius of Gyration-Compound Pendulum.
- 7. Melde's experiment Transverse and Longitudinal modes.
- 8. Verification of laws of stretched string –Sonometer.
- 9. Magnetic field along the axis of a current carrying coil Stewart and Gee's apparatus.
- 10. Determination of Velocity of sound –Volume Resonator.
- 11. Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
- 12. Determination of wavelength of Laser by diffraction grating.
- 13. Determination of particle size using Laser.
- 14. Determination of spring constant of springs using coupled oscillators.
- 15. Determination of Pressure variation using strain Gauge sensor.

Note: Minimum 12 experiments of duration 3 periods must be completed for the eligibility to appear for the semester end examinations. In case if the student fails to get eligibility for semester end exams in the current semester, he has to take the permission of HOD and complete the required number of experiments and appear for semester end exam as and when conducted.

TEXT BOOK:

A Text book of Practical Physics, Balasubramanian S, Srinivasan M.N, S Chand Publishers,2017

Course outcomes:

Upon the completion of course, student will be able to

CO1: operate optical instruments like microscope and spectrometer.

CO2: interpret the thickness of a hair/paper with the concept of interference.

CO3: determine the wavelength and resolving power of different colors using diffraction grating.

CO4: make use of elastic response of loaded beams; estimate the frequency of a vibrating system using standing wave pattern.

CO5: estimate the strength of the magnetic field due to a current carrying coil.

CO6: evaluate the mechanical properties of materials.

I Year - I Semester	Course Code : UR19ESCL101	LTPC
I Year - I Semester	Course Code : UR19ESCL101	LTPO

0 0 3 1.5

Internal: 20 Marks External: 30 Marks

ENGINEERNG WORK SHOP AND IT WORK SHOP

ENGINEERNG WORK SHOP:

Course Objectives:

- To familiarize with the basics of tools and equipments used in fitting, carpentry, Sheet metal and smithy.
- To familiarize with the production of simple modes in the above trades.

NOTE: At least one exercise to be done from each trade.

Trade: Carpentry:

- 1. Cross –Lap joint
- 2. Mortise and Tenon joint
- 3. T-Lap joint

FITTING:

- 1. V-fit
- 2. Square fit
- 3. Dovetail fit

Black Smithy:

- 1. S-Hook
- 2. Round rod to square
- 3. Round rod to Hexagonal headed bolt
- 4. Making simple parts like chisel.

House Wiring:

- 1. Parallel/Series connection of three bulbs
- 2. Stair Case wiring
- 3. Florescent lamp fitting
- 4. Measurement of earth resistance

Tin Smithy:

- 1. Making rectangular tray
- 2. Making scoop
- 3. Making hopper
- 4. Making funnel

IT WORK SHOP:

Course Objectives:

• IT Workshop is to impart basic computer usage and maintenance skills and to introduce you to a suite of productivity tools that will aid in your day to day activities.

- IT workshop works in a learning-by-doing mode. It concentrates more on hands-on experience for the participants rather theoretical classes.
- It enables the participant to make the best use of Microsoft Office Suite in their day-to-day requirements and make use of it to improve the standards in the educational environment.
- The IT Workshop prepares the participant to have a hands-on experience in maintaining and troubleshooting a PC by themselves.
- Task1: Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor
- Task2: Every student should individually install MS windows on the personal computer.
- Task3: Hardware Troubleshooting: Students have to be given a PC which does not boot due to improper assembly or defective peripherals.
- Task 4: Word Orientation: an overview of Microsoft (MS) office 2007/ 10: Importance of MS office 2007/10, overview of toolbars, saving files, Using help and resources, rulers, format painter.
- Task 5: Excel Orientation: The importance of MS office 2007/10 tool Excel as a Spreadsheet tool, Accessing, overview of toolbars, saving excel files, Using help and resources. Creating a Scheduler - Features to be covered:- Gridlines, Format Cells, Summation, auto fill, Formatting Text.
- Task 6: Basic power point utilities and tools which helpful to create basic power point presentation. Topic covered during this includes PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in both Latex and Power point.
- Task 7: Introduction to HTML &Basic syntax of html Attributes, elements, lists, and basic programs, Homepage using HTML Consisting of photo, name, address and education details as a table.

Note: Minimum 12 experiments of duration 3 periods must be completed for the eligibility to appear for the semester end examinations. In case if the student fails to get eligibility for semester end exams in the current semester, he has to take the permission of HOD and complete the required number of experiments and appear for semester end exam as and when conducted.

Course Outcomes:

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

CO1: Identify the peripherals, components of CPU along with the functions of CPU.

CO2: Implement the installation of Windows OS and explain about Hardware Troubleshooting.

CO3: Create HTML Homepage and use MS Office like Word, Excel and Power Point Presentation.

CO4: Apply basic Electrical Engineering knowledge for House-wiring Practice.

CO5: Make different components using Fitting and Carpentry.

CO6: Prepare simple jobs as per specifications using Tinsmithy tools and Blacksmithy Tools.

0 0 0 0

Internal: 20 Marks External: 0 Marks Semester-end: 30 Marks

ENGINEERING PHYSICS - VIRTUAL LAB

(Any 3 of the following listed 12 experiments)

Course objectives:

- To gain practical knowledge by applying the experimental methods to correlate with the Physics theory.
- To learn the usage of electrical and optical systems for various measurements.

LIST OF EXPERIMENTS

- 1. Hall Effect
- 2. Crystal Structure
- 3. Brewster's angle
- 4. Numerical Aperture of Optical fiber
- 5. Photoelectric Effect
- 6. LASER Beam Divergence and Spot size
- 7. Michelson's interferometer
- 8. Black body radiation
- 9. Flywheel -moment of inertia
- 10.AC Sonometer
- 11. Resistivity by four probe method
- 12. Newton's rings –Refractive index of liquid

URL: <u>www.vlab.co.in</u>

Course outcomes:

CO1: Handle optical instruments like microscope and spectrometer CO2: Determine thickness of a hair/paper with the concept of interference

L	Т	Р	С
2	0	0	2

Internal: 30 Marks External: 70 Marks

PROFESSIONAL ENGLISH

(Common to all branches)

Course Objectives:

- Recall and improve the language proficiency of the students in English
- Paraphrase and interpret the ideas and thoughts in a dynamicway
- Prioritize the importance of practical learning of English
- Distinguish the various levels of Listening, Speaking, Reading and writingskills
- Construct statements in writing and speaking in professionalmanner

UNIT – I

Poem: "Enterprise" by

Nissim Ezekiel Grammar:

Types of Sentences

Vocabulary: Synonyms

Writing: Essay Writing

Life-Skills: Values and Ethics

UNIT – II

Text: Like a tree, unbowed:

WangariMaathaiGrammar:

Active Voice & Passive Voice

Vocabulary: Antonyms

Writing: Technical Report Writing Life-Skills: Time Management

UNIT – III

Text: Stay Hungry – Stay Foolish Grammar: Common Errors in Articles and Prepositions Vocabulary: Words Often Confused Writing: Describing People, Places, Objects, Events Life-Skills: Motivation

$\mathbf{UNIT} - \mathbf{IV}$

Story: The Cop and the Anthem by O. HenryGrammar: Common Errors in Subject – Verb agreementVocabulary: Technical Vocabulary

Writing: Note- Making Life-Skills: Rapid Reading

UNIT – V

Short Story: "A Village School Master" by Oliver Gold Smith **Grammar:** CommonErrors

Vocabulary: GRE WordList

Writing: Precise Writing / Information Article

Life-Skills: Career Planning

TEXT BOOK:

1. 'InfoTech English' – MarutiPublications

REFERENCE BOOKS:

- 1. Raymond Murphy, "Murphy's Essential English Grammar" with CD, Cambridge UniversityPress.
- 2. Practical English Usage, Michael Swan, OUP, 1995
- 3. Remedial English Grammar, F.T. Wood, Macmillan, 2007

Course Outcomes:

Upon completion of the course, the students will be able to
CO1: Apply critical thinking to develop writing skills
CO2: Evaluate common errors in grammar
CO3: Describe distinct literary characteristics of poems
CO4: Analyze the characteristics of one-act-plays
CO5: Develop correspondence skills and promotional writing skills
CO6: Evaluate the importance of values and ethics for career planning.

L	Т	Р	С
3	0	0	3

Internal: 30 Marks External: 70 Marks

DIFFERENTIAL EQUATIONS & VECTOR CALCULUS

(Common to all branches)

Course Objectives:

- To enlighten the learners in the concept of differential equations.
- To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real world applications.

UNIT – I

Linear Differential Equations of Higher Order: Definitions, complete solution, operator D, rules for finding complimentary function, inverse operator, rules for finding particular integral with RHS of the forms e^ax, Sinax, Cosax, x^n, e^ax.V and xV. L-C-R Circuit problems.

UNIT – II

First order Partial Differential Equations: Formation of PDE, solutions of Lagrane's linear equation Method of grouping – Method of multipliers, Solution of non-linear PDEs of the forms f(p,q)=0, f(z,p,q)=0, f(x,p)=g(y,q), Z=px+qy+f(p,q).

UNIT – III

Applications of Partial Differential Equations: Method of Separation of variables-One dimensional Wave equation-Two dimensional Heat equation, Laplaceequation.

$\mathbf{UNIT} - \mathbf{IV}$

Vector Differential Calculus: Scalar and vector point functions, Gradient, Directional derivative. Divergence, Curl, Physical interpretation of operators.

$\mathbf{UNIT} - \mathbf{V}$

Vector Integral Calculus: Line integral-work done, surface and volume integrals, Green's theorem in the plane (without proof), Stoke's theorem (without proof), Divergence theorem (without proof).

TEXT BOOK:

1. Higher Engineering Mathematics, B. S. Grewal.

REFERENCE BOOKS:

- 1. Advance Engineering in Mathematics, ErwinKreyszig.
- 2. Vector calculus, Schaum'sseries.

Course Outcomes:

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

CO1: Solve the differential equations related to various engineering fields. **CO2:**Identify solution methods for partial differential equations that model physical processes.

CO3: Apply a range of techniques to find solutions of standard PDEs .

CO4:Classify the nature of the partial differential equations. **CO5:**Interpret the physical meaning of different operators such as gradient, curl and divergence.

CO6: Estimate the work done against a field and circulation using vector calculus.

Internal: 30 Marks External: 70 Marks ENGINEERING CHEMISTRY

(CIVIL)

Course Objectives:

- Importance of usage of Plastics in household appliances and composites (FRP) in aerospace automotiveindustries.
- Select the fuels as a source of energy are a basic need of any industry, particularly industries like thermalpowerstations,steelindustry,fertilizerindustryetc.,and hencetheyareintroduced.
- Construction of galvanic cells as well as some batteries used in instruments are introduced. Understand the mechanism of corrosion which itself is explained by electrochemical theory
- With the increase in demand, a wide variety of materials are coming up; some of them have excellent engineering properties and a few of these materials areintroduced.
- List the differences between temporary and permanent hardness of water and explain the working principles of different Industrial water treatmentprocesses.

UNIT – I

Polymerisation : Introduction- Mechanism of polymerization - Stereo regular polymers – methods of polymerization (emulsion and -Physical and mechanical properties – Plastics suspension) as engineering materials : advantages and limitations - Thermoplastics and Thermosetting plastics - Compounding and fabrication (4 techniques)-Preparation, properties and applications of Polyethene, PVC, Bakelite Elastomers – Natural rubber- compounding and Teflon and vulcanization - Synthetic rubbers : Buna S, Buna N, Thiokol and polyurethanes - Applications of elastomers. Composite materials & Fiber reinforced plastics - Biodegradable polymers - Conducting polymers.

UNIT – II

Fuels: Introduction – Classification – Calorific value - HCV and LCV – Dulong's formula – Bomb calorimeter – Numerical problems – Coal — Proximate and ultimate analysis – Significance of the analyses – Liquid fuels – Petroleum- Refining – Cracking – Synthetic petrol –Petrol knocking – Diesel knocking - Octane and Cetane ratings – Anti-knock agents – Power alcohol – Gaseous fuels – Natural gas. LPG and CNG – Combustion – Calculation of air for the combustion of a fuel – Flue gas analysis – Orsat apparatus – Numerical problems on combustion.

UNIT – III

CORROSION PART-A: ELECTROCHEMISTRY

Introduction-Galvanic cells - Reversible and irreversible cells - Single electrode potential - Electro chemical series and uses of this series-Standard electrodes (Hydrogen and Calomel electrodes) - Concentration Cells – Batteries: Dry Cell - Ni-Cd cells-Li cells. Fuel cells: - Hydrogen Oxygen fuel cells – Methanol Oxygen fuel cells

PART-B: CORROSION

Corrosion:-Definition-Theories of Corrosion (electrochemical and chemical)-Galvanic corrosion, Differential aeration corrosion -Factors which influence the rate of corrosion - Protection from

corrosion– Cathodic protection - Protective coatings: – Surface preparation – Metallic (cathodic and anodic) coatings - Methods of application on metals (Galvanizing, Tinning, Electroplating, Electroless plating)

UNIT – IV

Hard water:- Reasons for hardness – units of hardness - determination of hardness and alkalinity - Water for steam generation - Boiler troubles – Priming and Foaming, Scale formation, Boiler corrosion, Caustic embrittlement - Internal treatments - Softening of Hard water : Zeolite process and Ion Exchange process - Water for drinking purposes Purification – Sterilization and disinfection : Chlorination, Break point chlorination and other methods – Reverse Osmosis and ElectroDialysis.

$\mathbf{UNIT} - \mathbf{V}$

Nano materials:- Introduction – Sol-gel method & chemical reduction method of preparation - Carbon nano tubes-Preparation and applications **Liquid Crystals** :- Types and applications **Green Chemistry** :- Principles-3 methods of synthesis with examples and Applications **Solar Energy:**- Introduction, application of solar energy, photovoltaic cell: design, working and its importance **Refractories:**-Definition, characteristics, classification, properties, failure of refractories.**Cement:**- Constituents, manufacturing, hardening and setting, deterioration of cement .

TEXT BOOKS:

- 1. Engineering Chemistry by Jain and Jain; Dhanpat Rai PublicatingCo.
- 2. Engineering Chemistry by Shikha Agarwal; Cambridge University Press, 2015edition.

REFERENCE BOOKS:

- 1. Engineering Chemistry of Wiley India Pvt. Ltd., Vairam and others, 2014 edition(second).
- 2. Engineering Chemistry by Prasanth Rath, Cengage Learning, 2015edition.
- 3. A text book of engineering Chemistry by S. S. Dara; S. Chand & Co Ltd., LatestEdition
- 4. Applied Chemistry by H.D. Gesser, SpringerPublishers

5. Text book of Nano-science and nanotechnology by B.S. Murthy, P. Shankar and others, University Press,IIM
Course Outcomes:

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

CO1: Understand the advantages and limitations of plastic materials.

CO2:Describe the need of fuels as a source of energy.

CO3: Explain the theory of construction of batteries.

CO4:Study some methods of corrosion control and Categorize the reasons for corrosion.

CO5: Generalize the importance of advanced engineering materials like Nanomaterials, Liquid Crystals, Semiconductors and superconductors.

CO6: Identify the problems associated with impurities in water and how to avoid them.

L	Т	Р	С
3	0	0	3

Internal: 30 Marks External: 70 Marks

ELEMENTS OF CIVIL ENGINEERING

(CIVIL)

Course Objectives:

- Explore the scope of various disciplines of Civil Engineering.
- Perceive the Role of a Civil Engineer in the construction industry.
- Appraise possible avenues of career and entrepreneurial opportunities in the Civil Engineering profession.

UNIT – I

Overview of Civil Engineering

Evolution and broad disciplines of Civil Engineering, works of eminent civil engineers, scopes for a career as a Civil Engineer, Construction industry, Building Dams and Reservoirs & town planning, development of smart cities.

Virtues of the Civil Engineer: Ethics, entrepreneurship, creativity & innovation, soft skills.

UNIT – II Building Planning, Surveying, Construction Technology and Management:

Building Planning, Traditional and modern surveying techniques, Construction materials, recycling of construction materials, construction methods and equipments, management of construction project, sustainability inconstruction, facility management, quality & HSE system sinconstruction.

UNIT – III Structural, Geotechnical, &TransportationEngineering

Structural Engineering: Types of structures, methods of analysis and design of structures, RCC & STEEL structures, Pre-stressed and Pre-fabricatedstructures,

Geotechnical Engineering: Geotechnical investigations, Soil Mechanics and design of foundations, Ground Improvement techniques

Transportation Engineering: Modes of transportation, Highways, Rail ways, Airports, DocsandHarbours, intelligent transportation systems, urbantransportationplanning.

UNIT – IV

Water Resources and Environmental Engineering

Water Resources Engineering: Fundamentals of fluid flow, Irrigation, Ground Water and

SurfaceWater Resources, multi-purpose reservoir projects

Environmental Engineering Water supply systems, water treatment systems, effluent treatment systems, solid waste management, Air pollution control

$\mathbf{UNIT} - \mathbf{V}$

Computational Tools in Civil Engineering

Overview of computational tools, AUTOCAD, Structural Analysis and Design packages like STAADPRO, ETABS, Geo-Spatial Software like Arc-GIS, ERDAS, QGISICT applications in Civil engineering, IoT in Civil engineering, 3Dprinting,

TEXT BOOKS:

- 1. Elements of Civil Engineering by Saikia M.D., B.M.Das, &M.M.Das, PHI Learning Pvt.Ltd.
- 2. Elements of Civil Engineering by Agor, R., KhannaPublications.

REFERENCE BOOKS:

1. Elements of Civil Engineering by SS. Bhavikatti, New

Age International PvtLtd Publishers

2. Raikar, R.V. Elements of Civil Engineering and Engineering Mechanics. LaxmiPublications.

Course Outcomes:

Upon completion of the course, the students will be able to
CO1: Identify various Civil Engineering Streams.
CO2:Express the contents of various specializations of Civil Engineering.
CO3:Judge the role of Civil Engineer in the construction industry.
CO4: Analyze the Virtues of an Ideal Civil Engineer.
CO5:Survey the Concept of Geo-Spatial software's.
CO6:Tell the Concept of IoT and 3D printing.

3 0 0 3

Internal: 30 Marks External: 70 Marks

BASIC ELECTRICAL AND MECHANICAL ENGINEERING

(CIVIL)

Course Objectives:

- To learn the basic principles of electrical law's and analysis of networks.
- To understand the principle of operation and construction details of DC & ACmachines.
- To understand the principle of operation and construction details oftransformer.
- To understand the working principle of ICEngines
- To understand the working principle of Boilers andCompressors.

UNIT – I

Electrical Circuits:Basic definitions, Types of network elements, Ohm's Law, Kirchhoff's Laws, inductive networks, capacitive networks, series, parallel circuits and star-delta and delta-star transformations.

UNIT – IIElectrical Machines

DC MACHINES: Principle of operation of DC generator – emf equation types – DC motor types –torque equation – applications – three point starter, swinburn's Test, speed control methods.

AC MACHINES: Principle of operation of alternators – regulation by synchronous impedance method – principle of operation of 3-Phase induction motor – slip-torque characteristics - efficiency – applications.

UNIT – III

Transformers: Principle of operation of single phase transformers – e.m.f equation – losses –efficiency and regulation.

UNIT – IV

Internal Combustion Engines: Classification of IC engines, basic engine components and nomenclature, working principle of engines, Four strokes

and two stroke petrol and diesel engines, comparison of CI and SI engines, comparison of four stroke and two stroke engines, simple problems such as indicated power, brake power, friction power, specific fuel consumption, brake thermal efficiency, indicated thermal efficiency and mechanical efficiency.

UNIT – V

Steam Boilers & Compressors:Classification of boilers, essentialities of boilers, selection of different types of boilers, study of boilers, boiler mountings and accessories.Reciprocating air compressors: uses of compressed air, work done in single stage and two-stage compression, intercooling.

TEXT BOOKS:

- 1. Basic Electrical Engineering, D.P.Kothari, I.J Nagarath, 2nd Ed., TMHPublications
- 2. Elements of Mechanical Engineering, A. R. Israni, S. M. Bhatt, P. K. Shah, 2nd Ed, BSPublications.

REFERENCE BOOKS:

- 1. Basic Electrical Engineering, M. S. Naidu and S. Kamakshiah, TMHPublications
- 2.A.Text Book of Electrical Technology, A.K.Theraja and B.L.Theraja, S.Chand Publications
- 3. Elements of Mechanical Engineering, M.L.Mathur,
- F.S.Metha& R .P. Tiwari, Jain BrothersPublications.
- 4. Thermal Engineering ,R.K.Rajput, LaxmiPublications.

Course Outcomes:

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

CO1:Analyse the various electrical networks.

CO2: Identify the operation of DC generators,3-point starter and conduct the Swinburne's Test.

CO3:Analyse the performance of transformer.

CO4: Explain the operation of 3-phase alternator and 3-phase induction motors.

CO5: Judge the stress/strain of a mechanical component subjected to loading.

CO6: Classify the performance of components like Boiler, I.C. Engine, Compressor, Steam/Hydraulic turbine, Belt, Rope and Gear.

L	Т	Р	С
3	0	0	3

Internal: 30 Marks External: 70 Marks

PROBLEM SOLVING AND PROGRAMMING USING C (CE/EEE/ECE/CSE/IT)

Course Objectives:

- The objectives of this course are to make the student familiar with 'problem solving using computers, development of algorithms, usage of basic flowchart symbols and designing flowcharts.
- The students can also understand programming language basic concepts, reading and displaying the data, earn the programming skills using selection, iterative control structures, functions, arrays, pointers and files. After completion of this course the student is expected to analyze the real life problem and write programs in C language to solve theproblems.

UNIT – I INTRODUCTION

Problem Solving: Problem solving aspects, Problem solving techniques, Computer as a Problem solving tool, Algorithms-definition, features, criteria. Flowchart-definition, basic symbols, sample flowcharts. Top down design, Implementation of program verification, The efficiency of algorithms, Analysis of algorithms, computational complexity of algorithm, order(O) notation, Worst case & Average case Analysis.

UNIT – II

Basics of C programming language: Introduction to C, structure of a C program, basic data types and sizes, constants, variables, unary, binary and ternary operators, expressions, type conversions, conditional expressions, precedence and order of evaluation, Input and Output statements, Sample Programs.

SELECTION-DECISION MAKING CONDITIONAL CONTROL STRUCTURES: simple-if, if- else, nested if-else, if- else ladder and

switch-case.

ITERATIVE: while-loop, do-while loop and for loop control structures, goto, break and continue statements. Sample Programs.

UNIT – III

FUNCTIONS-basics, parameter passing, storage classes extern, auto, register, static, scope rules, block structure, user defined functions, standard library functions, recursive functions, Recursive solutions for Fibonacci series, towers of Hanoi, header files, C Preprocessor, example c programs :

ARRAYS-concepts, declaration, definition, accessing elements, storing

'elements, 1-D arrays, 2-D arrays and character arrays, Multidimensional arrays, array applications: Matrix operations, checking the symmetricity of a Matrix, Passing 1-D arrays, 2-D arrays to functions, Strings and String Manipulations

UNIT – IV

POINTERS-pointers concepts, initialization of pointer variables, pointers and function arguments, passing by address-dangling memory, address arithmetic, character pointers and functions, pointers to pointers, pointers and -multi-dimensional arrays, dynamic memory management functions, command line arguments

UNIT – V

ENUMERATED, STRUCTURE AND UNION TYPES: Derived typesstructures- declaration, definition and initialization of structures, accessing 'structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typedef, bit-fields, program applications

FILEHANDLING: Concept of a file, text files and binary files, Formatted I/O, File I/O operations

TEXT BOOKS:

- 1. How to Solve it by Computer, R. G. Dromey, Pearson Education, 2019
- 2. ProgramminginC,AshokNKamthane,AmitAshokKamthane,3rdEd ition,PearsonEducation, 2019

REFERENCE BOOKS:

- 1. The C programming Language by Dennis Richie and BrianKernighan
- 2. Programming in C, ReemaThareja,OXFORD
- 3. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, Cengage

Course Outcomes:

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

CO1:Design efficient algorithm for solving a problem.

CO2:Identify various constructs of C programming language efficiently.

CO3:Apply programs using modular approach such as functions.

CO4:Create programs to perform matrix and mathematical applications.

- **CO5:**Understand dynamic memory management and problems using pointers and solving the problems.
- **CO6:**Developreal life applications using structures and also learn about handling the files for storing the data permanently.

L	Т	Р	С
0	0	3	1.5

Internal: 20 Marks External: 30 Marks **PROFESSIONAL ENGLISH LAB**

(Common to all branches)

Course Objectives:

To enable the students to learn through practice the communication skills of listening, speaking, reading and writing.

List of activities:

- 1) Body Language: facial expressions, body posture, gestures
- 2) Body Language: eye movement, touch and the use of space
- 3) JAM
- 4) Extempore
- 5) Debate: Lincoln-Douglas debate and dos and don'ts
- 6) Debate: Formal and Informal debate
- 7) Interview Skills: Formal and Informal Interview
- 8) Interview Skills: Telephonic interview
- 9) Group Discussion: Dos and don'ts, general topics
- 10) Group Discussion: Science and technical topics
- 11) Presentation: Elimination of stage fear and preparation
- 12) Presentation on general topics
- 13) Presentation: using ppt or visual aids.

Note: Minimum 12 experiments of duration 3 periods must be completed for the eligibility to appear for the semester end examinations. In case if the student fails to get eligibility for semester end exams in the current semester, he has to take the permission of HOD and complete the required number of experiments and appear for semester end exam as and when conducted.

REFERENCE MANUALS:

'INTERACT: English Lab Manual for Undergraduate Students' Published by Orient Blackswan Pvt Ltd 'Strengthen Your Communication Skills' published by Maruthi Publications

Course Outcomes:

Upon Completion of the course, the student will be able to:

CO1: Understand different types of body language

CO2: Develop communication skills through various language activities

CO3: Apply critical thinking to get main ideas for debate

CO4: Develop audacity to face an interview

CO5: Build knowledge for discussing topics effectively

CO6: Analyze a topic by making a presentation

Internal: 20 Marks External: 30 Marks

ENGINEERING AND APPLIED CHEMISTRY LAB

Course objectives:

- To gain practical knowledge by applying the experimental methods to correlate with the chemistry theory.
- To learn the usage of electrical systems for various measurements.
- Apply the analytical techniques and graphical analysis to the experimental data.

List of Experiments

- Introduction to Chemistry laboratory-Molarity,Normality,Primary,Secondary standard solutions, Volumetric titrations, Qualitative analysis, Quantitative analysis etc.
- 2. Trial experiment-Estimation of HCl by using standard Na**2**CO**3** solution.
- 3. Estimation of Total hardness of water by using standard EDTA solution.
- 4. Estimation of Zinc using standard EDTA solution.
- 5. Estimation of Copper using standard EDTA solution.
- 6. Estimation of $P^{\mathbf{H}}$ of the given sample solution using $P^{\mathbf{H}}$ meter.
- 7. Conductometric titration between Strong acid and Strong base.
- 8. Conductometric titration between Strong acid and Weak base.
- 9. Potentiometric titration between Strong acid and Strong base.
- 10. Potentiometric titration between Strong acid and Weak base.
- 11. Estimation of KMnO**4** using standard Oxalic acid.
- 12. Determination of Alkalinity of water.
- 13. Determination of Viscosity of given sample by Ostwald viscometer.
- 14. Estimation of Ferric iron using standard K2Cr2O7 solution.
- 15. Estimation of Copper using standard K2Cr2O7 solution.
- 16. Preparation of Bakelite (Demo).

Note: Minimum 12 experiments of duration 3 periods must be completed for the eligibility to appear for the semester end examinations. In case if the student fails to get eligibility for semester end exams in the current semester, he has to take the permission of HOD and complete the required number of experiments and appear for semester end exam as and when conducted.

REFERENCE BOOKS:

- 1. A Textbook of Quantitative Analysis, Arthur J. Vogel.
- 2. Dr. Jyotsna Cherukuris (2012) Laboratory Manual of engineering chemistry-II, VGS Techno Series
- 3. Chemistry Practical Manual, Lorven Publications
- 4. K. Mukkanti (2009) Practical Engineering Chemistry, B.S. Publication.

Course Outcomes:

Upon Completion of the course, the student will be able to

CO1: Utilize different Analytical tools and execute experiments involving estimation of raw materials, finished products and environmental samples etc.

CO2: Utilize modern instruments like Conductometer, pH meter and Potentiometer for the analysis of samples.

CO3: Determine the total hardness present in water for its quality in drinking purpose.

CO4: Estimate the Viscosity of oil and assess its suitability as a lubricant.

CO5: Determine the alkalinity present in water for its quality in drinking purpose.

CO6: Identify the adulteration of lemon juice for Vitamin-C.

I Year - II Semester Course Code : UR19ESCL202

L T P C 0 0 3 1.5

Internal: 20 Marks External: 30 Marks

PROBLEM SOLVING AND PROGRAMMING USING C LAB

Course Objectives:

- Understand the basic concept of C Programming, and its different modules that include conditional and looping expressions, Arrays, Strings, Functions, Pointers, Structures and File programming.
- Acquire knowledge about the basic concept of writing a program.
- Role of constants, variables, identifiers, operators, type conversion and other building blocks of C Language.
- Use of conditional expressions and looping statements to solve problems associated with conditions and repetitions.
- Role of Functions involving the idea of modularity.

Exercise 1

- a) Write a C Program to calculate the area of a triangle.
- b) Write a C program to find the largest of three numbers using ternary operator.
- c) Write a C Program to swap two numbers without using a temporary variable.

Exercise 2

- a) Write a C program to find the 2's complement of a binary number.
- b) Write a C program to find the roots of a quadratic equation.
- c) Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)

Exercise 3

- a) Write a C program to find the sum of individual digits of a positive integer and, also, find 'the reverse of the given number.
- b) Write a C program to generate the first n terms of the Fibonacci sequence.
- c) Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

Exercise 4

- a) Write a C Program to print the multiplication table of a given number.
- b) Write a C Program to read a decimal number and find its equivalent binary number.
- c) Write a C Program to check whether the given number is Armstrong number or not.

Exercise 5

a) Write a C program to interchange the largest and smallest numbers in

the given array.

- b) Write a C program to implement a liner search on a given set of values.
- c) Write a C program to implement binary search on a given set of values.

Exercise 6

- a) Write a C program to implement sorting of an array of elements.
- b) Write a C program to input two m x n matrices, check the compatibility and perform 'addition and multiplication of them.

Exercise 7

Write a C program that uses functions to perform the following operations:

- i. To insert a sub-string into given main string at a given position.
- ii. To delete n characters from a given position in a given string.
- iii. To replace a character of string either from beginning or ending or at a specified location.

Exercise 8

Write a C program that uses functions to perform the following operations using Structure: i) Reading a complex number

ii) Writing a complex number

- iii) Addition of two complex numbers
- iv) Multiplication of two complex numbers

Exercise 9

Write C Programs for the following string operations without using the built in functions

- to concatenate two strings to append a string to another string
- to compare two strings

Exercise 10

- a) Write C Program to find the number of characters in a given string including and excluding spaces.
- b) Write C Program to copy the contents of one string to another string without using string handling functions.
- c) Write C Program to find whether a given string is palindrome or not.
- d) Write a C program to find both the largest and smallest number of an array of integers using call by value and call by reference.

Exercise 11

Write a C program using recursion for the following:

- a) To display sum of digits of given number
- b) To find the factorial of a given integer
- c) To find the GCD (greatest common divisor) of two given integers.
- d) To find Fibonacci sequence

Exercise 12

- a) Write C Program to reverse a string using pointers
- b) Write a C Program to compare two 2D arrays using pointers
- c) Write a C program consisting of Pointer based function to exchange value of two integers using passing by address.

Exercise 13

Examples which explores the use of structures, union and other user defined variables.

Exercise 14

- a) Write a C program. which copies one file to another.
- b) Write a C program to count the number of characters and number of lines in a file.
- c) Write a C Program to merge two files into a third file. The names of the files must be entered using command line arguments.

Note: Minimum 12 experiments of duration 3 periods must be completed for the eligibility to appear for the semester end examinations. In case if the student fails to get eligibility for semester end exams in the current semester, he has to take the permission of HOD and complete the required number of experiments and appear for semester end exam as and when conducted.

Course Outcomes:

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

- **CO1:** Apply and practice logical ability to solve the problems.
- **CO2:** Identify C programming development environment, compiling, debugging, and linking and executing a program using the development environment.
- **CO3**: Analyze the complexity of problems, modularize the problems into small modules and then convert them into programs.
- **CO4:** Apply the in-built functions and customized functions for solving the problems.

CO5: Create C programs using pointers, memory allocation techniques.

CO6: Use files for dealing with variety of problems.

L T P C 0 0 0 0

Internal: 20 Marks External: 0 Marks Semester-end: 30 Marks

ENGINEERING EXPLORATION PROJECT

COURSE OBJECTIVES:

- Build mindsets & foundations essential for designers
- Learn about the Human-Centered Design methodology and understand their real-world applications
- Use Design Thinking for problem solving methodology for investigating illdefined problems.
- Undergo several design challenges and work towards the final design challenge.

Apply Design thinking on the following Streams to

- Project Stream 1: Electronics, Robotics, IOT and Sensors
- Project Stream 2: Computer Science and IT Applications
- Project Stream 3: Mechanical and Electrical tools
- Project Stream4: Eco-friendly solutions for waste management, infrastructure, safety, alternative energy sources, Agriculture, Environmental science and other fields of engineering.

HOW TO PURSUE THE PROJECT WORK?

- The first part will be learning-based-masking students to embrace the methodology by exploring all the phases of design thinking through the wallet/ bag challenge and podcasts.
- The second part will be more discussion-based and will focus on building some necessary skills as designers and learning about complementary material for human- centered design.
- The class will then divide into teams and they will be working with one another for about 2 3 weeks. These teams and design challenges will be the basis for the final project and final presentation to be presented.
- The teams start with **Design Challenge** and go through all the phases more in depth from coming up with the right question to empathizing to ideating to prototyping and to testing.
- Outside of class, students will also be gathering the requirements, identifying the challenges, usability, importance etc
- At the end, Students are required to submit the final reports, and will be evaluated by the faculty.

TASKS TO BE DONE:

Task 1: Everyone is a Designer

• Understand class objectives & harness the designer mindset

Task 2: The Wallet/Bag Challenge and Podcast

• Gain a quick introduction to the design thinking methodology

- Go through all stages of the methodology through a simple design challenge
- Podcast: Observe, Listen and Engage with the surrounding environment and identify a design challenge.

Task 3: Teams & Problems

- Start Design Challenge and learn about teams & problems through this
- Foster team collaboration, find inspiration from the environment and learn how to identify problems.

Task 4: Empathizing

- Continue Design Challenge and learn empathy
- Learn techniques on how to empathize with users
- Go to the field and interview people in their environments
- Submit Activity Card

Task 5: Ideating

- Continue Design Challenge and learn how to brainstorm effectively
- Encourage exploration and foster spaces for brainstorming
- Submit Activity Card

Task 6: Prototyping

- Continue Design Challenge and learn how to create effective prototypes
- Build tangible models and use them as communication tools
- Start giving constructive feedback to classmates and teammates
- Submit Activity Card

Task 7: Testing

- Finish Design Challenge and iterate prototypes and ideas through user feedback
- Evolve ideas and prototypes through user feedback and constructive criticism
- Get peer feedback on individual and group performance
- Submit Activity Card

Task 8:

• Final Report Submission and Presentation

Note: The colleges may arrange for Guest Speakers from Various Design Fields: Graphic Design, Industrial Design, Architecture, Product Design, Organizational Design, etc to enrich the students with Design Thinking Concept.

REFERENCES:

1. Tom Kelly, *The Art of Innovation: Lessons in Creativity From IDEO, America's Leading Design Firm* (Profile Books, 2002)

2. Tim Brown, Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation (HarperBusiness, 2009) 3. Jeanne Liedtka, Randy Salzman, and Daisy Azer, Design Thinking for the Greater Good: Innovation in the Social Sector (Columbia Business School Publishing, 2017)

OTHER USEFUL DESIGN THINKING FRAMEWORKS AND METHODOLOGIES:

- Human-Centered Design Toolkit (IDEO); https://www.ideo.com/post/design-kit
- Design Thinking Boot Camp Bootleg (Stanford D-School); https://dschool.stanford.edu/resources/the-bootcamp-bootleg
- Collective Action Toolkit (frogdesign); https://www.frogdesign.com/wpcontent/ uploads/2016/03/CAT_2.0_English.pdf
- Design Thinking for Educators (IDEO); https://designthinkingforeducators.com/

I Year - II Semester

L	Т	Р	С
0	0	0	0

Internal: 100 Mark External: 0 Marks

CONSTITUTION OF INDIA

(CE,EEE, ME & ECE)

Course Objectives:

- To Enable the student to understand the importance of constitution
- To understand the structure of executive, legislature and judiciary
- To understand philosophy of fundamental rights andduties
- To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of india and election commission ofindia.
- To understand the central and state relation financial and administrative.

UNIT – I

Introduction to Indian Constitution: Constitution' meaning of the term, Indian Constitution - Sources and constitutional history, Features -Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

UNIT – II

Union Government and its Administration Structure of the Indian

Union: Federalism, Centre- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and

Central Secretariat, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions;

UNIT – III

State Government and its Administration Governor - Role and Position - CM and Council of ministers, State Secretariat: Organisation, Structure and Functions

UNIT – IV

A.Local Administration - District's Administration Head - Role and Importance, Municipalities - Mayor and role of Elected Representative -CEO of Municipal Corporation PachayatiRaj: Functions PRI: Zila Panchayat, Elected officials and their roles, CEO Zila Panchayat: Block level Organizational Hierarchy - (Different departments), Village level -Role of Elected and Appointed officials - Importance of grass root democracy.

$\mathbf{UNIT} - \mathbf{V}$

Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissionerate State Election Commission:, Functions of Commissions for the welfare of SC/ST/OBC and women.

TEXT BOOKS:

1.Subash Kashyap, Indian Constitution, National Book Trust 2.J.A. Siwach, Dynamics of Indian Government & Politics

REFERENCE BOOKS:

 Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt. Ltd.. New Delhi
 D.C. Gupta, Indian Government and Politics
 H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication)
 J.C. Johari, Indian Government and Politics Hans
 J. Raj Indian Government and Politics
 M.V. Pylee, Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd.. New Delhi
 Noorani, A.G., (South Asia Human Rights Documentation Centre), Challenges to Civil Right), Challenges to Civil Rights Guarantees in India, Oxford University Press2012.

Course Outcomes:

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

- **CO1:** Explain the concept of Indian constitution and Evaluate Preamble Fundamental Rights and Duties
- **CO2:** Judge the structure of Indian government, Differentiate between the state and central government.
- **CO3:** Explain the role of President and Prime Minister and Know the Structure of Supreme Court and High court.
- **CO4:** Analyze the role Governor and Chief Minister and explain the role of state Secretariat

CO5:

ExplaintheroleofMyerandelectedrepresentativesofMunicipalities,Eval uateZillapanchayat block levelorganization

CO6: Identify the roles of Election Commission apply knowledge and Evaluate various commissions of viz SC/ST/OBC andwomen.

2-Year Syllabus-B.Tech Civil

Course Code: UR19BSC301

II Year - I Semester	Internal: 30 Marks	L	Т	Ρ	С
	External: 70 Marks	3	0	0	3

NUMERICAL METHODS AND TRANSFORMS

(Civil Engineering)

Course Objectives:

- To elucidate the different numerical methods to solve nonlinear algebraic equations.
- To familiarize the students with numerical methods of solving the non-linear equations.
- To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real world applications.

SYLLABUS:

UNIT – I: Solution to algebraic equations

Solution of polynomial and transcendental equations: Bisection method, Regula-Falsi method, Iteration method, Newton-Raphson method.

UNIT – II: Interpolation

Finite differences, interpolation using Newton's forward and backward difference formulae, Gauss forward and backward interpolation formulae, Interpolation with unequal intervals, Newton's divided difference and Lagrange's formulae.

UNIT - III: Numerical integration and Solution of ODE

Numerical integration- trapezoidal rule and Simpson's 1/3rd and 3/8 rules. Ordinary differential equations- Taylor's series, Euler and modified Euler's methods. Runge-Kutta method of fourth order for solving first order ODE.

UNIT – IV: Laplace Transforms

Laplace transforms of elementary functions, Properties of Laplace Transforms of derivatives and integrals, Multiplication by t, Division by t, Inverse Laplace transforms-Method of Partial fractions, Applications of Ordinary differential equations.

UNIT – V: Fourier Transforms

Fourier integral theorem (without proof), Fourier sine and cosine integral, Fourier transforms, Fourier sine and cosine transforms, Properties of Fourier transforms.

TEXT BOOKS:

1. Higher Engineering Mathematics, B.S. Grewal.

REFERENCE BOOKS:

- 1. Advanced Engineering Mathematics, Erwin kreyszig.
- 2. Introductory methods of Numerical Analysis by S.S.Sastri.

Course Outcomes:

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

- **CO1:** Evaluate approximating the roots of polynomial and Transcendental equations by different algorithms.
- **CO2**: Apply Newton's forward & backward interpolation and Lagrange's formulae for equal and unequal intervals.
- **CO3**: Apply definite integral of a function by using different numerical methods.
- **CO4**: Apply definite integral of a function by using different numerical methods.
- **CO5**: Apply the Laplace and Inverse Laplace Transform for different types of functions and evaluate ordinary differential equations using Laplace transform technique.
- **CO6**: Know and be able to apply integral expressions for the forwards and inverse Fourier transform to a range of non periodic waveforms

Course Code: UR19PCCE301

II Year - I Semester	Internal: 30 Marks	L	Т	Ρ	С
	External: 70 Marks	3	0	0	3

STRENGTH OF MATERIALS

Course Objectives:

- To impart preliminary concepts of Strength of Material and Principles of Elasticity and Plasticity Stress strain behavior of materials and their governing laws.
- Introduce student the moduli of Elasticity and their relations
- To impart concepts of Bending Moment and Shear force for beams with different boundary and loading conditions and to draw the diagrams of variation across the length.
- To give concepts of stresses developed in the cross section and bending equations calculation of section modulus of sections with different cross sections
- The concepts above will be utilized in measuring deflections in beams under various loading and support conditions
- To classify cylinders based on their thickness and to derive equations for measurement of stresses across the cross section when subjected to external pressure.

SYLLABUS:

UNIT-I: Simple Stresses and Strains and Strain Energy: Elasticity and plasticity – Types of stresses and strains – Hooke's law – stress – strain diagram for mild steel – Working Stress – Factor of safety – Lateral strain, Poisson's ratio and volumetric strain – Elastic moduli and the relationship between them – Bars of varying section – composite bars – Temperature stresses. Strain Energy – Resilience – Gradual, sudden, impact and shock loadings – simple applications.

UNIT-II: Shear Force And Bending Moment: Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, u.d.l., uniformly varying loads and combination of these loads – Point of contraflexure – Relation between S.F., B.M and rate of loading at a section of a beam

UNIT-III: Flexural Stresses: Theory of simple bending – Assumptions – Derivation of bending equation: M/I = f/y = E/R, Neutral axis – Determination bending stresses – section modulus of rectangular and circular sections (Solid and Hollow), I, T, Angle and Channel sections – Design of simple beam sections.

Shear Stresses: Derivation of formula – Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T angle sections, built up beams, shear centre.

UNIT-IV: Deflection Of Beams: Bending into a circular arc – slope, deflection and radius of curvature–Differential equation for the elastic line of a beam – Double integration and Macaulay's methods – Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, - U.D.L. Uniformly varying load. Mohr's theorems – Moment area method – application to simple cases including overhanging beams.

UNIT–V: Thin And Thick Cylinders: Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and Volumetric strains – changes in diameter, and volume of thin cylinders – Thin spherical shells.

Thick Cylinders: Introduction Lame's theory for thick cylinders – Derivation of Lame's formulae – distribution of hoop and radial stresses across thickness – design of thick cylinders – compound cylinders – Necessary difference of radii for shrinkage – Thick spherical shells.

TEXT BOOKS:

- 1. Strength of Materials by Strength of materials, R. K. Rajput, S. Chand & Co, New Delhi
- 2. Strength of Materials by S. Ramamrutham,

REFERENCE BOOKS:

- 1. Strength of Materials by R.K Bansal, Lakshmi Publications.
- 2. Mechanics of Materials by B.C Punmia, Jain and Jain.
- 3. Mechanics of Materials- by R. C. Hibbler, Pearson; 10 edition
- 4. Mechanics Of Materials by Gere J. M., CBS Publications

Course Outcomes:

- 1. The student will be able to calculate the stresses and strains on application of loads.
- 2. The student will be able to draw the shear force and bending moment diagrams.
- 3. The student will be able to calculate the Flexural and Shear stresses
- 4. The student shall calculate the deflections of Beams.
- 5. The student will be able to analyse thick cylinders.
- 6. The student will be able to analyse thin cylinders.

II Year - I Semester	Internal: 30 Marks	L	Т	Ρ	С
	External: 70 Marks	3	0	0	3

FLUID MECHANICS AND HYDRAULIC MACHINERY Course Objectives:

• To understand the properties of fluids and fluid statics

• To derive the equation of conservation of mass and its application

• To solve kinematic problems such as finding particle paths and stream lines

• To use important concepts of continuity equation, Bernoulli's equation and turbulence, and apply the same to problems

• To analyze laminar and turbulent flows and understand the various flow measuring devices

• To study in detail about boundary layers theory and about the characteristics of hydraulic jump

• To introduce dimensional analysis for fluid flow problems

• To understand the working principles of various types of hydraulic machines and Pumps.

SYLLABUS:

UNIT-I Introduction : Dimensions and units–Physical properties of fluids - specific gravity, viscosity, surface tension, vapour pressure and their influences on fluid motion, pressure at a point, Pascal's law, Hydrostatic law -atmospheric, gauge and vacuum pressures-measurement of pressure. Pressure gauges, Manometers: Differential and Micro Manometers.

Hydrostatics: Hydrostatic forces on submerged plane, Horizontal, Vertical, inclined and curved surfaces –Center of pressure.

UNIT-II Fluid Kinematics: Description of fluid flow, Stream line, path line and streak line and stream tube. Classification of flows: Steady, unsteady, uniform, non-uniform, laminar, turbulent, rotational and irrigational flows – Equation of continuity for one, two, three dimensional flows – stream and velocity potential functions, flow net analysis.

Fluid Dynamics: Surface and body forces – Euler's and Bernoulli's equations for flow along a stream line - Momentum equation and its application – forces on pipe bend.

UNIT-III Measurement of Flow: Pitot tube, Venturi meter and Orifice meter – classification of orifices, small orifice and large orifice, flow over rectangular, triangular, trapezoidal and stepped notches - –Broad crested weirs.

Laminar Flow And Turbulent Flows: Reynold's experiment – Characteristics of Laminar & Turbulent flows, Shear and velocity distributions, Laws of Fluid friction, Hagen-Poiseulle Formula, Flow between parallel plates, Flow through long tubes, hydro dynamically smooth and rough flows.

Closed Conduit Flow: Darcy-Weisbach equation, Minor losses – pipes in series – pipes in parallel – Total energy line and hydraulic gradient line, variation of friction factor with Reynold's number – Moody's Chart, Pipe network problems, Hazen-Williams formula, Hard-Cross Method,

UNIT-IV Basics Of Turbo Machinery: Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes, jet striking centrally and at tip, velocity triangles at inlet and outlet, expressions for work done and efficiency-Angular momentum principle.

Hydraulic Turbines: Layout of a typical Hydropower installation – Heads and efficiencies - classification of turbines. Pelton wheel - Francis turbine - Kaplan turbine - working, working proportions, velocity diagram, work done and efficiency, hydraulic design, draft tube – theory and efficiency. Governing of turbines-surge tanks-unit and specific quantities, selection of turbines, performance characteristics-geometric similarity-cavitation.

UNIT - V PUMPS

Centrifugal-Pumps: Pump installation details-classification-work done-Manometric head-minimum starting speed-losses and efficiencies-specific speed, multistage pumps-pumps in parallel and series - performance of pumps-characteristic curves-NPSH- Cavitation.

Reciprocating Pumps: Introduction, classification, components, working, discharge, indicator diagram, work done and slip.

TEXT BOOKS:

1. Fluid Mechanics, P. N. Modi and S. M. Seth, Standard book house, New Delhi

2.A text of Fluid mechanics and hydraulic machines, R. K. Bansal - Laxmi Publications (P) ltd., New Delhi

REFERENCES BOOKS:

1.Mechanics of Fluids, Merle C. Potter, David C. Wiggert and Bassem H. Ramadan, CENGAGE Learning

2. Fluid Mechanics and Machinery, C.S.P. Ojha, R. Berndtsson and P.N. Chandramouli, Oxford Higher Education.

Course Outcomes: Upon successful completion of this course the students will be able to:

- 1. Understand the various properties of fluids and their influence on fluid motion and Analyze a variety of problems in fluid statics and dynamics.
- 2. Calculate the forces that act on submerged planes and curves. Identify and analyze Various types of fluid flows.
- 3. Apply the integral forms of the three fundamental laws of fluid mechanics to turbulent and laminar flow through pipes and ducts in order to predict relevant pressures, Velocities and forces. Draw simple hydraulic and energy gradient lines.
- 4. Measure the quantities of fluid flowing in pipes, tanks and channels.
- 5. Apply the principals of dimensional analysis and similitude in hydraulic model testing.
- 6. Understand the working principles of various hydraulic machineries and pumps.

II Year - I Semester	Internal: 30 Marks	L	Т	Ρ	С
	External: 70 Marks	3	0	0	3

SURVEYING

Course Objective: To introduce the students to basic principles of surveying, various methods of linear and angles measuring instruments and enable the students to use surveying equipments.

SYLLABUS:

UNIT –I Introduction: definition-Uses of surveying- overview of plane surveying (chain, compass and plane table), Objectives, Principles and classifications – Errors in survey measurements

UNIT –II Distances And Direction: Electronic distance measurements (EDM)- principles of electro optical EDM-Errors and corrections to linear measurements- Compass survey-Meridians, Azimuths and Bearings, declination, computation of angle. Traversing-Purpose-types of traverse-traverse computation-traverse adjustments-Introduction to omitted measurements

UNIT-III Leveling And Contouring: Concept and Terminology, Levelling Instruments and their Temporary and permanent adjustments- method of levelling. Characteristics and Uses of contours- methods of conducting contour surveys.

Theodolite: Description, principles-uses and adjustments – temporary and permanent, measurement of horizontal and vertical angles. Principles of Electronic Theodolite – Introduction to Trigonometrical leveling,.**Tachometric Surveying:** Stadia and tangential methods of Tacheometry. Distance and Elevation formulae for Staff vertical position.

UNIT-IV Curves: Types of curves, design and setting out – simple and compound curves

Introduction to geodetic surveying, Total Station and Global positioning system(GPS)

UNIT-V Computation Of Areas And Volumes: Area from field notes, computation of areas along irregular boundaries and area consisting of regular boundaries. Embankments and cutting for a level section and two level sections with and without transverse slopes, Determination of the capacity of reservoir, volume of barrow pits.

TEXT BOOKS:

- 1. Surveying, Vol No.1, 2 &3, B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain Laxmi Publications Ltd, New Delhi.
- 2. Advance Surveying, Satish Gopi, R. Sathi Kumar and N. Madhu, Pearson Publications.
- 3. Text book of Surveying, C. Venkataramaiah, University press, India Limited.
- 4. Surveying and levelling, R. Subramanian, Oxford University press.

REFERENCE BOOKS:

- 1. Text book of Surveying, S.K. Duggal (Vol No. 1&2), Tata McGraw Hill Publishing Co. Ltd. New Delhi.
- 2. Text book of Surveying, Arora (Vol No. 1&2), Standard Book House, Delhi.
- 3. Higher Surveying, A.M. Chandra, New Age International Pvt ltd.
- 4. Fundamentals of surveying, S.K. Roy PHI learning (P) ltd.
- 5. Plane Surveying, Alak de, S. Chand & Company, New Delhi.

Course Outcomes: Upon successful completion of the course, the student will be able:

- 1. To demonstrate the basic surveying skills
- 2. To use various surveying instruments.
- 3. To perform different methods of surveying
- 4. To compute various data required for various methods of surveying.
- 5. To integrate the knowledge and produce topographical map.
- 6. To integrate the compound curves.

II Year - I Semester	Internal: 30 Marks	L	Т	Р	С
	External: 70 Marks	2	0	0	2

MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Course Objectives:

- The Learning objectives of this paper is to understand the concept and nature of Managerial Economics and its relationship with other disciplines and also to understand the Concept of Demand and Demand forecasting, Production function, Input Output relationship, Cost-Output relationship and Cost-Volume-Profit Analysis.
- To understand the nature of markets, Methods of Pricing in the different market structures and to know the different forms of Business organization and the concept of Business Cycles.
- To learn different Accounting Systems, preparation of Financial Statement and uses of different tools for performance evaluation. Finally, it is also to understand the concept of Capital, Capital Budgeting and the techniques used to evaluate Capital Budgeting proposals.

SYLLABUS:

UNIT-I: Introduction to Managerial Economics and demand Analysis:

Definition of Managerial Economics –Scope of Managerial Economics and its relationship with other subjects –Concept of Demand, Types of Demand, Determinants of Demand-Demand schedule, Demand curve, Law of Demand and its limitations- Elasticity of Demand, Types of Elasticity of Demand and Measurement- Demand forecasting and Methods of forecasting, Concept of Supply and Law of Supply.

UNIT - II: Production and Cost Analysis:

Concept of Production function- Cobb-Douglas Production function-Leontief production function - Law of Variable proportions-Isoquants and Isocosts and choice of least cost factor combination-Concepts of Returns to scale and Economies of scale-Different cost concepts: opportunity costs, explicit and implicit costs- Fixed costs, Variable Costs and Total costs – Cost –Volume-Profit analysis-Determination of Breakeven point(simple problems)-Managerial significance and limitations of Breakeven point.

UNIT- III: Introduction to Markets, Theories of the Firm & Pricing Policies:

Market Structures: Perfect Competition, Monopoly, Monopolistic competition and Oligopoly– Features – Price and Output Determination – Managerial Theories of firm: Marris and Williamson's models – other Methods of Pricing: Average cost pricing, Limit Pricing, Market Skimming Pricing, Internet Pricing: (Flat Rate Pricing, Usage sensitive pricing) and Priority Pricing.

UNIT-IV: Types of Business Organization and Business Cycles:

Features and Evaluation of Sole Trader, Partnership, Joint Stock Company – State/Public Enterprises and their forms – Business Cycles : Meaning and Features – Phases of a Business Cycle.

UNIT-V: Introduction to Accounting & Financing Analysis:

Introduction to Double Entry Systems – Preparation of Financial Statements-Analysis and Interpretation of Financial Statements-Ratio Analysis – Preparation of Funds flow and cash flow statements (Simple Problems)

Capital and Capital Budgeting: Capital Budgeting: Meaning of Capital-Capitalization-Meaning of Capital Budgeting-Time value of money-Methods of appraising Project profitability: Traditional Methods(payback period, accounting rate of return) and modern methods (Discounted cash flow method, Net Present Value method, Internal Rate of Return Method and Profitability Index)

TEXT BOOKS:

- 1. Dr. N. AppaRao, Dr. P. Vijay Kumar: 'Managerial Economics and Financial Analysis', Cengage Publications, New Delhi 2011
- 2. Dr. A. R. Aryasri Managerial Economics and Financial Analysis, TMH 2011
- 3. Prof. J.V.Prabhakararao, Prof. P. Venkatarao. 'Managerial Economics and Financial Analysis', Ravindra Publication.

REFERENCE BOOKS:

- 1. Dr. B. Kuberudu and Dr. T. V. Ramana: Managerial Economics & Financial Analysis, Himalaya Publishing House, 2014.
- 2.V. Maheswari: Managerial Economics, Sultan Chand.2014
- 3. Suma Damodaran: Managerial Economics, Oxford 2011.
- 4. Vanitha Agarwal: Managerial Economics, Pearson Publications 2011.
- 5. Sanjay Dhameja: Financial Accounting for Managers, Pearson.
- 6. Maheswari: Financial Accounting, Vikas Publications.

- 7. S. A. Siddiqui& A. S. Siddiqui: Managerial Economics and Financial Analysis, New Age International Publishers, 2012
- 8. Ramesh Singh, Indian Economy, 7th Edn., TMH2015
- 9. Pankaj Tandon A Text Book of Microeconomic Theory, Sage Publishers, 2015
- 10. Shailaja Gajjala and Usha Munipalle, Universities press, 2015

Course Outcomes:

- 1. The Learner is equipped with the knowledge of estimating the Demand and demand elasticities for a product and the knowledge
- 2. Understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs.
- 3. Understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units.
- 4. The Learner is able to prepare Financial Statements and the usage of various Accounting tools
- 5. Evaluate various investment project proposals with the help of capital budgeting techniques for decision making.
- 6. Understand the concept of Capital Budgeting

Course Code: UR19MC301

II Year - I Semester	Internal: 100 Marks	L	Т	Ρ	С
	External: 00 Marks	0	0	0	0

ENVIRONMENTAL STUDIES

Course Objectives: The objectives of the course is to impart

- Overall understanding of the natural resources
- Basic understanding of the ecosystem and its diversity
- Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities
- An understanding of the environmental impact of developmental activities
- Awareness on the social issues, environmental legislation and global treaties

SYLLABUS:

UNIT-I Multidisciplinary nature of Environmental Studies: Definition, Scope and Importance –Sustainability: Stockholm and Rio Summit– Global Environmental Challenges: Global warming and climate change, Carbon Credits, acid rains, ozone layer depletion, population growth and explosion, effects. Role of information Technology in Environment and human health.

Ecosystems: Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.

UNIT – II Natural Resources: Natural resources and associated problems Forest resources–Use and over–exploitation, deforestation–Timber extraction–Mining, dams and other effects on forest and tribal peopleWater resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problemsMineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, Sustainable mining of Granite, Literate, Coal, Sea and River sands.Food resources: World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems, water logging, salinityEnergy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources Vs Oil and Natural Gas Extraction.Land resources: Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil

erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

UNIT-III Biodiversity and its conservation: Definition: genetic, species and ecosystem diversity- classification - Value of biodiversity: consumptive use, productive use, social-Biodiversity at national and local levels. India as a mega-diversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, man-wildlife conflicts - Endangered and endemic species of India – Conservation of biodiversity: conservation of biodiversity.

UNIT-IV Environmental Pollution: Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards. Role of an individual in prevention of pollution. - Pollution case studies, Sustainable Life Studies. Impact of Fire Crackers on Men and his well being.

Solid Waste Management: Sources, Classification, effects and control measures of urban and industrial solid wastes. Consumerism and waste products, Biomedical, Hazardous and e – waste management.

UNIT-V Social Issues and the Environment: Urban problems related to energy -Water conservation, rain water harvesting-Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issues and possible solutions. Environmental Protection Act -Air (Prevention and Control of Pollution) Act. –Water (Prevention and control of Pollution) Act -Wildlife Protection Act -Forest Conservation Act-Issues involved in enforcement of environmental legislation. -Public awareness.

Environmental Management: Impact Assessment and its significance various stages of EIA, preparation of EMP and EIS, Environmental audit. Ecotourism, Green Campus – Green business and Green politics. The student should Visit an Industry / Ecosystem and submit a report individually on any issues related to Environmental Studies course and make a power point presentation.

TEXT BOOKS:

- 1. Environmental Studies, K. V. S. G. Murali Krishna, VGS Publishers, Vijayawada.
- Environmental Studies, R. Rajagopalan, 2nd Edition, 2011, Oxford University Press.
- 3. Environmental Studies, P. N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani; Pearson Education, Chennai

REFERENCE BOOKS:

- 1. Text Book of Environmental Studies, Deeshita Dave & P. Udaya Bhaskar, Cengage Learning.
- 2. A Textbook of Environmental Studies, Shaashi Chawla, TMH, New Delhi.

- 3. Environmental Studies, Benny Joseph, Tata McGraw Hill Co, New Delhi.
- 4. Perspectives in Environment Studies, Anubha Kaushik, C P Kaushik, New Age International Publishers, 2014.

Course Outcomes: The student should have knowledge on

- 1. The natural resources, ecology, Biodiversity, and conservation of natural resources
- 2. Various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices
- 3. Social issues both rural and urban environment and the possible means to combat the challenges
- 4. The Environmental Impact Assessment and environmental legislations of India and global initiatives towards sustainable development.
- 5. Understand the concept of Biodiversity and its conservation
- 6. Understand the concept of Solid Waste Management

Course Code: UR19PCCEL301

II Year - I Semester	Internal: 20 Marks	L	Т	Ρ	С
	External: 30 Marks	0	0	3	1.5

MATERIAL TESTING LAB

Course Objective:

To test the basic properties of steel bar and Concrete **LIST OF EXPERIMENTS:**

1. Tension test on Steel bar

2.Bending test on (Steel / Wood) Cantilever beam.

3.Bending test on simple support beam.

- 4. Torsion test
- 5.Hardness test
- 6.Spring test
- 7. Compression test on wood or concrete
- 8.Impact test

9.Shear test

- 10. Verification of Maxwell's Reciprocal theorem on beams.
- 11. Use of Electrical resistance strain gauges
- 12. Continuous beam deflection test.

LIST OF MAJOR EQUIPMENT:

UTM for conducting tension test on rods Steel beam for flexure test Wooden beam for flexure test Torsion testing machine Brinnell's / Rock well's hardness testing machine Setup for spring tests Compression testing machine Izod Impact machine Shear testing machine Beam setup for Maxwell's theorem verification. Continuous beam setup Electrical Resistance gauges

Course Outcomes:

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

- 1. Determine the Tension test on Steel bar
- 2. Determine the bending test on simple support beam.

Note: Minimum 10 experiments of duration 3 periods each must be completed for the eligibility to appear for the semester end examinations.

Incase if the student fails to get eligibility for semester end examinations in the current semester, he has to take the permission of HOD and complete the required number of experiments and appear for the semester end examination as and when conducted.

Course Code: UR19PCCEL302

II Year - I Semester	Internal: 20 Marks	L	Т	Р	С
	External: 30 Marks	0	0	3	1.5

FLUID MECHANICS AND HYDRAULIC MACHINERY LAB

Course Objective:

To test the basic properties of Water

List of Experiments

1. Calibration of Venturimeter & Orifice meter

- 2.Determination of Coefficient of discharge for a small orifice by a constant head method.
- 3. Determination of Coefficient of discharge for an external mouth piece by variable head method.
- 4. Calibration of contracted Rectangular Notch and /or Triangular Notch
- 5. Determination of Coefficient of loss of head in a sudden contraction and friction factor.
- 6. Verification of Bernoulli's equation.
- 7.Impact of jet on vanes

8. Study of Hydraulic jump.

- 9. Performance test on Pelton wheel turbine
- 10. Performance test on Francis turbine.
- 11. Efficiency test on centrifugal pump.
- 12. Efficiency test on reciprocating pump.

List of Equipment:

Venturimeter setup.

Orifice meter setup.

Small orifice setup.

External mouthpiece setup.

Rectangular and Triangular notch setups.

Friction factor test setup.

Bernoulli's theorem setup.

Impact of jets.

Hydraulic jump test setup.

Pelton wheel and Francis turbines.

Centrifugal and Reciprocating pumps.

Course Outcomes:

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

- 1. Determine the Coefficient of loss of head of water
- 2. Determine the Coefficient of discharge

Note: Minimum 10 experiments of duration 3 periods each must be completed for the eligibility to appear for the semester end examinations.

Incase if the student fails to get eligibility for semester end examinations in the current semester, he has to take the permission of HOD and complete the required number of experiments and appear for the semester end examination as and when conducted.

Course Code: UR19PCCEL303

II Year - I Semester	Internal: 20 Marks	L	Т	Ρ	С
	External: 30 Marks	0	0	3	1.5

SURVEY LAB [FIELD WORK]

Course Objective:

To have the ability to apply knowledge of mathematics, science, and engineering to understand the measurement techniques and equipment used in land surveying.

List of Field Works:

- 1. Survey by chain survey of road profile with offsets in case of road widening.
- 2. Survey in an area by chain survey (Closed circuit)
- 3. Determination of distance between two inaccessible points by using compass.
- 4. Finding the area of the given boundary using compass (Closed Traverse)
- 5. Plane table survey; finding the area of a given boundary by the method of Radiation
- 6. Plane table survey; finding the area of a given boundary by the method of intersection.
- 7. Fly levelling : Height of the instrument method (differential levelling)
- 8. Fly levelling: Rise and fall method.
- 9. Theodolite Survey: Determining the Horizontal and Vertical Angles by the method of repetition method.
- 10. Theodolite Survey: Finding the distance between two inaccessible points.
- 11. One Exercise on Curve setting and contours.
- 12. Total Station: Introduction to total station and practicing setting up, levelling up and elimination of parallax error.
- 13. Total Station: Determination of area using total station.
- 14. Total Station: Traversing And Contouring

15. Total Station: Determination of Remote height and distance between two inaccessible Points

Course Outcomes: Upon successful completion of this course, student will be able to

1. Determine the need for accurate and thorough note taking in field work to serve as a legal record.

2. Gain the ability to use modern survey equipment to measure angles and distances.

Note: Minimum 12 experiments of duration 3 periods each must be completed for the eligibility to appear for the semester end examinations.

Incase if the student fails to get eligibility for semester end examinations in the current semester, he has to take the permission of HOD and complete the required number of experiments and appear for the semester end examination as and when conducted.

Course Code: UR19BSC406

II Year - II SemesterInternal: 30 MarksLTPCExternal: 70 Marks3003

PROBABILITY AND STATISTICS

(Civil Engineering)

Course Objectives:

- To familiarize the students with the foundations of probability and statistical methods.
- To impart probability concepts and statistical methods in various applications in Engineering.

SYLLABUS:

UNIT – I: RANDOM VARIABLES AND DISTRIBUTIONS

Introduction, Random variables, Distribution function, Discrete Distributions- Binomial and Poisson distributions; Continuous distribution Normal, Gamma and exponential distributions.

UNIT – II: MOMENT AND GENERATING FUNCTION

Introduction – Mathematical expectation and properties – Moment generating function – Moments of standard distributions (Binomial, Poisson, Normal and exponential distributions).

UNIT – III: SAMPLING THEORY

Introduction – Population and samples – Sampling distribution of mean for large and small samples (with known and unknown variance) Proportion sums and differences of means – Sampling distribution of variance – Point and interval estimators for means and proportions.

UNIT – IV: TEST OF HYPOTHESIS

Introduction - Type I & Type II errors – maximum error – one tail, two tail tests – Tests concerning one mean and proportion, two means – Proportions and their differences using Z-test, Students' test – F-test and Chi-Square test.

UNIT - V: CURVE FITTING AND CORRELATION

Introduction – Fitting a straight line – Second degree curve – exponential curve – power curve by method of least squares. Simple Correlation and regression – Rank Correlation.

TEXT BOOKS:

1. Probability & Statistics for Engineers, Miller and Freund.

Reference Books:

1. Fundamentals of mathematical statistics, S.C.Gupta & V.K.Kapoor.

Course Outcomes:

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

- **CO1**: Make use of concepts of probability and their Applications.
- **CO2**: Apply discrete and continuous probability distributions.
- **CO3**: Infer the statistical inferential methods based on small and large sampling tests.
- **CO4**: Design the components of classical hypothesis test.
- **CO5**: Fit a curve to the numerical data.
- **CO6**: Interpret the association of characteristics through correlation and regression tools.

Course Code: UR19PCCE401

II Year - II Semester	Internal: 30 Marks	L	Т	Ρ	С
	External: 70 Marks	3	0	0	3

ENGINEERING GEOLOGY

Course Objectives:

The objective of this course is:

- To introduce the Engineering Geology as a subject in Civil Engineering
- To enable the student to use subject in civil engineering applications.
- To know the Geological history of India.

SYLLABUS:

UNIT-I: Introduction: Branches of Geology, Importance of Geology in Civil Engineering with case studies

Weathering: Weathering of rocks, Geological agents, weathering process of Rock, River process and their development.

UNIT-II Mineralogy and Petrology: Definitions of mineral, Structures of silicates and rock, Different methods of study of mineral and rock, The study of physical properties of minerals and rocks for megascopic study for the following minerals and rocks, Common rock forming minerals are Feldspar, Quartz Group, Olivine, Augite, Hornblende, Mica Group, Asbestos, Talc, Chlorite, Kyanite, Garnet, Calcite and other ore forming minerals are Pyrite, Hematite, Magnetite, Chlorite, Galena, Pyrolusite, Graphite, Chromite, Magnetite And Bauxite. Classification, structures, textures and forms of Igneous rocks, Sedimentary rocks, Metamorphic rocks, and their megascopic study of granite varieties, (pink, gray, green). Pegmatite, Dolerite, Basalt etc., Shale, Sand Stone, Lime Stone, Laterite, Quartzite, Gneiss, Schist, Marble, Khondalite and Slate and their importance in Civil Engineering.

UNIT-III Structural Geology: Strike, Dip and Outcrop study of common geological structures associating with the rocks such as Folds, Faults, Joints and Unconformities- parts, types, mechanism and their importance in Civil Engineering–Indian stratigraphy. Aims of statigrtaphy, Principles, Geological time scour, Geological division in India, Major stratigraphic units in India.

UNIT-IV Ground Water: Water table, Cone of depression, Geological controls of Ground Water Movement, Ground Water Exploration Techniques.

Earthquakes And Land Slides: Terminology, Classification, causes and effects, Shield areas and Seismic bells, Richter scale intensity, Precautions of building constructions in seismic areas. Classification of Landslides, Causes and Effects, measures to be taken prevent their occurrence at Landslides. Case studies.

UNIT-V Geophysics: Importance of Geophysical methods, Classification, Principles of Geophysical study by Gravity method, Magnetic method, Electrical methods, Seismic methods, Radiometric method and Electrical resistivity, Seismic refraction methods and Engineering properties of rocks. **Geology of Dams, Reservoirs And Tunnels:** Types and purpose of Dams, Geological considerations in the selection of a Dam site. Life of Reservoirs Purpose of Tunnelling, effects, Lining of Tunnels. Influence of Geology for successful Tunnelling.

TEXT BOOKS:

- 1. Engineering Geology, N. Chenna Kesavulu, Laxmi Publications, 2nd Edition, 2014.
- 2. Engineering Geology, Subinoy Gangopadhay, Oxford University press.

REFERENCE BOOKS:

1. Engineering Geology, D. Venkat Reddy, Vikas Publishing House pvt. Ltd, 2013.

2. Engineering Geology, Vasudev Kanithi, University Press.

3. Engineering Geology for Civil Engineers P. C. Varghese, PHI learning pvt. Ltd.

4. Fundamentals of Engineering Geology' P.G. Bell, B. S. P. Publications, 2012

5. Geology for Engineers and Environmental Society, Alan E Kehew, person publications, 3^{rd} edition.

6. Engineer's Geology by S. K. Duggal, H.K. Pandey, N. Rawd, McGraw Hill education.

7. Engineering Geology, K. S. Valdiya, McGraw Hill.

8. Environmental Geology, K. S
 Valdiya, Mcgraw Hill Publications, $2^{\rm nd}$ Edition.

Course Outcomes: Upon the successful completion of this course, the students will be able to:

- 1. Identify and classify the geological minerals, Measure the rock strengths of various rocks
- 2. Classify and measure the earthquake prone areas to practice the hazard zonation
- 3. Prepares, analyses and interpret the Engineering Geologic maps
- 4. Analyses the ground conditions through geophysical surveys.
- 5. Test the geological material and ground to check the suitability of civil engineering project construction.
- 6. Investigate the project site for mega/mini civil engineering projects. Site selection for mega engineering projects like Dams, Tunnels, disposal sites etc...

Course Code: UR19PCCE402

II Year - II Semester	Internal: 30 Marks	L	Т	Ρ	С
	External: 70 Marks	3	0	0	3

CONSTRUCTION MATERIALS AND CONCRETE TECHNOLOGY

Course Objectives:

• Initiating the student with the knowledge of basic building materials and their

Properties.

• Imparting the knowledge of course pattern in masonry construction and flat roofs and techniques of forming foundation, columns, beams, walls, sloped and flat roofs.

• The student is to be exposed to the various patterns of floors, walls, different types of paints and varnishes.

• Imparting the students with the techniques of formwork and scaffolding.

• The students should be exposed to classification of aggregates, moisture content of the aggregate.

• To learn the test procedures for the determination of properties of concrete.

• To understand durability properties of concrete in various environments

SYLLABUS:

UNIT I: Stones, Bricks, Tiles and Wood

Properties of building stones – relation to their structural requirements, classification of stones – stone quarrying – precautions in blasting, dressing of stone, composition of good brick earth, various methods of manufacturing of bricks.

Characteristics of good tiles - Manufacturing methods& types of tiles. Uses of materials like

Aluminum, Gypsum, Glass and Bituminous materials

Wood: Structure – Properties- Seasoning of timber-Classification of various types of woods used in buildings- Defects in timber. Alternative materials for wood–Galvanized Iron, Fiber Reinforced Plastics, Steel, Aluminum.

UNITII: Building Components Lintels, arches, vaults, stair cases – types. Different types

Of floors – Concrete, Mosaic, Terrazzo floors, Pitched, flat roofs. Lean to roof, Coupled

Roofs. Trussed roofs – King and Queen post Trusses. R.C.C Roofs, Madras Terrace and Pre fabricated roofs.

Building Finishings Damp Proofing and water proofing materials and uses – Plastering Pointing, white washing and distempering. Paints: Constituents of paint – Types of paints – Painting of new/old wood-Varnish. Form Works and Scaffoldings.

UNIT III: Materials for making Mortar and concrete:

Lime: Lime manufacture, properties, hardening of lime, types of lime, lime concrete uses, cement, aggregates, water, characteristics, properties and uses of Pozzolana materials, Types of mortars, special mortars, properties and applications, admixtures

Cement: Portland cement- Chemical Composition – Hydration, setting and fineness of cement. Various types of cement and their properties. Various field and laboratory tests for Cement. Various ingredients of cement concrete and their importance – various tests for concrete.

Aggregates: Classification of aggregate – Particle shape & texture– Bond, strength & other mechanical properties of aggregates– Engineering Properties–Thermal properties– Sieve analysis– Fineness modulus– Grading curves–Grading of fine & coarse Aggregates.

Water - General Requirements & limiting values of impurities. Quality of mixing water

Admixtures–Mineral and chemical admixtures–accelerators, retarders, air trainers, plasticizers, super plasticizers, fly ash and silica fume.

UNIT IV Elasticity, Creep& Shrinkage, Modulus of elasticity, Dynamic modulus of elasticity, Poisson's ratio, Creep of concrete, Factors influencing creep, Relation between creep & time, Nature of creep, Effects of creep – Shrinkage –types of shrinkage. Durability and permeability of concrete: Definitions, causes, carbonation, cracking

UNIT V Fresh Concrete& Hardended Concrete: Steps in Manufacture of Concrete-proportion, mixing, placing, compaction, finishing, curing – including various types in each stage. Properties of fresh concrete-Workability – Factors affecting workability – Measurement of workability by different tests, Setting times of concrete, Effect of time and temperature on workability – Segregation & bleeding – Mixing and vibration of concrete, Shotcrete

Hardened Concrete: Water/Cement ratio-Abram's Law- Gel space ratio-Nature of strength of concrete-Maturity concept-Strength in tension & compression-Factors affecting strength – Relation between compression & tensile strength- Curing, Testing of Hardened Concrete.

Mix Design: Factors in the choice of mix proportions–Durability of concrete–Quality Control of concrete–Statistical methods–Acceptance criteria–Concepts Proportioning of concrete mixes by various methods–BIS method of mix design.

TEXT BOOKS:

1. Building Materials, S. S. Bhavikatti, Vices publications House private ltd.

2. Building Construction, S. S. Bhavikatti, Vices publications House private ltd.

3. Building Materials, B. C. Punmia, Laxmi Publications private ltd.

4. Building Construction, B.C. Punmia, Laxmi Publications (p) ltd.

5. Concrete Technology, M. S. Shetty. - S. Chand & Company

6. Concrete Technology, A. R. Santha Kumar, Oxford University Press, New Delhi

REFERENCE BOOKS:

1. Building Materials, S. K. Duggal, New Age International Publications.

2. Building Materials, P. C. Verghese, PHI learning (P) ltd.

3. Building Materials, M. L. Gambhir, Tata McGraw Hill Publishing Co. Ltd. New Delhi.

4. Building construction, P. C. Verghese, PHI Learning (P) Ltd.

5. Building Materials, Construction and Planning, S. Mahaboob Basha, Anuradha Publications, Chennai

6. Properties of Concrete, A. M. Neville – PEARSON – 4th edition

7. Concrete Technology, M.L. Gambhir. – Tata Mc. Graw Hill Publishers, New Delhi

COURSE OUTCOMES: Upon the successful completion of the course:

- 1. The student should be able to identify different building materials and their importance in building construction.
- 2. The student is expected to differentiate brick masonry, stone masonry construction and use of lime and cement in various constructions.
- 3. The student should have learnt the importance of building components and finishings.
- 4. The student is expected to know the classification of aggregates
- 5. The student is expected to know the sieve analysis
- 6. The student is expected to know the moisture content usually required in building Construction.

Course Code: UR19PCCE403

II Year - II SemesterInternal: 30 MarksLTPCExternal: 70 Marks3003

GEOTECHNICAL ENGINEERING

Course Objectives: The objective of this course is:

• To enable the student to find out the index properties of the soil and classify it.

•To impart the concept of seepage of water through soils and determine the seepage discharge.

• To enable the students to differentiate between compaction and consolidation of soils and to determine the magnitude and the rate of consolidation settlement.

• To enable the student to understand the concept of shear strength of soils, assessment of the shear parameters of sands and clays and the areas of their application

•To enable the student to compute immediate and consolidation settlements of shallow foundations.

•To impart the principles of important field tests such as SPT and Plate bearing test.

•To enable the student to imbibe the concepts of pile foundations and determine their load carrying capacity.

SYLLABUS:

UNIT-I Introduction: Soil formation – soil structure and clay mineralogy – Adsorbed water – Mass- volume relationship –Relative density, Mechanism of compaction – factors affecting – effects of compaction on soil properties - compaction control.

Index Properties of Soils: Grain size analysis – Sieve and Hydrometer methods– consistency limits and indices – Various Types of soil Classifications – Unified soil classification and I.S. Soil classification.

UNIT –II Permeability: Soil water–capillary rise– One dimensioned flow of water through soils– Darcy's law-permeability–Factors affecting–laboratory determination of coefficient of permeability–Permeability of layered systems. Total, neutral and effective stresses –quick sand condition–2-D flow and Laplace's equation-Seepage through soils – Flow nets: Characteristics and Uses.

Stress Distribution in Soils: Stresses induced by applied loads-Boussinesq and Westergaard's theories for point loads and areas of different shapes– Newmark's influence chart – 2:1 stress distribution method. **UNIT – III Consolidation:** Compressibility of soils – e-p and e-log p curves – Stress history – Concept of consolidation – Spring Analogy – Terzaghi's theory of one-dimensional Consolidation – Time rate of consolidation and degree of consolidation – Determination of coefficient of consolidation (c_v) – Over consolidated and normally consolidated clays.

Shear Strength of Soils: Basic mechanism of shear strength - Mohr – Coulomb Failure theories – Stress-Strain behavior of Sands - Critical Void Ratio – Stress-Strain behavior of clays – Shear Strength determination- various drainage conditions.

UNIT – IV Stability of Slopes: Infinite and finite earth slopes in sand and clay – types of failures – factor of safety of infinite slopes – stability analysis by Swedish arc method, standard method of slices – Taylor's Stability Number-Stability of slopes of dams and embankments – different conditions.

Earth Retaining Structures: Rankine's & Coulomb's theory of earth pressure – Culmann's graphical method - earth pressures in layered soils.

Soil Exploration: Need – Methods of soil exploration – Boring and Sampling methods – Field tests – Penetration Tests – Pressure meter – planning of Programme and preparation of soil investigation report.

UNIT-V Shallow Foundations – Bearing Capacity Criteria: Types of foundations and factors to be considered in their location - Bearing capacity – criteria for determination of bearing capacity – factors influencing bearing capacity – analytical methods to determine bearing capacity – Terzaghi's theory - IS Methods. Settlement Criteria: Safe bearing pressure based on N- value – allowable bearing pressure; safe bearing capacity and settlement from plate load test – Types of foundation settlements and their determination - allowable settlements of structures.

Pile Foundations: Types of piles – Load carrying capacity of piles based on static pile formulae – Dynamic pile formulae– Pile load tests - Load carrying capacity of pile groups in sands and clays.

Well Foundations: Types – Different shapes of well – Components of well – functions – forces acting on well foundations - Design Criteria – Determination of steining thickness and plug - construction and Sinking of wells – Tilt and shift.

TEXT BOOKS:

- 1. Basic and Applied Soil Mechanics, Gopal Ranjan and A. S. R. Rao, New Age International Publishers.
- 2. Soil Mechanics and Foundation Engineering, V. N. S. Murthy, CBS publishers.
- 3. Kameswara Rao, N.S.V., "Dynamics soil tests and applications", Wheeler Publishing, New Delhi, 2000.

4. Moore, P.J., "Analysis & Design of Foundations for Vibrations", Oxford & IBH, 2006.

REFERENCE BOOKS:

1. Fundamentals of Soil Mechanics, D. W. Taylor, Wiley.

2. An introduction to Geotechnical Engineering, Holtz and Kovacs; Prentice Hall.

3. Fundamentals of Geotechnical Engineering, B M Das, Cengage Learning, New Delhi.

4. Vaidyanathan, C.V., and Srinivasalu, P., "Handbook of Machine Foundations", McGraw Hill, 1995.

Course Outcomes: Upon the successful completion of this course

1. The student must know the definition of the various parameters related to soil mechanics and establish their inter-relationships.

2. The student should be able to know the methods of determination of the various index properties of the soils and classify the soils.

3. The student should be able to know the importance of the different engineering properties of the soil such as compaction, permeability, consolidation and shear strength and determine them in the laboratory.

4. The student should be able to apply the above concepts in day-today civil engineering practice

5. The student must be able to compute the magnitude of foundation settlement to Decide the size of the foundation.

6. The student must be able to use the field test data and design Piles based on the principles of bearing capacity

Course Code: UR19PCCE404

II Year - II Semester	Internal: 30 Marks	L	Т	Ρ	С
	External: 70 Marks	3	0	0	3

MECHANICS OF SOLIDS

Course Objectives

• To give concepts of Principal stresses and strains developed in cross section of the beams on the cross section and stresses on any inclined plane. To impart concepts of failures in the material considering different theories

• To give concepts of torsion and governing torsion equation, and there by calculate the power transmitted by shafts and springs and design the cross section when subjected to loading using different theories of failures.

• To classify columns and calculation of load carrying capacity and to assess stresses due to axial and lateral loads for different edge conditions and to calculate combined effect of direct and bending stresses on different engineering structures.

• Introduce the concept of unsymmetrical bending in beams Location of neutral axis Deflection of beams under unsymmetrical bending.

• Impart concepts for determination of Forces in members of plane pinjointed perfect trusses by different methods

SYLLABUS:

UNIT- I Principal Stresses And Strains And Theories Of Failures: Introduction – Stresses on an inclined section of a bar under axial loading – compound stresses – Normal and tangential stresses on an inclined plane for biaxial stresses – Two perpendicular normal stresses accompanied by a state of simple shear – Mohr's circle of stresses – Principal stresses and strains – Analytical and graphical solutions.

Theories Of Failures: Introduction – Various Theories of failures like Maximum Principal stress theory – Maximum Principal strain theory – Maximum shear stress theory – Maximum strain energy theory – Maximum shear strain energy theory.

UNIT-II Torsion Of Circular Shafts And Springs: Theory of pure torsion – Derivation of Torsion equations: $T/J = q/r = N\varphi/L$ – Assumptions made in the theory of pure torsion –Torsional moment of

resistance – Polar section modulus – Power transmitted by shafts – Combined bending and torsion and end thrust – Design of shafts according to theories of failure.

Springs: Introduction – Types of springs – deflection of close and open coiled helical springs under axial pull and axial couple – springs in series and parallel – Carriage or leaf springs.

UNIT- III Columns And Struts: Introduction – Types of columns – Short, medium and long columns – Axially loaded compression members – Crushing load – Euler's theorem for long columns- assumptionsderivation of Euler's critical load formulae for various end conditions – Equivalent length of a column – slenderness ratio – Euler's critical stress – Limitations of Euler's theory – Rankine – Gordon formula – Long columns subjected to eccentric loading – Secant formula – Empirical formulae – Straight line formula – Prof.Perry's formula.

Laterally loaded struts – subjected to uniformly distributed and concentrated loads – Maximum B.M. and stress due to transverse and lateral loading.

UNIT-IV Direct And Bending Stresses: Stresses under the combined action of direct loading and B.M. Core of a section – determination of stresses in the case of chimneys, retaining walls and dams – conditions for stability – stresses due to direct loading and B.M. about both axis.

UNIT-V Unsymmetrical Bending: Introduction – Centroidal principal axes of section – Graphical method for locating principal axes – Moments of inertia referred to any set of rectangular axes – Stresses in beams subjected to unsymmetrical bending – Principal axes –Resolution of bending moment into two rectangular axes through the centroid – Location of neutral axis Deflection of beams under unsymmetrical bending.

Analysis Of Pin-Jointed Plane Frames: Determination of Forces in members of plane pin-jointed perfect trusses by (i) method of joints and (ii) method of sections. Analysis of various types of cantilever and simply supported trusses by method of joints, method of sections.

TEXT BOOKS:

- 1. Mechanics of Materials- by R. C. Hibbler, Pearson.
- 2. Strength of materials by R. K Rajput, S.Chand and Co.

REFERENCE BOOKS:

- 1. Strength of Materials by R. Subramanian, Oxford Publications
- 2. Mechanics of Materials by B.C Punmia, Jain and Jain.
- 3. Strength of materials by R. K. Bansal, Lakshmi Publications.

Course Outcomes: Upon successful completion of this course

1. The student will be able to understand the basic concepts of Principal stresses developed in a member when it is subjected to stresses along different axes

2. The student can asses stresses in different engineering applications like shafts, & springs

3. The student will be able to assess columns and struts subjected to different loading conditions

4. The student will be able to assess direct and bending stresses and combined stresses

5. The student will be able to understand the behavior of unsymmetrical bending

6. The student will be able to find forces in different types of pin joined frames.

Course Code : UR19HM405

II Year - II Semester	Internal: 30 Marks	L	Т	Р	С
	External: 70 Marks	2	0	0	2

PROFESSIONAL ETHICS AND HUMAN VALUES

COURSE OBJECTIVE:

1. To give basic insights and inputs to the student to inculcate Human values to grow as a responsible human beings with proper personality.

2. Professional Ethics instills the student to maintain ethical conduct and discharge their professional duties.

SYLLABUS:

UNIT I: Human Values:

Morals, Values and Ethics – Integrity –Trustworthiness - Work Ethics – Service Learning – Civic Virtue – Respect for others – Living Peacefully – Caring – Sharing – Honesty –Courage – Value Time – Co-operation – Commitment – Empathy – Self confidence – Spirituality- Character. Principles for Harmony: Truthfulness – Customs and Traditions -Value Education – Human Dignity – Human Rights – Fundamental Duties -Aspirations and Harmony (I, We & Nature) – Gender Bias - Emotional Intelligence – Salovey – Mayer Model – Emotional Competencies – Conscientiousness.

UNIT II: Engineering Ethics and Social Experimentation:

History of Ethics - Need of Engineering Ethics - Senses of Engineering Ethics- Profession and Professionalism —Self Interest - Moral Autonomy – Utilitarianism – Virtue Theory - Uses of Ethical Theories - Deontology-Types of Inquiry –Kohlberg's Theory - Gilligan's Argument –Heinz's Dilemma - Comparison with Standard Experiments — Learning from the Past –Engineers as Managers – Consultants and Leaders – Balanced Outlook on Law - Role of Codes – Codes and Experimental Nature of Engineering.

UNIT III: Engineers' Responsibilities towards Safety and Risk:

Concept of Safety - Safety and Risk - Types of Risks - Voluntary v/s Involuntary Risk - Consequences - Risk Assessment - Accountability -Liability - Reversible Effects - Threshold Levels of Risk - Delayed v/s Immediate Risk - Safety and the Engineer - Designing for Safety - Risk-Benefit Analysis-Accidents.

UNIT IV: Engineers' Duties and Rights:

Concept of Duty - Professional Duties – Collegiality - Techniques for Achieving Collegiality – Senses of Loyalty - Consensus and Controversy -Professional and Individual Rights – Confidential and Proprietary Information - Conflict of Interest-Ethical egoism - Collective Bargaining – Confidentiality - Gifts and Bribes - Problem solving-Occupational Crimes-Industrial Espionage- Price Fixing-Whistle Blowing.

UNIT V: Global Issues:

Globalization and MNCs –Cross Culture Issues - Business Ethics – Media Ethics - Environmental Ethics – Endangering Lives - Bio Ethics -Computer Ethics - War Ethics – Research Ethics -Intellectual Property Rights.

TEXT BOOKS:

- 1. Professional Ethics, R. Subramaniam Oxford Publications, New Delhi.
- 2. Ethics in Engineering, Mike W. Martin and Roland Schinzinger -Tata McGraw-Hill – 2003.
- 3. Professional Ethics and Morals, A. R. Aryasri, Dharanikota Suyodhana - Maruthi Publications.
- 4. Engineering Ethics, Harris, Pritchard and Rabins, Cengage Learning, New Delhi.

REFERENCE BOOKS:

- 1. Human Values & Professional Ethics, S. B. Gogate, Vikas Publishing House Pvt. Ltd., Noida.
- 2. Engineering Ethics & Human Values, M. Govindarajan, S. Natarajan and V. S.SenthilKumar-PHI Learning Pvt. Ltd 2009.
- 3. Professional Ethics and Human Values, A. Alavudeen, R.Kalil Rahman and M. Jayakumaran – University Science Press.

- 4. Professional Ethics and Human Values, D. R. Kiran-Tata McGraw-Hill - 2013
- 5. Human Values And Professional Ethics, Jayshree Suresh and B. S. Raghavan, S.Chand Publications

Course Outcomes:

- 1. To understand the concept of Human values
- 2. To understand the Principle for Harmony
- 3. To understand the Engineering Ethics.
- 4. To understand the Engineers' Responsibilities towards Safety and Risk.
- 5. To learn about the Engineers' Duties and Rights.
- 6. To understand the current Global Issues.

Course Code: UR19PCCEL401

II Year - II SemesterInternal: 20 MarksLTPCExternal: 30 Marks0031.5

ENGINEERING GEOLOGY LAB

Course Objectives: The objective of this course is:

- To identify the mega-scopic types of Ore minerals & Rock forming minerals.
- To identify the mega-scopic types of Igneous, Sedimentary, Metamorphic rocks.
- To identify the topography of the site & material selection
- Identify Mega-scopic minerals & their properties.
- Identify Mega-scopic rocks & their properties.
- Identify the site parameters such as contour, slope & aspect for topography.
- Know the occurrence of materials using the strike & dip problems.

SYLLABUS:

LIST OF EXPERIMENTS

- 1. Physical properties of minerals: Mega-scopic identification of
 - a) Rock forming minerals Quartz group, Feldspar group, Garnet group, Mica group & Talc, Chlorite, Olivine, Kyanite, Asbestos, Tourmelene, Calcite, Gypsum, etc...
 - b) Ore forming minerals Magnetite, Hematite, Pyrite, Pyralusite, Graphite, Chromite, etc...
- 2. Megascopic description of rocks.
- 3. Identification of rocks.
- 4.Igneous rocks Types of Granite, Pegmatite, Gabbro, Dolerite, Syenite, Granite Poryphery, Basalt, etc...
- 5.Sedimentary rocks Sand stone, Ferrugineous sand stone, Lime stone, Shale, Laterite, Conglamorate, etc...
- 6.Metamorphic rocks Biotite Granite Gneiss, Slate, Muscovite & Biotiteschist, Marble, Khondalite, etc...
- 7. Interpretation and drawing of sections for geological maps showing tilted beds, faults, unconformities etc.
- 8. Simple Structural Geology problems.
- 9. Bore hole data.
- 10. Strength of the rock using laboratory tests.
- 11. Field work To identify Minerals, Rocks.
- 12. Field work To identify Geomorphology& Structural Geology.

Course Outcomes: After the completion of the course the student

1. Will be able to identify rocks and minerals by simple tests.

2. Will be able to solve geological problems (strike and dip)

3. Will be able to interpret geological maps

4. Ability to categorize rocks and minerals by their origin and engineering properties.

5. Ability to apply geological principles to rock masses and discontinuities for use in engineering design e.g. rock slopes, foundation

Note: Minimum 10 experiments of duration 3 periods each must be completed for the eligibility to appear for the semester end examinations.

Incase if the student fails to get eligibility for semester end examinations in the current semester, he has to take the permission of HOD and complete the required number of experiments and appear for the semester end examination as and when conducted.

Course Code: UR19PCCEL402

II Year - II SemesterInternal: 20 MarksLTPCExternal: 30 Marks0031.5

CONCRETE TECHNOLOGY LAB

Course Objective:

To test the basic properties ingredients of concrete, fresh and hardened concrete properties

List of Experiments:

- 1. Determination of normal Consistency and fineness of cement.
- 2. Determination of initial setting time and final setting time of cement.
- 3. Determination of specific gravity and soundness of cement.
- 4. Determination of compressive strength of cement.
- 5. Determination of grading and fineness modulus of Coarse aggregate by sieve analysis.
- 6. Determination of specific gravity of coarse aggregate
- 7.Determination of grading and fineness modulus of fine aggregate (sand) by sieve analysis.
- 8. Determination of bulking of sand.
- 9. Determination of workability of concrete by compaction factor method.
- 10. Determination of workability of concrete by slump test
- 11. Determination of workability of concrete by Vee-bee test.
- 12. Determination of compressive strength of cement concrete and its young's modulus.
- 13. Determination of split tensile strength of concrete.
- 14. Non-Destructive testing on concrete (for demonstration)

List of Equipment:

Standard set of sieves for coarse aggregate and fine aggregate

Vicat's apparatus

Specific gravity bottle.

Lechatlier's apparatus.

Slump Test Apparatus.

Compaction Factor Test Apparatus.

Vee- Bee test apparatus

Longitudinal compresso meter

Universal testing Machine (UTM)/Compression Testing Machine (CTM).

Rebound hammer, Ultrasonic pulse velocity machine, micro cover meter etc.

Course Outcomes:

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

- 1. Determine the consistency and fineness of cement and the setting times of cement.
- 2. Determine the specific gravity and soundness of cement.
- 3. Determine the compressive strength of cement.
- 4. Determine the workability of cement concrete by compaction factor, slump and
- 5. Vee-Bee tests
- 6. Determine the specific gravity of coarse aggregate and fine aggregate by Sieve analysis.
- 7. Determine the flakiness and elongation index of aggregates and the bulking of sand.
- 8. Understand the non-destructive testing procedures on concrete.

Note: Minimum 10 experiments of duration 3 periods each must be completed for the eligibility to appear for the semester end examinations. Incase if the student fails to get eligibility for semester end examinations in the current semester, he has to take the permission of HOD and complete the required number of experiments and appear for the semester end examination as and when conducted.

Course Code: UR19PCCEL403

II Year - II SemesterInternal: 20 MarksLTPCExternal: 30 Marks0031.5

GEOTECHNICAL ENGINEERING LAB

Course Objectives: The objective of this course is:

To impart knowledge of determination of index properties required for classifcation of soils.

To teach how to determine compaction characteristics and consolidation behavior from relevant lab tests; to determine permeability of soils.

To teach how to determine shear parameters of soil through different laboratory tests.

SYLLABUS:

LIST OF EXPERIMENTS

- 1. Specific gravity, G
- 2. Atterberg's Limits.
- 3. Field density-Core cutter and Sand replacement methods
- 4. Grain size analysis by sieving
- 5. Hydrometer Analysis Test
- 6. Permeability of soil Constant and Variable head tests
- 7. Compaction test
- 8. Consolidation test (to be demonstrated)
- 9. Direct Shear test
- 10. Triaxial Compression test (UU Test)
- 11. Unconfined Compression test
- 12. Vane Shear test
- 13. Differential free swell (DFS)
- 14. CBR Test

LIST OF EQUIPMENT:

Casagrande's liquid limit apparatus. Apparatus for plastic and shrinkage limits Field density apparatus for Core cutter method Sand replacement method Set of sieves: 4.75mm, 2mm, 1mm, 0.6mm, 0.42mm, 0.3mm, 0.15mm, and 0.075mm. Hydrometer Permeability apparatus for Constant head test Variable head test Universal auto compactor for I.S light and heavy compaction tests. Shaking table, funnel for sand raining technique. Apparatus for CBR test 10 tons loading frame with proving rings of 0.5 tons and 5 tons capacity One dimensional consolation test apparatus with all accessories. Triaxial cell with provision for accommodating 38 mm dia specimens. Box shear test apparatus

Laboratory vane shear apparatus. Hot air ovens (range of temperature 50^o - 150^oC

REFERENCES:

- 1. Determination of Soil Properties, J. E. Bowles.
- 2. IS Code 2720 relevant parts.

Course Outcomes: Upon successful completion of this course, student will be able to

- 1. Determine index properties of soil and classify them.
- 2. Determine permeability of soils.
- 3. Determine Compaction, Consolidation and shear strength characteristics.

Note: Minimum 10 experiments of duration 3 periods each must be completed for the eligibility to appear for the semester end examinations. Incase if the student fails to get eligibility for semester end examinations in the current semester, he has to take the permission of HOD and complete the required number of experiments and appear for the semester end examination as and when conducted.

Course Code: UR19MPROJCE401

II Year - II Semester Internal: 20 Marks L T P C External: 00 Marks 0 0 0 0 END SEMESTER: 30 MARKS

SOCIALLY RELEVANT MINI PROJECT

Objective :

The objective of this course is to make the students learned about practical orientation to the technical aspects of certain social issues with regard to the social responsibility

Guidelines :

- 1. A Batch of max 3 students is to be formed
- 2. Batch should carry out the project based on experimental/survey poll/field observation
- 3.Selection of the project shall be addressing the real life situations

4. A 10 page report is to be submitted at the end of the semester

Evaluation :

All the students of each batch should give a presentation/demonstration of the work in front of the evaluation committee constituted by the Head of the department.