

Curriculum Structure and Detailed Syllabus

Bachelor of Technology
in
CIVIL ENGINEERING



GITAAUTONOMOUS COLLEGE

Affiliated to BPUT Odisha

Effective From Academic Year 2020-21

Approval History

Date	Resolutions
17.07.2021	The curriculum structure and detailed syllabus of 1st Year & 2 nd Year as proposed by the Boards of Studies is approved by the Academic Council. 1 st Semester Syllabus as per BPUT syllabus.
08.10.2021	The curriculum structure and detailed syllabus approved by Governing body members.

Program Outcomes (UG Engineering)

Graduates Attributes (GAs) form a set of individually assessable outcomes that are the components indicative of the graduate's potential to acquire competence to practice at the appropriate level. The Program Outcomes (POs) for UG Engineering programmes defined by NBA are:

PO1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialisation to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend

and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PEO: Program Educational Objectives Statements

PEO1 The graduates will utilize their expertise in engineering to solve industrial and technological problems.

PEO2 Graduates will be innovators and professionals in technology deployment, and system implementation.

PEO3 Graduates will function in their profession with social awareness and responsibilities.

PEO4 Graduates will interact with their peers in industry and society as engineering professionals and leaders.

PEO5 Graduates will succeed in achieving innovative skills in the field of research and computer application.

Program specific outcomes (PSO) of the Department:

PSO1 The graduates will have the ability to design, develop, and innovate software product or Process in a systematic way by applying algorithm design, Artificial Intelligence, Soft Computing and programming skills.

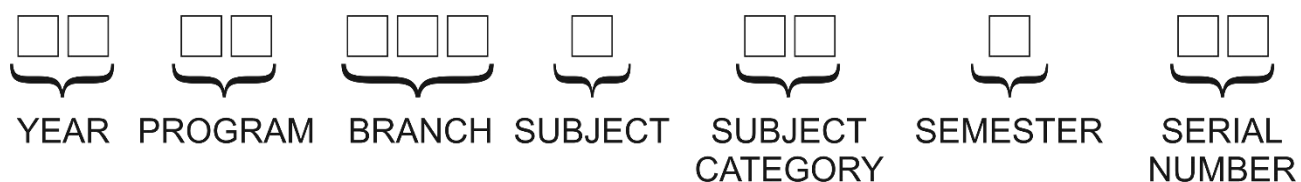
PSO2 The graduates will have the ability to take up higher studies, collaborative research and Entrepreneurships in the modern computing environment.

PSO3 The graduates will have the ability to achieve additional expertise through add-on programs in Machine Learning, Deep Learning, IoT etc and Lifelong learning.

Course Types & Definitions

L	Lecture
T	Tutorial
P	Laboratory / Practical / Sessional
BS	Basic Sciences
LC	Laboratory Courses
HS	Humanities & Social Sciences (including Management)
ES	Engineering Sciences
PC	Professional Core
PE	Professional Elective
OE	Open Elective
MC	Mandatory Course
OO	Massive Open Online Course (MOOC) - Self Study
PI	Summer Internship / Industry Internship / Project Work / Seminar
VV	Viva Voce

Subject Code Format



Curriculum Structure

First Semester					
Theory					
Sl. No.	Category	Course Code	Course Title	L-T-P	Credit
1	BS	20BTCETBS101	Engineering Mathematics I	3-0-0	3
2	BS	20BTCETBS102 / 20BTCETBS103	Engineering Physics / Engineering Chemistry	3-0-0	3
3	ES	20BTCETES101 / 20BTCETES102	Basic Electrical Engg. / Basic Electronics Engg.	3-0-0	3
4	ES	20BTCETES103 / 20BTCETES104	Basic Mechanical Engg./ Basic Civil Engineering	3-0-0	3
5	HS	20BTCETHS101	Functional English	2-0-0	2
6	ES	20BTCETES105	Programming for Problem Solving using C	3-0-0	3
7	MC	20BTCEPMC101	Induction Training (21 Days)		0
Total Credit (Theory)					17
Practical					
1	BS	20BTCEPBS102 / 20BTCEPBS103	Physics Lab / Chemistry Lab	0-0-2	1
2	ES	20BTCEPES101 / 20BTCEPES102	Basic Electrical Engg. Lab / Basic Electronics Engg. Lab	0-0-2	1
3	ES	20BTCEPES103 / 20BTCEPES104	Basic Mechanical Engg. Lab / Basic Civil Engineering Lab	0-0-2	1
4	ES	20BTCEPES105 / 20BTCEPES106	Engineering Graphics & Design Lab / Workshop	0-0-2	1
5	HS	20BTCEPHS101	Functional English Lab	0-0-2	1
6	ES	20BTCETES105	Programming for Problem Solving using C Lab	0-0-2	1
Total Credit (Practical)					6
Total Semester Credit					23

Second Semester					
Theory					
Sl. No.	Category	Course Code	Course Title	L-T-P	Credit
1	BS	20BTCETBS204	Engineering Mathematics II	3-0-0	3
2	BS	20BTCETBS202 / 20BTCETBS203	Engineering Physics / Engineering Chemistry	3-0-0	3
3	ES	20BTCETES201 / 20BTCETES202	Basic Electrical Engg. / Basic Electronics Engg.	3-0-0	3
4	ES	20BTCETES203 / 20BTCETES204	Basic Mechanical Engg./ Basic Civil Engineering	2-0-0	3
5	HS	20BTCETHS201	Business Communication and life Skills	2-0-0	2
6	ES	20BTCETES205	Programming for Problem Solving using Python	3-0-0	2
7	MC	20BTCEPMC201	NSS / NCC / Yogo		0
Total Credit (Theory)					16
Practical					
1	BS	20BTCEPBS202 / 20BTCEPBS203	Physics Lab / Chemistry Lab	0-0-2	1
2	ES	20BTCEPES201 / 20BTCEPES202	Basic Electrical Engg. Lab / Basic Electronics Engg. Lab	0-0-2	1
3	ES	20BTCEPES203 / 20BTCEPES204	Basic Mechanical Engg. Lab / Basic Civil Engineering Lab	0-0-2	1
4	ES	20BTCEPES205 / 20BTCEPES206	Engineering Graphics & Design Lab / Workshop	0-0-2	1
5	ES	20BTCEPES207	Programming for Problem Solving using Python Lab	0-0-2	2
Total Credit (Practical)					6
Total Semester Credit					22
SUMMER INTERNSHIP TRAINING for 30 Days					

1 st Semester	20BTCETBS101	ENGINEERING MATHEMATICS - I	L-T-P 3-0-0	Credit 3
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Prerequisite

Function, Limit of a function, Continuity of function, Differentiation, Integration.

Course Objectives:

- To discuss the concepts associated with Asymptote, Curvature, Special functions, Partial differentiation, Maxima, Minima and their applications.
- To discuss the concepts and different methods for solution of First order differential equations and its application to Electrical circuits.
- To describe the concepts of Linear differential equation of second order and its methods of solution as well as application to Electrical circuits.
- To present the concepts of Power series method and its use in solving differential equations.
- To present the concepts of Laplace Transformation and its use in getting solution to differential equations.

Evaluation Scheme

Teacher's Assessment			Written Assessment		Total
Quiz	Surprise Test(s)	Assignment(s)	Mid-Term	End-Term	
05	05	05	25	60	100

Module - I (8 Hrs)

Asymptote, Curvature (Cartesian and Polar), Gamma and Beta function, Partial differentiation, Maxima and Minima for function of two variables.

Module - II (8 Hrs)

Differential Equations: First order differential equations, Separable equation, Exact differential equation, Linear differential equation, Bernoulli's equation and application to Electrical circuits.

Module - III (9 Hrs)

Linear differential equation of second order, Homogeneous equation with constant co-efficient, Euler-Cauchy equations, Solution by undetermined co-efficient, Solutions by variation of parameters, Modeling of electric circuits.

Module - IV (10 Hrs)

Series solution of differential equations, Power series method, Legendre's equation and Legendre's polynomials, Bessel's equation, Bessel's function and its properties.

Module - V (10 Hrs)

Laplace Transformation and its use in getting solution to differential equations, Convolution, Integral equations.

Text Books :

1. Differential Calculus by Santi Narayan and Mittal, Publisher: S. Chand.
2. Advanced Engineering Mathematics by E. Kreyszig, Publisher: Willey, 8th Edition.

References:

1. Higher Engineering Mathematics by B. V. Ramana , Publisher: Mc-Graw Hills Education.
2. Higher Engineering Mathematics by B.S. Grewal,, Khanna Publishers, 36th Edition, 2010.
3. Ordinary and Partial Differential Equations by J. Sinha Ray and S. Padhy, Publisher: Kayani Publishers.
4. Advanced Engineering Mathematics by P. V. O'NEIL , Publisher: CENAGE.

Online Resources :

Laplace Transform-https://onlinecourses.nptel.ac.in/noc21_ma69/preview

CourseOutcomes:

Afterreadingthis subject,students willbeableto:

1. Identify, formulate and solve Engineering problems.
2. Apply the knowledge of Mathematics in Physical sciences and Engineering.
3. Acquire knowledge about Advance Calculus.
4. Acquire knowledge about Series solution of Differential equations.
5. Acquire knowledge about Gamma and Beta function.
6. Acquire knowledge about Laplace transform and apply it to solve IVP.

1 st & 2 nd Semester	20BTCETBS102 / 20BTCETBS202	ENGINEERING PHYSICS	L-T-P 3-0-0	Credit 3
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PRE-REQUISITE:

Basic knowledge on intermediate Physics including mechanics, modern Physics, optics, wave motion, electricity and magnetism.

OBJECTIVE:

The objective of this course is to attract the students towards detail understanding of concepts, fundamentals and applications of Physics enriching engineering and its emerging branches. It makes students conceive new ideas to have theoretical and experimental knowledge to be applied in academics, designs and research.

Evaluation Scheme

Teacher's Assessment			Written Assessment		Total
Quiz	Surprise Test(s)	Assignment(s)	Mid-Term	End-Term	
05	05	05	25	60	100

DETAILED SYLLABUS:

Module I

OSCILLATIONS& WAVES: (08 HOURS)

Simple Harmonic Oscillation: velocity of motion, acceleration, time period, frequency, phase; damped harmonic oscillation: Differential equation of damped vibration, logarithmic decrement, Forced oscillation, resonance, velocity resonance and amplitude resonance, coupled oscillation, Normal coordinates and normal frequencies, In- phase and out-Phase Oscillation, Concept of wave and wave equation, Velocity of transverse vibration in a stretched string. Superposition principle.

Module II

WAVE OPTICS:(08 HOURS)

Concept of interference, two sources interference pattern, Bi-prism, Fringe width, Newton's ring & measurement of wavelength and refractive index. Diffraction: Huygen's principle, Fresnel's Diffraction and Fraunhofer's diffraction, Half period zone, Zone plate, construction, principle, multiple foci, comparison of zone plate with convex lens, Fraunhofer's diffraction of Single slit, intensity distribution.

Module III

LASER and FIBRE OPTICS : (08 HOURS)

Atomic excitation and energy states, Interaction of external energy with atomic energy states, Absorption, spontaneous emission and stimulated emission, Population inversion, Pumping mechanism, optical pumping, Electrical Pumping, Components of laser system, active medium, population inversion, Ruby laser, Helium-Neon laser (basic concepts, energy level diagram and Engineering application only), Structure of optical fibre, Principle of propagation and numerical aperture, Acceptance angle, classification of optical fibre (Single mode and Multimode, SI and GRIN), FOCL (Fiber Optic Communication Link)

SOLID STATE PHYSICS: (04 HOURS)

Crystalline and Amorphous solid, unit cell, lattice parameter, Miller Indices, Bragg's law, Fermi level and Fermi distribution Functions, Band theory of Solids(Qualitative), Classification of materials: metals, semiconductor and insulator in terms of band theory.

Module IV

ELECTROMAGNETISM: (06 HOURS)

(Student will be familiarized with some basic used in vector calculus prior to Development of Maxwell's electromagnetic wave equations. No proof of theorems and laws included in this unit expected- statement and interpretation should suffice) Introduction; Scalar & vector fields, Gradient Of Scalar Field, divergence and curl of Vector Field, Gauss divergence theorem, Stokes theorem (Only Statements, no proof), Gauss's law of electrostatics in free space and in a medium (Only statements), Faraday's law of electromagnetic induction (Only statements), Displacement

current, Ampere's circuital law, Maxwell's equation in Differential and Integral form, Electromagnetic wave equation in E and B, Electromagnetic Energy, Poynting theorem and Poynting vector (no derivation)

Module V

QUANTUM PHYSICS: (08 HOURS)

Elementary concepts of quantum physics formulation to deal with physical systems. Need for Quantum physics- historical overviews (For concept), Einstein equation, de Broglie matter waves, Compton Scattering, Pair production (no derivation), Uncertainty Principle, Application of Uncertainty Principle, Non-existence of electrons in the Nucleus, Ground state energy of a harmonic oscillator. Basic Features of Quantum Mechanics: Transition from deterministic to Probabilistic, Wave function, probability density, Normalization of wave function (Simple problem), operators, expectation values (Simple problem), Schrodinger equation-Time dependent and time independent equations.

Applications of quantum mechanics: Free Particle, Potential step, Particle in a box.

Text Books:

1. Engineering Physics by D.R. Joshi, Mc Graw Hill
2. Principle of Physics Vol. I & Vol. II by Md. M. Khan & S. Panigrahi (Cambridge Univ. Press).
3. Lectures on Engineering Physics by L. Maharana, Prafulla K. Panda, Sarat K. Dash, Babita Ojha (Pearson)
4. Engineering Physics by D.K. Bhattacharya and Poom Tondon, Oxford University Press

Reference Books:

1. Optics - A. K. Ghatak
2. Introduction to Electrodynamics - David J. Griffiths, PHI Publication
3. Concepts of Modern Physics – Arthur Beiser.
4. Physics-I for engineering degree students - B.B. Swain and P.K. Jena.

ONLINE RESOURCES

<https://nptel.ac.in/courses/115/106/115106119/>

<https://nptel.ac.in/courses/122/106/122106034/>

<https://nptel.ac.in/courses/115/105/115105099/>

COURSE OUTCOMES OF ENGINEERING PHYSICS :

Intended Learning Outcomes/ Course Outcomes (CO)

Upon completion of the subject, students will be able to

1. Learn vibrations and oscillatory systems. It helps in understanding multiple oscillatory systems and complex oscillations. It adds in developing ideas of wave propagation and superposition principle
2. Know the benefits the understanding of light and its wave nature in different experimental demonstration of interference. Diffraction in solids will help in dealing with XRD and structure of materials.

3. Make a clarity of making out crystal structures and crystallography to learn about different materials and characteristics of solids.
4. Different LASER'S like Ruby, He-Ne and S.C. Lasers will help to develop multiple ideas of its application. Principle of optical fibres will help to know new generation optical fibres in communication systems.
5. Gain some fundamental knowledge about electromagnetism. It will familiarize with some basic used in vector calculus prior to development of Maxwell's electromagnetic wave equations.
6. Dealwith elementary concepts of quantum physics formulation with physical systems and to gain knowledge on applied quantum physics.

It will help in solving problems using Schrödinger wave equation and to acquire knowledge about application of Quantum mechanics.

1 st & 2 nd Semester	20BTCEPBS102 / 20BTCEPBS202	ENGINEERING PHYSICS LAB	L-T-P 0-0-2	Credit 1
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PRE-REQUISITE:

Basic knowledge of measurements, errors and uses of different measuring instruments like vernier calipers, screw gauge and spherometer is required. Students are supposed to be aware of the fundamental principles of lens, oscillation, waves, electronics and mechanics..

OBJECTIVES:

To make students engage in learning the experimental aspects of Physics with hands-on experience in precision measurements, experiments of optics, electronics and mechanics.

Evaluation Scheme

Experiment (work) Planning and execution	Results and interpretation	Report	Viva-voce to experiment	Total
20	30	30	20	100

DETAILS SYLLABUS OF ENGINEERING PHYSICS LABORATORY

A student is expected to perform ten experiments form the list given below.

1. Determination of Young's modulus by Searle's method.

2. Determination of Young's modulus by bending of beams.
3. Determination of Rigidity modulus by static method.
4. Determination of surface tension by capillary rise method.
5. Determination of acceleration due to gravity by Bar pendulum.
6. Verification of laws of vibration of string using sono meter.
7. Determination of wave length of light by Newton's ring apparatus.
8. Determination of wavelength of laser source by diffraction rating method.
9. Determination of grating element of a diffraction grating.
10. Plotting of characteristic curve of a PN junction diode.
11. Plotting of characteristic curves of BJT.
12. Study of Hall Effect.
13. Study of RC circuit.
14. Determination of unknown resistance using Meter Bridge.
15. Energy gap determination by Four-Probe method.

Text Books:

1. Engineering Practical Physics, by S. Panigrahi and B. Mallick, (CENGAGE learning)
2. Practical Physics, by Dr. Rajendra Singh, J. N. Jaiswal

Reference Books :

1. Practical Physics, by Savinder Singh
2. A Text-book of Practical Physics by Dr. William Watson

Course Outcomes:

Engineering Physics Laboratory:

Intended Learning Outcomes/ Course Outcomes (CO)

Upon completion of the subject, students will be able to.

1. Know the accuracy and precision in measurement.
2. know how to calculate Young's modulus, rigidity modulus of a wire and to understand the concept of vibration mechanism.
3. Determine the surface tension of liquid and to understand fluid properties.
4. To experiment with wave nature of light in diffraction through a grating.
5. To know the variation of $I \sim V$ of PN junction and BJT.
6. To determine the wavelength of light using Newton's ring.

1 st & 2 nd Semester	20BTCETBS103 / 20BTCETBS203	ENGINEERING CHEMISTRY	L-T-P 3-0-0	Credit 3
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Course Objectives

The main objective of the course is to impart knowledge on the fundamental concepts of chemistry involved in application of several important engineering materials that are used in the industry/day-to-day life.

The course aims to impart the basic understanding about the chemical behavior of fuels, alloy systems, corrosion, instrumental method of analysis and nanomaterials.

It also aims to develop selection of ideal engineering materials and its application in suitable engineering field.

Evaluation Scheme

Teacher's Assessment			Written Assessment		Total
Quiz	Surprise Test(s)	Assignment(s)	Mid-Term	End-Term	
05	05	05	25	60	100

Module-1

Energy Sciences:

Types of fuels, Calorific value, Determination of Calorific value by using Dulong's formula, Combustion and its calculations, Solid fuel: Coal analysis (Proximate and ultimate analysis), Elementary ideas on some gaseous fuels (Natural gas, Water gas, Producer gas, LPG) (Synthesis is excluded), Liquid fuels: IC - engine fuel, concept of knocking, antiknocking, octane number and cetane number, Fractional Distillation of petroleum, introductory idea about Cracking of heavy oils; 12 hrs.

Module-2

Instrumental Techniques:

Spectroscopy: Selection rule Lambert Beer's Law, Principles and applications of UV-Visible Molecular Absorption Spectroscopy; Chromophores, Auxochrome . Effect of conjugation on chromophores, , Basic Principles and application of rotational and vibrational Spectroscopy , selection rule of UV-visible, vibrational and rotational spectroscopy.

Module-3

Corrosion Science:

Definition and scope of corrosion, Dry and wet corrosion; Direct chemical corrosion, Electrochemical corrosion and its mechanisms; Types of electrochemical corrosion, (differential aeration, galvanic, & concentration cell Corrosion); Typical Electrochemical corrosion like Pitting, Waterline; Factors affecting corrosion, Protection against corrosion : Modifying the environment, Use of Inhibitors, Cathodic Protection: Sacrificial anode method, Impressed current Cathodic protection. Anodic & cathodic coating. 10 hrs

Module-4

Phase rule & Phase diagram

Statement of Gibb's phase rule and explanation of the terms involved, Advantages and imitations of phase rule, Phase diagram of one component system – water and sulphur system, Condensed phase rule, Phase diagram of two component system – Eutectic system: Bi-Cd, Pb-Tin system

7 Hrs

Module-5

Nanomaterials

Introduction, Top-down and Bottom-up approach, Classification on dimension(1D, 2D, 3D and 0D), Characteristic, properties & application: Carbon nanotube, Nanowire, Application of Nanomaterial: Catalysis, Medicine, Bio nanomaterials.

6Hrs

Text Books:

1. Text Book in Applied Chemistry by A. N. Acharya and B. Samantaray, Pearson India.
2. Engineering Chemistry, Jain and Jain, Dhanpat Rai Publication. Reference Books:
3. Textbook of nanoscience and Nanotechnology, McGraw Hill Education (India) Pvt. Ltd., 2012.
4. Fundamentals of Molecular Spectroscopy by Banwell, Tata McGraw Hill Education.
5. Quantum Chemistry by Ira N. Levine, Pearson 7th Edition.
6. Molecular Spectroscopy, Ira N. Levine, John Wiley and Sons

Reference Books:

1. R1. S. Chawla, Engineering Chemistry, Dhanpat Rai & Co.
2. R2. S. K. Bhasin and S. Rani, Engineering Chemistry, 3rd Edition, Dhanpat Rai & Co, 2012.
3. Introductory to Quantum Chemistry by A. K. Chandra, 4th Edition, McGrawHill Education.
4. Inorganic Chemistry by Donald A. Tarr, Gary Miessler, Pearson India, Third Edition.
5. Engineering Chemistry (NPTEL web-book) by B. L. Tembe, Kamaluddin and M. S. Krishan.

Online Resources:

1. <https://www.metrohm.com/en/industries/petro-lubricants/>: Lubricant analysis according to international standards
2. <http://www.eco-web.com/edi/01759.html>: Efficient Wastewater Treatment: The field for analytical and monitoring

Course Outcomes

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

- CO1 : Classify various fuels based on combustion parameters and understand the working principle of various batteries.
- CO2 : Apply the concept of molecular spectroscopy to analyze organic compounds using spectrophotometer .
- CO3 : Utilize the knowledge of electrochemistry and corrosion science in preventing engineering equipments from corrosion.
- CO4 : To understand the microstructure of a given alloy systems and eutectic systems under a given set of conditions.
- CO5: Discuss the benefits and applications of nano materials.
- CO6: Compare and contrast the chemical behavior and physical properties of common substances.

1 st & 2 nd Semester	20BTCEPBS103 / 20BTCEPBS203	ENGINEERING CHEMISTRY LAB	L-T-P 0-0-2	Credit 1
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Objectives :

In this laboratory the engineering students are provided with the basic practical knowledge on Analysis of Portable & waste water, sample ore analysis, characterisation of lubricating oils, introducing the students to some theoretical topics through instrumental method of analysis such as PH measurement, Viscosity and flash point measurement & weight measurement.

Pre-Requisites :

Student should have the knowledge of balancing equations, principle of titrations, titrant, titrand, preparation of standard solutions, concentration of a solution, indicators used in a titration, principle of reduction-oxidation reactions, handling of instruments like pH meter & accurate measurement of sample by using electronic balance

Teaching Scheme :

Regular laboratory experiments conducted under supervision of the teacher. Demonstration will be given for each experiment.

Evaluation Scheme

Experiment (work) Planning and execution	Results and interpretation	Report	Viva-voce experiment to	Total
20	30	30	20	100

Detailed Syllabus

At least 10 Experiments

- 1 Estimation of calcium in limestone powder
- 2 Determination of dissolved oxygen in supplied water.
- 3 Determination of Total hardness of water sample by EDTA method
- 4 Determination of alkalinity of water.
- 5 Determination of available chlorine of bleaching powder/residual chlorine in tap water
- 6 Determination of Flash-point/fire point of a lubricant by Pensky-Martens apparatus.
- 7 Determination of kinematic viscosity and Viscosity Index of a lubricant by Redwood viscometer.
- 8 Standardization of KMnO₄ using sodium oxalate.
- 9 Determination of Ferrous ion in a given sample of Mohr's salt
- 10 Determination of the partition coefficient of a substance between two immiscible liquids.
- 11 Determination of Acid value of oil.
- 12 Determination of concentration of a colour substance by Spectrophotometer
- 13 Green synthesis of noble metal/oxide based nanoparticles
- 14 Determination of the partition coefficient of a substance between two immiscible liquids.
- 15 Proximate analysis of coal sample.
- 16 Determination of iodine value of oil/fat.

Text Books:

T1. Jain & Jain, Engineering Chemistry, 16th Edition, Dhanpat Rai Publishing Company, 2015.

T2. S. S. Dara, Engineering Chemistry, 12th Edition, S. Chand Publisher, 2014.

Reference Books:

R1. S. Chawla, Essentials of Experimental Engineering Chemistry, Dhanpat Rai & Co.

R2. S. K. Bhasin and S. Rani, Laboratory Manual on Engineering Chemistry, 3rd Edition, Dhanpat Rai & Co, 2012.

Online Resources:

1. <https://www.metrohm.com/en/industries/petro-lubricants/>: Lubricant analysis according to international standards

2. <http://www.eco-web.com/edi/01759.html>: Efficient Wastewater Treatment: The field for analytical and monitoring

Course Outcomes**The student at the end of the course will**

CO1 learn and apply basic techniques used in chemistry laboratory for small/large scale water analyses/purification

CO2 be able estimate the ions/metal ions present in domestic/industry waste water.

CO3 utilize the fundamental laboratory techniques for analyses such as titrations, separation/purification and spectroscopy.

CO4 able to analyze and gain experimental skill.

CO5 Test the quality of an oil/fat by measuring its iodine or acid value by means of amount of unsaturation for various industrial use.

CO6 Verify quality of a lubricant by means of its viscosity or flash point which gives their nature & flammability for various industrial applications

1 st & 2 nd Semester	20BTCETES101 / 20BTCETES201	BASIC ELECTRICAL ENGINEERING	L-T-P 3-1-0	Credit 3
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Pre-Requisites:

Basic knowledge of intermediate Physics, knowledge of basic Mathematics such as Calculus, Ordinary Differential Equations, Matrices etc.

Course Objectives:

- To provide an understanding of basics of Electricity and Magnetism.
- The course will cover the basics of DC & AC networks, principle of operation of different electrical machines.

Evaluation Scheme

Teacher's Assessment			Written Assessment		Total
Quiz	Surprise Test(s)	Assignment(s)	Mid-Term	End-Term	
05	05	05	25	60	100

Module-1 (12 Hours)

Fundamentals of Electric Circuits:

Charge & current, Voltage & current sources, Electrical circuit elements (R, L and C) and their characteristics, Kirchoff's current and voltage laws; Star-Delta Conversion, Current Division and Voltage Division, Resistive Network Analysis: Node voltage & Mesh current analysis, Node voltage and mesh current analysis with controlled sources, Thevenin's Theorem, Norton's Theorem, Principle of superposition. Maximum power transfer theorem.

Module-2 (6 Hours)

AC Circuits:

Complex Algebra, Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, and RL, RC, RLC combinations (series and parallel).

Module-3 (4 Hours)

Three Phase AC:

Three phase balanced circuits, Comparison between single phase and three phase circuits, voltage and current relations in star and delta connections. Power measurement by wattmeter method, Brief introduction to generation, Transmission and Distribution of electrical power, Earthing & electrical safety

Module-4 (8 Hours)

Magnetic Circuits:

MMF, flux, reluctance, magnetic circuit and magnetic reluctance, Magnetic materials, BH characteristics and Hysteresis loss, Series and parallel magnetic circuits. Ideal and practical transformer, e.m.f. equation of transformer, Equivalent circuit, open circuit and short circuit test (no problem), Auto-transformer

Module-5 (6 hours)

Electrical Machines

Construction and principle of operation of DC machines (Generator and Motor), emf equation. Types of DC Generators and Motors, Back emf, applications. synchronous generator (construction and principle of operation)

Brief idea about Induction Motors (construction and principle of operation), slip, Torque-slip characteristics.

Text Books:

1. G. Rizzoni, Principles and Applications of Electrical Engineering, 5th Edition, McGraw Hill, 2006

2. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
3. Hughes, "Electrical Technology", VII Edition, International Student -on, Addison WelseyLongman Inc., 1995

Reference:

1. B. L. Theraja and A. K. Theraja, Textbook of Electrical Technology (Vol-I), 23rd Edition, S. Chand & Co. Ltd., 2002.
2. J.B. Gupta, "Fundamentals of Electrical Engineering and Electronics" S.K. Kataria & Sons Publications, 2002
3. Electrical Engineering Fundamentals, Vincent Del Toro, 2nd Edition, PHI

Course Outcomes:

- To analyze Electrical circuits to compute and measure the parameters of Electrical Energy.
- To comprehend the working principles of Electrical DC Machines.
- To comprehend the working principles of electrical AC machines.

1 st & 2 nd Semester	20BTCEPES101/ 20BTCEPES201	BASIC ELECTRICAL ENGINEERING LAB	L-T-P 0-0-2	Credit 1
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Evaluation Scheme

Experiment (work) Planning and execution	Results and interpretation	Report	Viva-voce to experiment	Total
20	30	30	20	100

Any Eight

1. Verification of theorems (Norton, Thevenin, Superposition).
2. Connection and measurement of power consumption of a fluorescent lamp.
3. Power and phase measurements in three phase system by two wattmeter method .
4. V-I characteristics of incandescent lamps and time-fusing current characteristics of a fuse.
5. Connection and testing of a single-phase energy meter.
6. Calculation of current, voltage and power in series R-L-C circuit excited by single-phase AC supply and calculation of power factor.
7. Calculation of no load losses of a single-phase transformer.
8. Measurement of Field and Armature Resistance of a DC Shunt Motor.
9. Study of House wiring.

1 st & 2 nd Semester	20BTCETES102 / 20BTCETES202	BASIC ELECTRONICS ENGINEERING	L-T-P 3-0-0	Credit 3
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Objectives :

- knowledge of the basic principles of electronic components and circuits operation,
- calculation and measurement of various parameters for electronic circuits,
- Knowledge of basic Digital electronics and communication in electronic field,
- This course will also help students to understand basic concepts of communication systems, VLSI design, Internet of Things etc.

Pre-Requisites :

Knowledge on structure of solid, Energy band gap, Basic of Semiconductors, Intrinsic and Extrinsic semiconductors in Physics of Higher Secondary Science level.

Teaching Scheme :

Regular classroom lectures with use of ICT as and when required, sessions are planned to be interactive with focus on problem solving activities.

Evaluation Scheme

Teacher's Assessment			Written Assessment		Total
Quiz	Surprise Test(s)	Assignment(s)	Mid-Term	End-Term	
05	05	05	25	60	100

Module-1 (10 Hours)

Junction Diode, Principle of Diodes, V-I characteristics of junction diode, AC and DC Resistance of Diode, Diode Current Equation, Equivalent circuit of Diode, Breakdown Mechanism, Zener diode and applications, Rectifier circuit, Clipper and Clamper Circuit.

Module-2 (10 Hours)

Bipolar Junction Transistor: Transistor Operation, Current Equation in transistors, CB, CE, CC Configurations and their Characteristics, Load line Analysis, DC Biasing.

Module-3 (6 Hours)

Feedback Amplifiers: Principle, Types, Advantages and Disadvantages of Feedback, Different Negative Feedback Topologies. Oscillators – Barkhausen's criteria for oscillation. Field Effect Transistor (FET): Construction, Characteristics of Junction FET (JFET), Depletion and Enhancement type Metal Oxide Semiconductor FET (MOSFET), Fixed and Voltage divider Biasing Configurations, Introduction to Complementary MOS (CMOS) circuits

Module-4 (10 Hours)

Digital Electronic Principles: Number System, Number System Conversion, BCD arithmetic, Hexa decimal arithmetic, Binary arithmetic, Representation of Negative numbers, Complement arithmetic, Logic Gates, Realization of different gates using NAND and NOR gates. Boolean algebra –

Laws and Rules, De Morgan's theorem, Standard forms of Boolean expressions, Realization of Boolean expressions using AOI logic and NAND /NOR logic.

Module-5 (4 Hours)

Communication Systems: Signals, Frequency spectrum of signals, Analog and digital signals, Elements of Communication Systems, Modulation: Amplitude Modulation, AM Detection (Demodulation), Frequency and Phase Modulation. Modulation: A comparison. Introduction to Microprocessor, Microcontroller, Embedded System, Internet of Things (IOT).

Total = 40 Hours

Text Books

1. R. L. Boylestad and L. Nashelsky, Electronic Devices and Circuit Theory, 11th Edition, Pearson Education.
2. S. Sedra and K. C. Smith, Microelectronic Circuits, 7th Edition, Oxford University Press.
3. Microprocessors and Interfacing, Programming & Hardware - Douglas V. Hall, McGraw Hill Education Pvt Ltd., 3rd edition.

Reference Books

1. Agarwal and J. Lang, Foundations of Analog and Digital Electronic Circuits, 1st Edition, Morgan Kaufmann, 2005.

CO1	Familiarize with different semiconductor device with their applications
CO2	Familiarize with different types of transistors with their configurations
CO3	Idea about the different feedback circuits
CO4	Familiarize with JFET, MOSFET, MOS with their applications
CO5	Knowledge about number systems, basic gates and logical expression.
CO6	To be aware with basic communication system including modulations

2. V. K. Mehta and Rohit Mehta, Principles of Electronics, 3rd Edition, S. Chand Publishing, 1980.

Online Resources

1. <http://www.electrical4u.com/circuit-analysis.htm>
2. <http://www.allaboutcircuits.com>
3. <https://www.electronics-tutorials.ws/>
4. <https://www.edx.org/course/circuits-electronics-1-basic-circuit-mitx-6-002-1x-0>

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

Program outcomes relevant to the course:

- PO1 **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems in electronics and communication engineering.
- PO2 **Problem analysis:** Identify, formulate, review research literature, and analyze complex electronics and communication engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- PO3 **Design/development of solutions:** Design solutions for complex electronics and communication engineering problems and design system components or processes that meet the specified

needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4 Conduct investigations of complex problems: Use research-based knowledge and research methods related to electronics and communication including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

Program Specific Outcomes (PSO) relevant to the course:

PSO1 Should be able to understand the concepts of Electronics & Communication engineering and their applications in the field of semiconductor technology, consumer electronics, communication/ networking and other relevant areas.

PSO3 Should have the capability to analyze, comprehend, design & develop electronic instruments, Display devices for a variety of engineering applications and thus demonstrating professional ethics & concern for societal well-being.

1 st & 2 nd Semester	20BTCEPES102 / 20BTCEPES202	BASIC ELECTRONICS ENGINEERING LAB	L-T-P 0-0-2	Credit 1
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Objectives

Know broadly the concepts and functionalities of the electronic devices, tools and instruments. Understand general specifications and deploy ability of the electronic devices, and assemblies. Develop confidence in handling and usage of electronic devices, tools and instruments in engineering applications.

Pre-Requisites

Knowledge on intrinsic and extrinsic semiconductors, Physics and Chemistry of Higher Secondary Science level.

Teaching Scheme

Regular laboratory experiments to be conducted under the supervision of teachers and demonstrators with the help of ICT, as and when required along with pre-lab session and demonstration for each experiment.

Evaluation Scheme

Experiment (work) Planning and execution	Results and interpretation	Report	Viva-voce to experiment	Total
20	30	30	20	100

Assignment/Experiment

- 1 Familiarization of electronic components and devices (Testing of semiconductor diodes and transistors using digital multi-meter).
- 2 Study and use of Oscilloscope, signal generator to view waveforms and measure amplitude and frequency of a given waveform.
- 3 V-I characteristics of semiconductor diode and determining its DC and AC resistances.
- 4 Study of half-wave and full-wave rectifier circuits without and with capacitor filter; recording of the waveforms and measurement of average and rms values of the rectified output.
- 5 Implementation of clipper circuits, both positive clipper and negative clipper. Observe its output waveforms and compare them with theoretical analyzed results.
- 6 Study of static characteristics of BJT in CE configuration.
- 7 DC biasing() of the transistor in CE configuration and determination of its operating point.
- 8 Studies on logic gates truth table verification of various gates, implementation of EXNOR and
- 9 Design of Half Adder and FULL Adder using gates.
- 10 Studies on Op-Amp applications (Inverting, non-inverting, integrating differentiating configurations) recording of the input-output waveforms.

Text Books:

T1. R. L. Boylestad and L. Nashelsky, Electronic Devices and Circuit Theory, 11th Edition, Pearson Education.

T2.A. S. Sedra and K. C. Smith, Microelectronic Circuits, 7th Edition, Oxford University Press.

Reference Books:

R1.V. K. Mehta and R. Mehta, Principles of Electronics, 3rd Edition, S. Chand Publishing, 1980.

Online Resources:

1.http://vlab.co.in/ba_labs_all.php?id=1

2.<http://iitg.vlab.co.in/?sub=59&brch=165>

Course Outcomes:

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

- CO1 Familiarize with various electronic components, measuring instruments
- CO2 Acquire knowledge of characteristics of diodes and design, testing
- CO3 Acquire knowledge of characteristics of transistors and design, testing & implementation of transistors in various applications
- CO4 Develop understanding of digital logic gates and design & test digital circuits for various applications using logic gates.
- CO5 Gain understanding of operational amplifiers (Op-Amp) and design & testing of electronic circuits for various applications using Op-Amp.
- CO6 implementation of Diode in various applications RECTIFIER & CLIPPER

Program outcomes relevant to the course:

PO1 **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems in electronics and communication engineering.

- PO2 **Problem analysis:** Identify, formulate, review research literature, and analyze complex electronics and communication engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- PO3 **Design/development of solutions:** Design solutions for complex electronics and communication engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- PO4 **Conduct investigations of complex problems:** Use research-based knowledge and research methods related to electronics and communication including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- PO5 **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern Electronics and communication engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- PO6 **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- PO12 **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSO) relevant to the course:

- PSO1 Should be able to understand the concepts of Electronics & Communication engineering and their applications in the field of semiconductor technology, consumer electronics, communication/ networking and other relevant areas.
- PSO2 Should have an ability to apply technical knowledge and usage of modern hardware tools related to Electronics & Communication engineering for solving real world problems.
- PSO3 Should have the capability to analyze, comprehend, design & develop electronic instruments, Display devices for a variety of engineering applications and thus demonstrating professional ethics & concern for societal well-being.

1 st & 2 nd Semester	20BTCETES103 / 20BTCETES203	BASIC MECHANICAL ENGINEERING	L-T-P 3-0-0	Credit 3
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Prerequisites:

Basics of Physics, Basics of Chemistry, Mathematics

Course Objective:

This course aims to expose the students to the thrust areas in Mechanical Engineering and their relevance by covering fundamental concepts.

Evaluation Scheme

Teacher's Assessment			Written Assessment		Total
Quiz	Surprise Test(s)	Assignment(s)	Mid-Term	End-Term	
05	05	05	25	60	100

Course Contents:**Module I (8 Hours)**

Concurrent forces on a plane – Composition and resolution of forces and equilibrium of concurrent coplanar forces, Methods of moment, Friction

Module II (8 Hours)

Centre of gravity- centroids of composite plane figure and curves, Moments of Inertia- Plane figure with respect to an axis in its plane and perpendicular to the plane- parallel axis theorem, Plane trusses- method of joints and method of sections,

Module III (8 Hours)

Rectilinear Translation Kinematics- Principles of Dynamics, D'Alembert's Principles. Momentum and impulse, Work and Energy, impact. Curvilinear translation, projectile- D'Alembert's Principle in curvilinear motion, Moment of momentum, Kinetics of Rotation of rigid body

Module IV (08 Hours)

Application of Thermodynamics: I.C. Engines, Refrigerators and Steam Generators- Classification of Boilers only, Boiler Mountings and Accessories, Condensers- Function of condenser in a Steam Power Plant, Steam Turbine- Principle of Operation, Classification of Steam Turbines. (Brief Description of different components of above mentioned systems and working principles only)

Fasteners and Power transmission devices:

Forms of Screw Threads, Single-start and multiple-start threads, Right-hand and Left-hand threads, Different types of Nuts, Bolts & Rivets and their applications, Automobile Power Transmission System – Clutch and Gear Box. Automobile Braking System- Classification, Main Components, Hydraulic Braking System. (working principles with schematic diagram only).

Module V (08 Hours)**Basic manufacturing Processes:**

Foundry Practices- Pattern, Mould & Casting, Mechanical working of metals - Sheet metal works. (Elementary ideas only)

Hydraulic Machines:

Hydraulic Turbines- Classifications and Applications.

Hydro Electric Power Plants (Schematic diagram of layouts & component description).

Hydraulic Pumps- Centrifugal Pump and Reciprocating Pump (Brief Description of different components of above mentioned systems and working principles with Schematic diagram only).

Text books-

1. Engineering Mechanics by S Timoshenko, D.H Young and J.V. Rao, McGraw Hill
2. Thermal Engineering by P. L. Ballaney, Khanna Publishers
3. Fluid Mechanics & Hydraulic Machines by Dr R. K. Bansal, Laxmi Publications.
4. Elements of Workshop Technology- Volume-I by S. K. HAJRACHOUDHURY,A. K. HAJRACHOUDHURY; Media Promoters & Publishers Pvt. Ltd.
5. Machine Drawing by N. D. Bhatt ;Charotar Publishing House
6. A Course in Automobile Engineering by R. P. Sharma ;Dhanpat Rai & Sons.
7. Basic Mechanical Engineering by A R Israni, P K Shah, B. S. Publications

Reference books

1. Manufacturing Technology by P.N.Rao, Tata McGraw Hill publication.
2. Manufacturing Science by A.Ghosh and A K Malick, EWP
3. A Text Book of Production Engineering by P.C.Sharma, S.Chand
4. Engineering Mechanics by K.L. Kumar, McGraw Hill
5. Basic Mechanical Engineering by .D. Mishra, P.K Parida, S.S.Sahoo, India TechPublishing company.
6. Elements of Mechanical Engineering by J K Kittur and G D Gokak,Willey

Course Outcomes

- CO1 To be able to understand fundamentals statics, friction, truss, CG and MI
- CO2 To be able to principle of dynamics, work, energy, impact, rotational and curvilinear motion.
- CO3 To be able to understand application of Thermodynamics,: I.C. Engines, Refrigerators and Steam Generators- Steam Power Plant, Steam Turbine
- CO4 To be able to understand the application of Screw Threads, Nuts, Bolts & Rivets, Clutch and Gear Box and Braking System
- CO5 To be able to understand Foundry Practices- Pattern, Mould & Casting, Mechanical working of metals - Sheet metal works.

1 st & 2 nd Semester	20BTCEPES103 / 20BTCEPES203	BASIC MECHANICAL ENGINEERING LAB	L-T-P 0-0-2	Credit 1
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(Minimum 8 experiments/studies should be conducted)

1. To study Four stroke (a) Petrol engine and (b) Diesel engine.
2. To study Two stroke (a) Petrol engine and (b) Diesel engine
3. To study the working and construction details of Cochran and Babcock and Wilcox Boiler.
4. To study a hose-hold Vapour Compression Refrigeration System.
5. To study constructional features and working of Pelton wheel turbine,
6. To study constructional features and working of Francis turbine
7. To study constructional features and working of Kaplan turbine.

8. To study the construction and working of Centrifugal pump.
9. To study the working of Single Plate Clutch.
10. To study construction and working principle of different types of Gears.
11. To study power transmission system of an Automobile.

Evaluation Scheme

Experiment (work) Planning and execution	Results and interpretation	Report	Viva-voce to experiment	Total
20	30	30	20	100

Course Outcomes

- CO1 To be able to understand different components and its function of an automobile.
- CO2 To be able to understand different types of boiler and its construction.
- CO3 To be able to understand the principle of vapour compression refrigeration system.
- CO4 To be able to understand the different types of hydraulic turbine and pump and its construction.
- CO5 To be able to understand principle and working of different types of gear, clutch.

1 st & 2 nd Semester	20BTCETES104 / 20BTCETES204	BASIC CIVIL ENGINEERING	L-T-P 3-0-0	Credit 3
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COURSE OBJECTIVES:

- (1) To understand the Importance of Civil Engineering
- (2) To have knowledge of Various Construction Materials and their uses.
- (3) To learn basics of Surveying for layout of structures on ground.
- (4) To understand the fundamentals of foundations of structures
- (5) To understand basics of sources of water and its use in Irrigation Engineering
- (6) To acquire Basic Knowledge of various Transportation Systems

Evaluation Scheme

Teacher's Assessment	Written Assessment	Total
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Quiz	Surprise Test(s)	Assignment(s)	Mid-Term	End-Term	
05	05	05	25	60	100

MODULE- I (12 hours)

Introduction and Scope of Civil Engineering. Broad disciplines of Civil Engineering; Development of various materials of construction and methods of construction.

Building Material and Building Construction:

Bricks: Brick and its use, Types of bricks, qualities of a good bricks, Tests for Bricks, Stone: Classification, Composition and their Characteristics, Types of Building stones, Cement: Uses of cement, Types of cement, Tests for cement, Mortar and Concrete: Ingredients of concrete, Workability, Compaction of concrete, Concrete mix design, Grade and strength of Concrete. Fundamentals of R.C.C., Pre-stressed concrete. Types of steels used in civil engineering works, Building Components, Stone masonry, Brick masonry, Type of roofs and flooring,

MODULE-II (8 hours)

Surveying: Linear measurement and chain survey: Use of chains and tapes for measurement of correct length of lines, direct and indirect ranging, Compass surveying: Use of prismatic compass, bearing of a line. General Layout of Buildings, Local attraction, Introduction surveying instruments, Level Instruments, Theodolites, EDM and Total Station.

MODULE-III (6 hours)

Geotechnical Engineering:

Fundamental of soil and its classification, Foundations: Types of shallow and deep foundations with sketches.

MODULE-IV (6 hours)

Water Resources Engineering: Sources of water and Irrigation Engineering: Hydrological Cycle, Rain gauges, Averaging Precipitation, Introduction of Hydraulics structure like canals, siphons, weirs, dams etc. and their purpose

MODULE-V (8 hours)

Transportation Engineering: Modes of transportation, Introduction to highway engineering, rail engineering, Airport engineering, Waterways, Traffic engineering, urban engineering

TEXT BOOKS

Basic Civil Engineering, S. Gopi, Pearson

Surveying and Levelling by R. Subramanian, Oxford University Press

Building Material and Construction, G C Sahu, Joygopal Jena, McGraw Hill

Water Resource Engineering, N.N. BasakMcGraw Hill

REFERENCE BOOKS

- i. Engineering Materials, S.C. Rangwala, Charotar Publishing House
- ii. Surveying Vol-1 by R Agor, Khanna Publishers
- iii. Basic Civil Engineering, M.S. Palanichamy, McGraw Hill

E-Resources:

1. <https://nptel.ac.in/courses/105/102/105102088/>

1 st & 2 nd Semester	20BTCEPES104 / 20BTCEPES204	BASIC CIVIL ENGINEERING LAB	L-T-P 0-0-2	Credit 1
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(Minimum 8 experiments /studies)

1. Water absorption and efflorescence of bricks
2. Compressive strength of brick
3. Consistency of cement
4. Setting time of cement
5. Compressive strength of concrete
6. Tensile strength of reinforcing steel
7. Linear measurement by chain
8. Bearing of a line using compass
9. Levelling Instruments
10. Study of Total Station

Evaluation Scheme

Experiment (work) Planning and execution	Results and interpretation	Report	Viva-voce to experiment	Total
20	30	30	20	100

Beyond Syllabus: (As per availability of time)

1. Workability of Concrete
2. Use of Theodolite
3. Tensile and compressive strength of Cement

1 st & 2 nd Semester	20BTCEPES105 / 20BTCEPES105	ENGINEERING GRAPHICS & DESIGN LAB	L-T-P 0-0-2	Credit 1
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(Minimum 8 Sheets)**COURSE OBJECTIVES:**

1. To create awareness and emphasize the need for Engineering Graphics in all the branches of engineering.
2. To follow basic drawing standards and conventions.
3. To develop skills in three- dimensional visualization of engineering component,
4. To solve specific geometrical problems in plane geometry involving lines, plane figures
5. To produce orthographic projection of engineering components working from pictorial drawings.

Evaluation Scheme

Quality of job	Understanding of the job and related theory	Quality of report and Viva – Voce	Total
50	30	20	100

Prerequisites:

Basic understanding of Geometry

1. Principles of Engineering Graphics and their significance, usage of various drawing instruments, lettering, dimensioning principles. (1 Sheet)
2. Orthographic Projections: Projection of points and straight lines. (2 Sheets)
3. Projections of Planes. (1 Sheet)
4. Projection of Solids. (1 Sheet)
5. Section of Solids. (1 Sheet)
6. Principles of Isometric projection. (1 Sheet)
7. Development of surface and intersection of surfaces. (2 Sheets)
8. Introduction to AUTOCAD tools. (1 Sheet)

TEXT BOOKS:

1. N. D. Bhat, M. Panchal, Engineering Drawing, Charotar Publishing House, 2008.
2. M. B. Shah, B. C. Rana, Engineering Drawing and Computer Graphics, Pearson Education, 2008.
3. R. K. Dhawan, A Text Book of Engineering Drawing, S. Chand Publications, 2007.

REFERENCE BOOKS:

1. E. French, C. J. Vierck, R. J. Foster, Graphic Science and Design, 4th Edition, McGraw- Hill.
2. W. J. Luzadder, J. M. Duff, Fundamentals of Engineering Drawing, 11th Edition, PHI, 1995.
3. K. Venugopal, Engineering Drawing and Graphics, 3rd Edition, New Age International, 1998.

1 st &	20BTCEPES106 /	WORKSHOP PRACTICE LAB	L-T-P	Credit
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2 nd Semester	20BTCEPES206		0-0-2	1
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Objective:

workshop Practice lab deals with different processes by which component of machines or equipments are made. Its purpose is to equip the trainee with knowledge, skill and attitude that enable them to perform basic workshop tasks.

FITTING PRACTICE

1. Use of hand tools in fitting, preparing a male female joint of M.S. or making a paper weight of Mild steel.

WELDING PRACTICE

2. Welding practice (Basic Theory to be explained prior to practice):
 A. Gas welding & Electric Arc welding practice.
 B. A joint such as a Lap joint, a T- joint or a Butt joint is to be prepared or to make furniture.

MACHINING PRACTICE

3. Machining (Basic Theory to be explained prior to practice):
 A. Stepped cylindrical Turning of a job and thread –cutting in lathe.
 B. Shaping
 C. Milling

Evaluation Scheme

Quality of job	Understanding of the job and related theory	Quality of report and Viva – Voce	Total
50	30	20	100

Outcomes:

Intellectual skills, Cognitive strategy, verbal information, motor skills and attitude

Course Outcomes

- CO1 To be able to use various fitting tools and able to perform fitting operation.
- CO2 To be able to understand principle of gas welding and able to perform gas welding operation.
- CO3 To be able to understand principle of arc welding and able to perform arc welding operation.
- CO4 To be able to understand different parts of a lathe and able to perform turning, facing, threading, tapering using lathe.
- CO5 To be able to understand different parts of a shaping and milling machine and able to perform shaping and milling operation.

1 st Semester	20BTCETHS101	FUNCTIONAL ENGLISH	L-T-P 2-0-0	Credit 2
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Course Objectives

This subject aims to:

- Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
- Equip students to study academic subjects more effectively and critically using the theoretical and practical components of English syllabus.
- Develop study skills and communication skills in formal and informal situations.
- To help students in improving their accent, overall presentation skills to enhance their employability.

Evaluation Scheme

Teacher's Assessment			Written Assessment		Total
Quiz	Surprise Test(s)	Assignment(s)	Mid-Term	End-Term	
05	05	05	25	60	100

MODULE 1 Effective Reading Skills

Process of Reading, Global and Local Comprehension, Sub skills of Skimming, Scanning, Inferencing, Guessing word-meaning, Using appropriate speed for various kinds of reading. Correction of Reading faults of Eye-fixation, Regression, Finger-pointing, Sub-vocalising, Reading aloud, and indiscriminate use of the Dictionary.

The module will acclimatize students with short stories of R. K Narayan, which will enable them to understand the nuances of reading and comprehension.

Text Book:

Malgudi Days by R.K Narayan

1. An astrologer's day
2. The missing mail
3. The doctor's word
4. Gateman's gift Links:
 - <https://pdfroom.com/books/malgudi-days-narayan-r-k/or5WWqZn5qD>
 - https://www.press.umich.edu/9441812/building_academic_reading_skills_book_1_2nd_edition/?s=look_inside
 - <https://www.jmu.edu/valleyscholars/files/studyreadingskills.pdf>
 - <https://files.eric.ed.gov/fulltext/ED583494.pdf>

MODULE 2

Nitty Gritty of Writing in English

Writing Process, Paragraph writing, Summarizing, Blogging, Paraphrasing, Précis-writing, Essay writing and Reading Comprehension.

The module will familiarize students with the nitty gritty of writing in English by drawing from the referred text books.

Text Books:

1. The Submerged Vallley and Other Stories by Manoj Das
2. Real Writing with Readings by Susan Anker

Link:

<https://ebin.pub/the-submerged-valley-and-other-stories.html>

MODULE 3

The Quintessence of Effective Pronunciation

Introduction to Phonetics: IPA, Received Pronunciation, Phonetic and Non-Phonetic Writing Systems; IPA:

Vowels and Consonants, MTI, Problem sounds; Stress, Intonation, Rhythm, Strong and Weak forms. The module will familiarize students with the sounds of English language and help them to use it in day-today situations.

Text Book:

1. Better English Pronunciation by J D O'Connor
2. Phonetics A Coursebook by Rachel Anne Knight

Links:

- <https://salahlibrary.files.wordpress.com/2017/03/a-practical-introduction-to-honetics.pdf>
- <https://bbooks.info/b/w/ef588b4a0491ac5e37669efa7c0d5476f92a872f/phonetics-for-dummies.pdf>
- https://salahlibrary.files.wordpress.com/2018/10/d8b4d986d8a7d8aed8aa_d8a2d988d8a7.pdf

MODULE 4

Applied Grammar

Articles, Prepositions, Subject-Verb agreement, State and Event verbs, Modals and Auxiliaries, Finite and Non-finite Verbs; Tenses; Vocabulary

The student will get a better understanding of the nuances and application of grammar and vocabulary in day-to-day usage.

Text Books:

1. Oxford modern English Grammar
2. Destination B1 Grammar and Vocabulary with Answer Key (Malcolm Mann & Steve Taylore-Knowles)
3. English vocabulary in use (Michael MC Carthy)

Links:

<https://pdfroom.com/books/oxford-modern-english-grammar/KRd6oO79gZp/download>

Recommended Books:

1. Remedial English Grammar by F. T. Wood, Macmillan.
2. Essential English Grammar By Raymond Murphy, Cambridge University Press
3. The Visual Element in Language Teaching (Education Today Series) (ELT) by PIT CORDER
4. Introducing Applied Linguistics (Penguin modern linguistics texts) by S. Pit Corder
5. Advanced Grammar in Use with Answers, MARTIN HEWINGS
6. Phonetics for Dummies by William F. Katz

Intended Learning Outcomes/ Course Outcomes (CO)

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

- Use English Language effectively in spoken and written forms.

- Comprehend the given texts and respond appropriately.
- Communicate confidently in various contexts and different cultural scenarios.
- Acquire proficiency in English including reading and listening comprehension, writing and speaking skills.
- Understand the nuances of spoken English and to be effective speakers.

1 st Semester	20BTCEPHS101	FUNCTIONAL ENGLISH LAB	L-T-P 0-0-2	Credit 1
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- 1 “Find The Word” Reading Aloud Activity (Pair Work); “Reading Aloud” Task (Pair Work / Small Group Work); “Team Reading Aloud” – Pronunciation Reading (Whole Group); Key Word Bingo – Vocabulary Based Reading Activity (Individual)
Pre-Reading Activities
<https://theidealteacher.com/21-must-use-reading-activities-for-your-language>
- 2 True or False? – Post-Reading Activity (Alone); Summarise The Text – Post Reading Activity (Individual); Re-write The Text – Reading Activity (Alone); Walking Text – Reading Comprehension Activity (Individual)
Post-Reading Activities
<https://theidealteacher.com/21-must-use-reading-activities-for-your-language>
- 3 Filminute: One-minute films in different languages on different topics, can watch without sound too! - IDEAS FOR USE: 1. Watch film clip and describe in detail what happened; 2. Watch film clip and summarise; 3. Watch film clip and extend the story; 4. Listen to film clip without watching and imagine what the film is about and describe it.
Short video based – For Spontaneous Speaking & Writing in Language Learning
<https://filminute.com/festival/>
- 4 Picture interpretation: interpreting a given image and making a short presentation about the same.
Speaking Activity
https://ssol.tki.org.nz/Social-studies-110/Teaching-and-learning/Effectiveteaching-in-social-studies/Teachingstrategies/writing_and_presenting_information/Picture-interpretation
- 5 News Paper Article Analysis - (General Topics): Provide A Newspaper Article And Ask Students To Comprehend And Analyse And Then make a Presentation on it.
Listening, Speaking, Reading & Writing Based activity
https://cdn.ymaws.com/okpress.com/resource/resmgr/onf/nie/newspaper_activities.pdf
- 6 Movie Talk Google Docs Database: Hundreds of short video clips and adverts with links and short descriptions of the clip content on a Google Doc. Most are French, Spanish, silent or with music only.
Short video based – For Spontaneous Speaking & Writing in Language Learning
https://docs.google.com/spreadsheets/d/1MjFKTuUu_fVwO30eJd9zGQliUlWnCO6VmT6kCZfI8V8
- 7 Digital Collage designing and presentation- students will design a collage in group based on a particular theme and will present it.
Speaking Activity
<https://www.technokids.com/blog/apps/digital-collage-in-the-classroom/>
- 8 Ppt-ask students to watch a web series of their choice. Give them few areas like Screenplay, Characterisation, Plot construction and ask them to make a power point presentation on it.
Listening, Speaking, Reading & Writing Based activity

- 9 Listening test: provide an audio clip and questions on it. Ask students to answer after listening to the audio. (Cambridge Assessment English content)
Listening, Reading & Writing Based activity
<https://www.teachingenglish.org.uk/professional-development/podcast>
- 10 Creavewri ng: students will be given a cue to write a short story.
Writing Activity
https://www-tc.pbs.org/now/classroom/acrobat/less_on05.pdf
- 11 Grammar and Vocabulary Test
Writing Activity
<https://toaz.info/doc-viewer>

Evaluation Scheme

Experiment (work) Planning and execution	Results and interpretation	Report	Viva-voce to experiment	Total
20	30	30	20	100

COURSE OUTCOMES

1. Understanding the sounds of English and using them in the right context.
2. Write paragraphs, stories etc. using short and crisp sentences.
3. Listen, speak, read & write the sounds of English using correct stress, tone and rhythm.
4. Language Skills- Grammar Exercises, Jumbled Sentences & correcting errors.
5. Writing- Paragraph & Precis Writing.
6. Role-Play- enacting ideas, themes(short duration & one-on-one activity)
7. Critical Appreciation - Article Analysis
8. Introducing Self & Others- Learning the nuances of Introduction, Asking questions and Overcoming stage fright.
9. Presentations- Power point Presentations on general topics, Book Review.

1 st Semester	20BTCETES105	PROGRAMMING FOR PROBLEM SOLVING USING C	L-T-P 3-0-2	Credit 3
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Course objectives: The course aims to provide exposure to problem-solving through programming. It aims to train the student to the basic concepts of the C-programming language. This course involves a lab component which is designed to give the student hands-on experience with the concepts.

- To understand the various steps in Program development.
- To understand the basic concepts in C Programming Language.
- To learn how to write modular and readable C Programs
- To learn to write programs (using structured programming approach) in C to solve problems.
- To introduce the students to basic data structures. To make the student understand simple sorting and searching method

Unit-1

Basic of Computer and Introduction to the C Language (7 hours)

Components of a computer system, Fundamentals of Computing, Computer Languages, Problems, Algorithms, flowcharts, Pseudo-code. Compiler and interpreter.

Output statements, Literals, Identifiers, Variables, Datatypes, Number Systems & Conversion, Format specifiers, Input statements, Escape sequences, Constant, Operators(Arithmetic, relational, logical, bitwise etc.), Expressions, Precedence and Associativity, Expression Evaluation, Type conversions, Comments

Unit-2

Control Statements and Array (10 hours)

Decision making: if, if-else, nested if, else if ladder, switch, break statement, goto. Loop: while, do-while, for, continue, infinite loop, nesting of loops. Array: 1-D array creation and memory representation, Manipulating array elements, Linear Search, Binary Search, Bubble sort. 2-D array creation and memory representation, Programs on 2-D array.

Unit -3

Pointer, Function and String (10 hours)

Pointer: Declaring and initializing Pointer, dereferencing pointer, Pointer and Array, Pointer Arithmetic, sizeof() operator, constant pointer, pointer to constant, void pointer, Null Pointer, Array of pointers and pointer to array.

Functions: Types of functions, Parts of function, User defined functions, Call by value and call by reference, Passing array to function, pointer to function, function returning pointer.

Recursion, programs on recursion.

C Strings, String Input / Output functions, arrays of strings, string manipulation functions.

Unit-4

Dynamic memory allocation, Structure and Union (7 hours)

Dynamic memory allocation concept, heap area, malloc, calloc, free. Advantage of dynamic memory allocation wrt static allocation, Programs on dynamic memory allocation.

Structure and Union:Need of structure, Creating a structure, typedef, array of structures, pointer to structure, passing structure to function, returning structure from function, self-referential structure. Creating a union, difference between structure and union.

Enum creation, assigning value to enum variables.

Unit-5

Macro, Storage Class and File Handling (6 hours)

Macro: Macro expansion process, programs on Macro.

Storage class: auto, extern, static, register.

Command Line Argument.

File Handling: File opening modes, read and write text in file, file copy, reading and writing structure variables in a file, fseek, ftell.

Text Books:

1. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill
2. Computer Science: A Structured Programming Approach Using C, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.

Reference Books:

1. Programming in C. P. Dey and M Ghosh, Oxford University Press.
2. ReemaThareja, Introduction to C Programming, 2nd Edition, Oxford University Press.
3. Programming with C, B.Gottfried, 3rd edition, Schaum's outlines, TMH.
4. Problem solving with C, M.T.Somasekhara, PHI
5. C Programming with problem solving, J.A. Jones & K. Harrow, Dreamtech Press.

Online Resources:

<https://nptel.ac.in/courses/106/105/106105171/>

<https://nptel.ac.in/courses/106/104/106104128/>

Course outcomes:

Students will be able to:

CO1: Design simple algorithms for arithmetic and logical problems

CO2: Implement the algorithms to programs (in C language).

CO3: Carryout experiments and correct syntax and logical errors.

CO4: Implement conditional branching, iteration and recursion.

CO5: Analyze a problem, decompose into functions and synthesize a complete program using divide and Conquer approach.

CO6: Apply arrays, pointers and structures to formulate algorithms and programs.

CO7: Apply programming to solve simple numerical method problems, differentiation of function and simple integration.

1 st Semester	20BTCETES105	PROGRAMMING FOR PROBLEM SOLVING USING C LAB	L-T-P 0-0-2	Credit 1
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Course objectives:

- To write, test, and debug simple C programs.
- To implement C programs with conditionals and loops.
- Use functions for structuring C programs.
- To understand and implement pointer and user defined data types
- To understand file concept and dynamic memory application
- To develop logic to solve problems using the programming

Experiment

Editing, compiling, executing, and debugging of simple C programs

Programs using operators and formatted input/output statements.

3,4 Decision making using if, if-else, else-if ladder, nested if

5 Decision making using switch-case construct.

6,7 Loop control structure (while, do-while, for) with jump statements

8 Nested loops (printing various formats)

9,10 1-D arrays including operation like searching, sorting, merging etc.

11 Handling 2-D arrays such as matrix operations

12, 13 Programs on strings using various string handling functions (library functions)

14, 15 Designing user-defined functions.

16 Programs on recursion.

17 Designing user defined functions for string manipulation.

- 18 Passing arrays (both 1D and 2D) to functions
- 19 , 20 Structure, array of structure, nested structure.
- 21 Dynamic memory management.
- 22 Self-referential structure (create and display operation of single linked list)
- 23 , 24 File handling - reading from and writing to files.
- 25 Command-line argument, pre-processor directives.

Course outcomes:

- CO1:** Read, understand and trace the execution of programs written in C language.
- CO2:** Develop programs using the basic elements like control statements, Arrays and String
- CO3:** Implement Programs with pointers, and learn to use the pre-processors, command line arguments etc.
- CO4:** Write the C code for a given algorithm
- CO5:** Write programs that perform operations using derived data types.
- CO6:** Write programs that perform various operations on files

2 nd Semester	20BTCETBS204	ENGINEERING MATHEMATICS - II	L-T-P 3-0-0	Credit 3
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Prerequisite

Matrix algebra, Determinants, Vector algebra.

CourseObjectives:

- To discuss the concepts associated with Matrix Algebra, Solution of system of linear equations, Vector Spaces.
- To discuss the concepts of eigenvalues and eigenvectors, Real matrices, Complex matrices and Diagonalisation of Matrices.
- To describe the concepts of Vector differential calculus and its application.
- To present the concepts of Vector integral calculus and its application.
- To present the concepts of Fourier series, Fourier Integral and Fourier transform.

Evaluation Scheme

Teacher's Assessment			Written Assessment		Total
Quiz	Surprise Test(s)	Assignment(s)	Mid-Term	End-Term	
05	05	05	25	60	100

Module - 1 (8 hrs.)

Matrix Algebra, Solution of system of linear equations (Gauss Elimination), Rank and Inverse of matrices (Gauss-Jordan), Vector Space and its Examples.

Module - 2 (8 hrs.)

Eigen values and eigen vectors, Symmetric and skew-symmetric matrices, Orthogonal matrices, Complex matrices, Hermitian and skew matrices, Unitary matrices and similarity of matrices, Diagonalisation of Matrices.

Module - 3 (9hrs.)

Vector differential calculus: vector and scalar functions and fields, Derivatives, Curves, tangents and arc Length, gradient, divergence, curl.

Module - 4 (10 hrs.)

Vector integral calculus: Line Integrals, Green Theorem, Surface integrals, Gauss theorem and Stokes Theorem.

Module - 5 (10 hrs.)

Fourier series, Fourier expansion of functions of any period, Even and odd functions, Half range Expansion, Fourier Integral and Fourier transform.

Text Books:

1. Advanced Engineering Mathematics by E. Kreyszig, 8th Edition, Willey.

References:

1. Higher Engineering Mathematics by B.V. Ramana, McGraw Hills Education.
2. Higher Engineering Mathematics by B.S. Grewal,, Khanna Publishers, 36th Edition, 2010.
3. Advance Engineering Mathematics by P.V.O'NEIL, CENGAGE.
4. A text book of Engineering Mathematics by N.P. Bali and Manish Goyal, , Laxmi Publications, Reprint, 2008.

Online Resources :

Linear algebra-https://onlinecourses.nptel.ac.in/noc21_ma50/preview

CourseOutcomes:

Afterreadingthis subject,students willbeableto:

1. Apply the knowledge of Mathematics in Physical sciences and Engineering.
2. Modeling of Physical Problems to Mathematical problems.
3. Acquire knowledge of Double and Triple Integral and their applications in engineering subjects.
4. Acquire knowledge about Fourier series and Fourier transform.
5. Apply Knowledge vector calculus in engineering and physical sciences.
6. Acquire knowledge of Matrix Algebra, Determinants and their applications in engineering subjects.

2 nd Semester	20BTCETHS201	BUSINESS COMMUNICATION AND LIFE SKILLS	L-T-P 2-0-0	Credit 2
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Course Objectives

This subject aims to:

- Understand the concepts of business communication in a diverse workplace. It aims at building their business acumen in order to work in an inter-cultural environment.
- Improve the listening, conversation and writing skills of students, which would help them co-exist in the business world.
- Groom the learners as potential and prospective candidates to take on the present-day challenges in the job sector with their acquired soft skills.

Evaluation Scheme

Teacher's Assessment			Written Assessment		Total
Quiz	Surprise Test(s)	Assignment(s)	Mid-Term	End-Term	
05	05	05	25	60	100

UNIT-1

Writing Business messages and Documents

(10 hours)

- 1.1 Importance of written Business communication, Types of Business messages, Stages of writing business messages, Plagiarism
- 1.2 Business letters- Common components and Strategies of writing a letter, Types of Business Letters, Sales Letters
- 1.3 Writing effective Memos - Principles and fundamentals to be followed to draft Business Memos, Letters Versus Memos, Characteristics of Effective Memos, Form and Structure, Parts of a Memo, Writing Strategies, Model Memos
- 1.4 Business Reports - Nature and Significance, Types of Reports, Formats of Reports, Structure of a formal Business Report.
- 1.5 Business Proposals – Types, Structure of a Business Report. Model Business Proposals.
- 1.6 E-mail Writing - Advantages of E-mail, Characteristics of Successful E-mail Messages Formatting, E-mail Format, Standard E-mail Practices, E-mail Writing Strategies

UNIT-2

Communicating at Workplace

(10 hours)

- 2.1 Effective Listening - Introduction, Active and Passive Listening, Process of Listening, Advantages of Listening, Types of Listening, Effective and Ineffective Listening Skills
- 2.2 Factors affecting Listening, Role of Listening in Leadership Styles, Six Styles of Leadership, Listening at Three Managerial Levels
- 2.3 Benefits of Listening for Leaders and Teams, Motivational Benefits of Listening in the Workplace, Poor Listening Habits, Strategies for Effective Listening
- 2.4 Business Conversations - Importance of Business Conversations and Essentials of a Business Conversation
- 2.5 Conversation Management - Use Verbal and Non-verbal Cues appropriately in Conversations - How to Identify Cues and Clues Signs and Signals; Stressful Conversations
- 2.6 Business Presentations - Planning, Preparing, Practicing, Performing, Reviewing, Emphatic Closing, Stage Fright
- 2.7 Business Meetings – Agenda, Minutes of a Meeting, Leading Effective Meetings

UNIT-3

Communication for Career Management

(08 hours)

- 3.1 Cover letter, Resume and CV Writing - Types, Formats, Cover letter - Format of cover letters, solicited and un-solicited job applications.
- 3.2 Group Discussion - Benefits of a GD; Workplace GD Guidelines - Planning and Preparation, Organizer's Role, Procedure; Functional and Non-functional Roles in Group Discussions; Tips for Success in GDs
- 3.3 Interviews - Fundamental Principles of Interviewing; General Preparation for an Interview, Stage of an interview, Success in an interview, Types of interviews
- 3.4 Life Skills – Problem Solving, Time Management, Stress Management, Leadership, Emotional Intelligence

UNIT-4

Use of Technology in Communication

(04 hours)

- 4.1 Technology in Business Communication - Advantages and Disadvantages of Technology, Changing Role of Technology in Communication
- 4.2 Classification of Various Technologies Available - Internet, Technology Tools, Collaborative Tools, Technology for Daily Use, Intranet and Communication; How much Technology does Your Company Need for Communicating? Latest Trends in Technology; Online Etiquettes

Intended Learning Outcomes/ Course Outcomes (CO)

- Upon completion of the subject, students will be able to:
- Understand and learn different formats of business correspondence at the workplace through which communication takes place.
- Understand the importance of writing an effective Resume and Cover letter in the professional world and its uses.
- Learn the concept and the use of oral presentation to improve professional presentation and the importance of Personal Interview.
- Learn the concept and procedure of Group Discussion.
- Build qualities like Teamwork and leadership. Learning effective time management skills and assertiveness.
- Learn the nuances of effective listening and conversation and use them in their professional life.

Text Books:

1. Technical Communication, Principle and Practice by Meenakshi Raman & Sangeeta Sharma, Oxford University Press
2. Effective Technical Communication by M. Ashraf Rizvi, Mcgraw-Hill Education Recommended Books:
1. Basic Communication Skills by P.KiranmaiDutt, Geetha Rajeevan, Cambridge University Press Books
2. Business Communication- concepts, cases & applications, Chaturvedi & Chaturvedi, Pearson
3. Communication Technology by Everette M.Rogers,Free Press.
4. 101 Great Resumes. 5thJaico Impression. (2008). New Delhi: Jaico Publishing House.
5. Krannich, Caryl Rae & Krannich, Ronald L.. (2003). Nail the Job interview!
6. 101 Dynamite Answers to Interview Questions. (5th ed.). United States of America: Impact Publications.
7. Murphy, A. Herta; Hildebrandt, W. Herbert; Thomas, P. Jane. (2008) Effective Business Communication (7th, ed.). New Delhi: Tata Mc Graw – Hill Publishing Company Company Ltd.

Links:

- <https://pdfroom.com/books/technical-communication-principles-and-practice/kZdowxNWdM8>
- <https://www.thebalancecareers.com/job-interview-questions-and-answers-2061204>
- <http://www.ascdegreecollege.ac.in/wp-content/uploads/2020/12/Business-Communicationby-P.-D.-Chaturvedi-Mukesh-Chaturvedig.pdf>

2 nd Semester	20BTCETES205	PROGRAMMING FOR PROBLEM SOLVING USING PYTHON	L-T-P 3-0-0	Credit 3
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Course objectives:

- To read and write simple Python programs.
- To develop Python programs with conditionals and loops.
- To define Python functions and call them.
- To use Python data structures — lists, tuples, dictionaries.
- To do input/output with files in Python.
- To use OOP concept such as class, object, inheritance in Python.

Prerequisites: Basic knowledge of programming

Unit-1

(7 hours)

Data, Expressions, Statements: Python interpreter and interactive mode; values and types: int, float, boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; modules and functions, function definition and use, flow of execution, parameters and arguments;

Unit-2

(10 hours)

Control Flow, Functions: Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays.

Unit 3

(8 hours)

Lists, Tuples, Dictionaries: Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension;

Unit-4

(7 hours)

Files, Modules, Packages: Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages

Unit-5

(8 hours)

OOP Concepts: Basic Concepts of Object-Oriented Programming, Class, Objects and object instantiation, Class constructor, Class methods, creating more than one object of a class, Inheritance in Python Class.

Text Books:

T1: Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist'', 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016 (<http://greenteapress.com/wp/think-python/>)

T2: Guido van Rossum and Fred L. Drake Jr, "An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.

Reference Books:

R1: Charles Dierbach, "Introduction to Computer Science using Python: A Computational Problem-Solving Focus, Wiley India Edition, 2013.

R2: John V Guttag, "Introduction to Computation and Programming Using Python'', Revised and expanded Edition, MIT Press , 2013

R3: Kenneth A. Lambert, "Fundamentals of Python: First Programs'', CENGAGE Learning, 2012.

R4: Paul Gries, Jennifer Campbell and Jason Montojo, "Practical Programming: An Introduction to Computer Science using Python 3'', Second edition, Pragmatic Programmers,LLC,2013.

Online Resources:

<https://wiki.python.org/moin/BeginnersGuide>

<https://nptel.ac.in/courses/106/106/106106182/>

Course outcomes:

CO1: To get familiar with python environment.

CO2: To implement control structures and user defined functions in python

CO3: To understand the use of tuples, lists or maps.

CO4: To implement file and exception handling in python programs

CO5: To implement basic OOP concepts in python

2 nd Semester	20BTCEPES207	PROGRAMMING FOR PROBLEM SOLVING USING PYTHON LAB	L-T-P 0-0-2	Credit 1
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Course objectives:

- To write, test, and debug simple Python programs.
- To implement Python programs with conditionals and loops.
- Use functions for structuring Python programs.
- Represent compound data using Python lists, tuples, and dictionaries.
- Read and write data from/to files in Python.
- To use OOP concept such as class, object, inheritance in Python.

Assignment/Experiment

- 1 Editing, compiling, executing, and debugging of simple Python programs
- 2 Programs on decision control
- 3 Programs on iterative control
- 4 Programs on nested loops
- 5 Programs on user defines functions
- 6 Programs of String manipulations
- 7 Programs to use list, tuples & dictionary
- 8 Programs to read/write files and use command line arguments
- 9 Programs to create modules and packages
- 10 Programs to create classes and corresponding objects
- 11 Programs to implement inheritance

Course Outcomes:

- CO1: Understand the basic concept of programming
- CO2: Apply programming concept to solve problem
- CO3: Develop logic for problem solving
- CO4: Remember the python programming approach for problem solving
- CO5: Design various model to handle and process data.

3rd Semester

Category	Course Code	Course Title	L-T-P	Credit
Theory				
ES	20BTCETES306	Data Structure using 'C' and Python	3-0-0	3
PC	20BTCETPC303	MOS	3-0-0	3
PC	20BTCET PC301	FMHM	3-0-0	3
PC	20BTCET PC302	Geo Tech Engineering	3-0-0	3
PC	20BTCET PC304	Surveying	3-0-0	3
HS	20BTCET HS303	Universal Human Value	2-0-0	2
MC	20BTCET MC301	Environmental Science	3-0-0	0
		Total Theory		17
Practicals				
PC	20BTCEPPC301	FMHM Lab	0-0-2	1
PC	20BTCEPPC302	GTE Lab	0-0-2	1
PC	20BTCEPPC303	Survey field work	0-0-2	1
ES	20BTCEPES308	Data Structure using 'C' and Python Lab	0-0-2	1
PC	20BTCEPPC304	Employability Skill I	0-0-2	1
		Sub total		5
		Total		22

DEPARTMENT OF CIVIL ENGINEERING

Name of the Subject: **FLUID MECHANICS &HYDRAULIC MACHINES**

Subject Code: 20BTCET PC301

Semester: 3rd

LTP: 3-0-0

Credit: 3

Programme Educational Objectives (PEOs)

PEO1: Our graduates will apply their knowledge and skills to succeed in a Civil Engineering career and/or obtain an advanced degree.

PEO2: Our graduates will apply basic principles of engineering in various practical fields to meet customer business objectives and/or productively engage in research.

PEO3: Our students will be able to apply creative thinking to design Civil Engineering equipment and processes including interdisciplinary technologies.

PEO4: Our graduates will function ethically and responsibly and will remain informed and involved fully in their profession and in society.

PEO5: Our graduates will successfully function in multi-disciplinary teams.

PEO6: Our students will be able to communicate well with others to share the ideas and to cooperate, thus establishing the leadership to manage the organization effectively.

Programme Specific Outcome (PSOs)

PSO1. Professional Design Engineering Skill: Skill to apply the latest Structural Design procedures for civil engineering structures through developing and applying the latest software design, by implementation of complex model analysis.

PSO2. Professional Construction Engineering Skill: Civil Engineering Construction being the heart of the infrastructural development, adoption of latest construction procedures through use and application latest equipment and machineries are to be encouraged.

PSO3. Innovative Skill: An ability to explore new ideas in the field of Civil Engineering with the help of Development of high-quality technical knowledge through application of software and field observed data.

PSO4. Civil Engineering Entrepreneurships: Scope of Civil and Construction Engineering Entrepreneurships are huge and attractive. Students of having right attitude of being entrepreneurs are encouraged and they can avail Institutional incubation cells and MSME inspiration.

Programme outcome (POs)

PO1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems in Civil and Construction Engineering.

PO2. Problem analysis: Identify, formulate, review research literature, and analyze complex Structural engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/development of solutions: Design solutions for complex Civil and Structural Engineering problems and design of various structural components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct investigations of complex problems: Use research-based knowledge and research methods related to Civil Engineering including laboratory experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern Civil, Structural and construction Engineering and related IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice

PO7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

PO11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Course Outcomes(COs)

CO1 :Student are able to understand and analyze the fluid characteristics like density , specific gravity , viscosity , surface tension and their utility in fluid science.

CO2 :Student are able to understand hydrostatic and dynamic pressures at various conditions ,understand different types of pressure measuring devices and identify application potential.

CO3 :Students are able to understand the concept of fluid flow in one ,two and three dimension ,principles of discharge ,energy and momentum as well as understand the working principle of various discharge measuring devices and their applications.

CO4 :Students will be able to apply their knowledge of fluid mechanics in addressing problems of open channel flow by understanding cross sections, hydraulic depth, hydrostatic pressure distribution and Manning's law and identifying future course of development in open channel flow.

CO5 :Students will be able to understand and address problems pertain to design, construction as well as efficient working of various types of hydraulics structures and machines is considerably simplified by using dimensional analysis and model studies.

CO6 :Students will have knowledge in Impact of Jet on vanes which is a base for analysis and design of turbo machines as well as knowledge of hydraulic machines (pumps and turbines)

Syllabus

Module 1 (10 HRS)

Introduction: Scope of fluid mechanics and its development as a science Physical property of Fluid: Density, specific gravity, specific weight, specific volume, surface tension and capillarity, viscosity, compressibility and bulk modulus, Fluid classification.

Fluid statics: Pressure, Pascal's Law, Pressure variation for incompressible fluid, atmospheric pressure, absolute pressure, gauge pressure and vacuum pressure, manometer. Hydrostatic process on submerged surface, force on a horizontal submerged plane surface, force on a vertical submerged plane surface. Buoyancy and floatation, Archimedes' principle, stability of immersed and floating bodies, determination of metacentric height.

Module 2 (8 HRS)

Fluid kinematics: Introduction, description of fluid flow, classification of fluid flow. Reynold's number, Acceleration of fluid particles, flow rate and continuity equation, differential equation of continuity, Mathematical definitions of irrotational and rotational motion. Circulation, potential function and stream function. Flow net.

Module 3 (6 HRS)

Fluid dynamics: Introduction to Force equations and non-dimensional number, Euler's equation along a streamline, energy equation, Bernoulli's equation and its application to siphon, venturi meter, orifice meter, pitot tube. Flow in pipes and ducts: Loss due to friction, Minor energy losses in pipes Hydraulic Gradient Line (HGL), Total Energy Line (TEL), Power transmission in the fluid flow in pipes, fluid flow in pipes in series and parallel. Flow through nozzles

Module 4 (8 HRS)

Impact of Jets: Flat, inclined and curved plates with stationary and moving case.

Hydraulic turbines: Classification, Impulse and Reaction turbine; Tangential, Radial and axial turbine. Impulse turbine, Pelton wheel, bucket dimensions, number of buckets in Pelton wheel, efficiency and performance curves.

Reaction Turbines: Francis turbine and Kaplan turbine, velocity triangle and efficiencies, performance curve. Function of draft tube and casing cavitation

Module 5 (8 HRS)

Centrifugal Pump: constructional features, vane shape, velocity triangles, Efficiencies, Multi stage centrifugal pumps, Pump Characteristic, NPSH and Cavitation. Positive displacement pumps: Reciprocating Pump, working principle, Discharge, work done and power requirement, Slip, Indicator diagram

Text Books:

- 1 "A text book of Fluid Mechanics and Hydraulic Machines" by R.K. Rajput, S. Chand and Company Ltd. 2006.
2. "Engineering Fluid Mechanics" by K. L. Kumar, 8th Revised Edition, S. Chand & Company Ltd.
3. "Hydraulics & Fluid Mechanics" by P.N. Modi & S.M. Seth, 19th Edition, Rajsons Publication

Reference Books:

1. "Engineering Fluid Mechanics" by R.J. Garde & A. G. Mirajgaonker, Scitech Publications (India) Private Limited.
2. "Fluid Mechanics & Hydraulic Machines" by Sukumar Pati, 1st Edition, Tata McGraw-hill Publication.

3. “Fluid Mechanics” by V.L. Streeter, E.B. Wylie & K.M. Bedford, 9th Edition, Tata McGraw-hill Publication.

4. “Fluid mechanics” by Frank M. White, 7th Edition, Tata McGraw-hill Publication

Course Outcomes (CO)	Relationship of Course Outcomes (CO) to Program Outcomes (PO)											
	1 – Slightly			2 – Moderately				3 – Substantive				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1.	2	2	1	3	2	2	2	2	3	2	1	2
2.	3	3	2	2	1	3	2	2	3	2	1	2
3.	3	3	2	2	2	2	2	2	3	2	1	3
4.	3	3	2	2	2	2	2	1	3	2	1	3
5.	2	1	2	2	2	2	1	2	1	2	1	1
6.	2	2	2	2	1	2	1	2	1	2	1	1
Gravity of contribution	83%	77%	61%	72%	55%	71%	55%	61%	78%	66%	33%	66%
	Above 70% is considered as Strong contribution											
	Above 50% below 70% is considered as Average contribution											
	below 50% is considered as Some contribution											

	Relationship of Course Outcomes (CO) to Program Specific Outcomes (PSO)			
	1 – Slightly	2 – Moderately		3 – Substantive
	PSO1	PSO2	PSO3	PSO4
CO1	2	2	2	1
CO2	1	2	2	1
CO3	1	2	2	2
CO4	2	1	3	2
CO5	2	2	2	2
CO6	2	2	3	2

Name of the Subject: **MECHANICS OF SOLIDS**

Subject Code: 20BTCETPC303

Semester: 3rd Semester

LTP: 0-0-2

Credit: 1

Programme Educational Objectives (PEOs)

PEO1: Our graduates will apply their knowledge and skills to succeed in a Civil Engineering career and/or obtain an advanced degree.

PEO2: Our graduates will apply basic principles of engineering in various practical fields to meet customer business objectives and/or productively engage in research.

PEO3: Our students will be able to apply creative thinking to design Civil Engineering equipment and processes including interdisciplinary technologies.

PEO4: Our graduates will function ethically and responsibly and will remain informed and involved fully in their profession and in society.

PEO5: Our graduates will successfully function in multi-disciplinary teams.

PEO6: Our students will be able to communicate well with others to share the ideas and to cooperate, thus establishing the leadership to manage the organization effectively.

Programme Specific Outcome (PSOs)

PSO1. Professional Design Engineering Skill: Skill to apply the latest Structural Design procedures for civil engineering structures through developing and applying the latest software design, by implementation of complex model analysis.

PSO2. Professional Construction Engineering Skill: Civil Engineering Construction being the heart of the infrastructural development, adoption of latest construction procedures through use and application latest equipment and machineries are to be encouraged.

PSO3. Innovative Skill: An ability to explore new ideas in the field of Civil Engineering with the help of Development of high-quality technical knowledge through application of software and field observed data.

PSO4. Civil Engineering Entrepreneurships: Scope of Civil and Construction Engineering Entrepreneurships are huge and attractive. Students of having right attitude of being entrepreneurs are encouraged and they can avail Institutional incubation cells and MSME inspiration.

Programme outcome (POs)

PO1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems in Civil and Construction Engineering.

PO2. Problem analysis: Identify, formulate, review research literature, and analyze complex Structural engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/development of solutions: Design solutions for complex Civil and Structural Engineering problems and design of various structural components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct investigations of complex problems: Use research-based knowledge and research methods related to Civil Engineering including laboratory experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern Civil, Structural and construction Engineering and related IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice

PO7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

PO11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

COURSE OBJECTIVES:

- (1) To know the concepts and principles of stresses and strains
- (2) To Analyze solid mechanics problems using classical methods and energy methods
- (3) To Analyze structural members subjected to combined stresses
- (4) To Calculate the deflections at any point on a beam subjected to a combination of loads
- (5) To Understand the behavior of columns.
- (6) To Analyze the strength of springs and cylinders against loads.

MODULE- I(12hours)

Simple Stress and Strain- Load, Stress, Principle of St.Venant, Principle of Superposition, Strain, Hooke's law, Modulus of Elasticity, Stress-Strain Diagrams, Working Stress, Factor of safety, Strain energy in tension and compression, Resilience, Impact loads, Analysis of Axially Loaded Members, Composite bars in tension and compression, temperature stresses in composite rods, Statically indeterminate problems, Shear stress, Complimentary shear stress, Shear strain, Modulus of rigidity, Poisson's ratio, Bulk Modulus, Relationship between elastic constants.

Compound Stress and strain- Stresses in thin cylinders, thin spherical shells under internal pressure, wire winding of thin cylinders, Analysis of Biaxial Stress. Plane stress, Principal stress, Principal plane, Mohr's Circle for Biaxial Stress, Two dimensional state of strain, Mohr's circle for strain, Principal strains and principal axes of strain, Calculation of principal stresses from principal strains.

MODULE- II(10hours)

Shear Force and Bending Moment for Determinate Beams - Types of load and Types of support. Support reactions, Shear force and bending moment, Relationship between bending moment and shear force, Point of inflection, Shear Force and Bending Moment diagrams for determinate beams.

MODULE- III(8hours)

Simple Bending of Beams - Theory of simple bending of initially straight beams, Bending stresses, Shear stresses in bending, Distribution of normal and shear stress, beams of two materials, Composite beams.

Deflection of Beams - Differential equation of the elastic line, Slope and deflection of beams by integration method and area -moment method.

MODULE- IV(4hours)

Theory of Columns - Eccentric loading of a short strut, Long columns, Euler's column formula, Lateral buckling, Critical Load, Slenderness ratio

MODULE- V(6hours)

Torsion in solid and hollow circular shafts - Twisting moment, Strain energy in shear and torsion, strength of solid and hollow circular shafts. Stresses due to combined bending and torsion, Strength of shafts in combined bending and twisting, Close-coiled helical spring.

TEXTBOOKS

1. Elements of Strength of Materials by S.P. Timoshenko and D.H. Young, Affiliated East-West Press
2. Strength of Materials by G.H. Ryder, Macmillan Press
3. Strength of Materials by R. Subramaniam, Oxford University Press
4. Strength of Material by S.S. Ratan, McGraw Hill

REFERENCE BOOKS

1. Mechanics of Materials by Beer and Johnston, McGraw Hill
2. Mechanics of Materials by R.C. Hibbeler, Pearson Education
3. Engineering Mechanics of Solids by Egor P. Popov, Prentice Hall of India

E-Resources:

1. https://onlinecourses.nptel.ac.in/noc20_ce34/preview
2. <https://nptel.ac.in/courses/105/104/105104160/>
3. <https://nptel.ac.in/courses/105/106/105106116/>

Course Out comes (CO)	Relationship of Course Outcomes (CO) to Program Outcomes (PO)											
	1 – Slightly			2 – Moderately				3 – Substantive				
	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
	3	3	3	2	2	2	2	2	1	1	1	3
	3	3	3	2	2	2	2	2	1	1	2	3
	3	3	3	3	2	2	1	1	1	1	1	2
	3	2	2	2	2	1	1	2	2	1	1	3
	3	3	3	2	2	2	1	2	1	1	1	2
	3	3	2	2	2	1	1	1	1	1	1	2
Gravity of contribution	100%	94%	89%	73%	67%	56%	44%	55%	38%	33%	39%	83%

	Above 70% is considered as Strong contribution										
	Above 50% below 70% is considered as Average contribution										
	below 50% is considered as Some contribution										

Relationship of Course Outcomes (CO) to Program Specific Outcomes (PSO)				
	1 – Slightly	2 – Moderately	3 – Substantive	
	PSO1	PSO2	PSO3	PSO4
CO1	2	3	3	3
CO2	3	2	2	2
CO3	3	3	3	3
CO4	3	3	3	3
CO5	3	3	2	3
CO6	3	3	3	3

Name of the Subject: **Surveying**

Subject Code: 20BTCET PC304

Semester: 3th Semester

LTP: 3-0-0

Credit: 3

Programme Educational Objectives (PEOs)

PEO1: Our graduates will apply their knowledge and skills to succeed in a Civil Engineering career and/or obtain an advanced degree.

PEO2: Our graduates will apply basic principles of engineering in various practical fields to meet customer business objectives and/or productively engage in research.

PEO3: Our students will be able to apply creative thinking to design Civil Engineering equipment and processes including interdisciplinary technologies.

PEO4: Our graduates will function ethically and responsibly and will remain informed and involved fully in their profession and in society.

PEO5: Our graduates will successfully function in multi-disciplinary teams.

PEO6: Our students will be able to communicate well with others to share the ideas and to cooperate, thus establishing the leadership to manage the organization effectively.

Programme Specific Outcome (PSOs)

PSO1. Professional Design Engineering Skill: Skill to apply the latest Structural Design procedures for civil engineering structures through developing and applying the latest software design, by implementation of complex model analysis.

PSO2. Professional Construction Engineering Skill: Civil Engineering Construction being the heart of the infrastructural development, adoption of latest construction procedures through use and application latest equipment and machineries are to be encouraged.

PSO3. Innovative Skill: An ability to explore new ideas in the field of Civil Engineering with the help of Development of high-quality technical knowledge through application of software and field observed data.

PSO4. Civil Engineering Entrepreneurships: Scope of Civil and Construction Engineering Entrepreneurships are huge and attractive. Students of having right attitude of being entrepreneurs are encouraged and they can avail Institutional incubation cells and MSME inspiration.

Programme outcome (POs)

PO1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems in Civil and Construction Engineering.

PO2. Problem analysis: Identify, formulate, review research literature, and analyze complex Structural engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/development of solutions: Design solutions for complex Civil and Structural Engineering problems and design of various structural components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct investigations of complex problems: Use research-based knowledge and research methods related to Civil Engineering including laboratory experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern Civil, Structural and construction Engineering and related IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice

PO7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

PO11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

COURSE OBJECTIVE

- 1.To determine the relative position of any objects or points of the earth.
- 2.To determine the distance and angle between different objects.
- 3.To prepare a map or plan to represent an area on a horizontal plan.
- 4.To develop methods through the knowledge of modern science and the technology and use them in the field.
- 5.To solve measurement problems in an optimal way.
6. To .develop skills to conduct traverse survey & to find the area

Module I (10 classes)

Linear measurement and chain survey: Use of chains and tapes for measurement of correct length of lines, direct and indirect ranging, chaining along sloping ground. Obstacle in chaining, errors and their elimination.

Compass surveying: Use of prismatic compass, temporary adjustment, bearing of a line, local attractions, and correction of bearing

Module II (8 classes)

Levelling: Use of dumpy level and levelling staff. Temporary and Permanent adjustment of dumpy level, Reduction of levels by height of instrument and rise and fall method. Curvature and refraction error, sensitiveness of level tube, reciprocal levelling, levelling difficulties and common errors, Automatic and Electronic or Digital levels

Module III (10 classes)

Contouring: Contour interval and horizontal equivalent, characteristics of contours, methods of contouring- different and indirect method, contour gradient

Module IV (8 classes)

Theodolite Survey: Use of theodolite, temporary adjustment, measuring horizontal and vertical angles, theodolite traversing

Module V (8 classes)

Modern Surveying Instruments – Electromagnetic Spectrum, Radar, Electronic Distance Measurement, EDM Equipment, Corrections to measurement, Digital Theodolite, Total Stations, Introduction to Remote Sensing and GIS

Text Books

1. Surveying & Levelling. Vol-I by T.P.Kanethar&S.V.Kulkarni, Pune Vidyarthi Griha Prakashan
2. Surveying and Leveling by R. Subramanian, Oxford University Press
3. Surveying- Vol.I, by B.C. Punmia, Laxmi Publications

Reference Books

1. Surveying Vol-1 by R Agor, Khanna Publishers
2. A Textbook of Surveying, C. Venkatramaiah, Universities Press
3. Surveying And Levelling, N.N. Basak, McGraw-Hill Education

E-Resources:<https://nptel.ac.in/courses/105/107/105107122/>

Course Outcomes (CO)	Relationship of Course Outcomes (CO) to Program Outcomes (PO)											
	1 – Slightly			2 – Moderately				3 – Substantive				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1.	2	3	3	3	2	3	3	3	3	2	3	2
2.	2	2	1	2	2	1	2	1	1	2	1	2
3.	3	1	2	3	1	2	2	2	3	1	3	2
4.	3	3	1	1	3	1	3	1	3	3	1	1
5.	2	3	2	2	2	3	1	2	2	3	3	2
6.	3	1	2	1	3	2	3	3	2	2	1	2
Gravity of contribution	83%	72%	61%	66%	72%	66%	77%	66%	77%	72%	66%	61%
	Above 70% is considered as Strong contribution											
	Above 50% below 70% is considered as Average contribution											
	below 50% is considered as Some contribution											

	Relationship of Course Outcomes (CO) to Program Specific Outcomes (PSO)			
	1 – Slightly	2 – Moderately		3 – Substantive
	PSO1	PSO2	PSO3	PSO4
CO1	2	3	3	3
CO2	3	2	2	2
CO3	1	3	3	3
CO4	3	1	2	2
CO5	3	3	2	3
CO6	3	2	1	3

Name of the Subject: SURVEY FIELD WORKS

Subject code: 20BTCEPPC303

3rd Semester

LTP 0-0-2

Credit– 1

1. Testing of chain and measurement of correct length of the line and chain traversing.
2. Traversing by Compass
3. Horizontal and vertical angle by theodolite
4. Traversing by theodolite
5. Use of dumpy level and automatic level for fly levelling.
6. Contouring
7. Measurement of distance, horizontal and vertical angle by Total Station

Name of the Subject: GEOTECHNICAL ENGINEERING

Subject Code: 20BTCET PC302

Semester: 3rd Semester

LTP: 3-0-0

Credit: 3

Programme Educational Objectives (PEOs)

PEO1: Our graduates will apply their knowledge and skills to succeed in a Civil Engineering career and/or obtain an advanced degree.

PEO2: Our graduates will apply basic principles of engineering in various practical fields to meet customer business objectives and/or productively engage in research.

PEO3: Our students will be able to apply creative thinking to design Civil Engineering equipment and processes including interdisciplinary technologies.

PEO4: Our graduates will function ethically and responsibly and will remain informed and involved fully in their profession and in society.

PEO5: Our graduates will successfully function in multi-disciplinary teams.

PEO6: Our students will be able to communicate well with others to share the ideas and to cooperate, thus establishing the leadership to manage the organization effectively.

Programme Specific Outcome (PSOs)

PSO1. Professional Design Engineering Skill: Skill to apply the latest Structural Design procedures for civil engineering structures through developing and applying the latest software design, by implementation of complex model analysis.

PSO2. Professional Construction Engineering Skill: Civil Engineering Construction being the heart of the infrastructural development, adoption of latest construction procedures through use and application latest equipment and machineries are to be encouraged.

PSO3. Innovative Skill: An ability to explore new ideas in the field of Civil Engineering with the help of Development of high-quality technical knowledge through application of software and field observed data.

PSO4. Civil Engineering Entrepreneurships: Scope of Civil and Construction Engineering Entrepreneurships are huge and attractive. Students of having right attitude of being entrepreneurs are encouraged and they can avail Institutional incubation cells and MSME inspiration.

Programme outcome (POs)

PO1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems in Civil and Construction Engineering.

PO2. Problem analysis: Identify, formulate, review research literature, and analyze complex Structural engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/development of solutions: Design solutions for complex Civil and Structural Engineering problems and design of various structural components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct investigations of complex problems: Use research-based knowledge and research methods related to Civil Engineering including laboratory experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern Civil, Structural and construction Engineering and related IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice

PO7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

PO11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

COURSE OBJECTIVES:

1. To know the basic concepts, theories and methods of analysis in soil mechanics and foundation engineering.
2. To get the knowledge of basic properties of soil by applying functional relationships.
3. To know the engineering properties of soil by applying the laboratory test results and the fundamental concepts
4. To estimate the strength through graphical representation.
5. To know the behavior of stresses occurred at the soil circumstances.
6. To get the knowledge about compaction and consolidation properties of soil.

Module-I (8 hours)

Origin of Soil: Rock Cycle and the origin of soil, clay mineralogy, mechanical analysis of soil, grain size distribution curve, particle shape and size, weight volume relationships, Index properties of soil, Consistency of soil: Atterberg limits - Liquidity index and consistency index, activity, soil structure. Engineering classification of soil: Types of Soil classification, IS, USCS, HRB and ASTM.

Module-II (8 classes)

Soil Hydraulics: Modes of occurrence of water in soil. Stress conditions in soil - total, effective and neutral stresses and relationships.

Permeability-

Bernoulli's equation, Darcy's Law, hydraulic conductivity, laboratory determination of hydraulic conductivity, Factors affecting hydraulic conductivity, equivalent hydraulic conductivity in stratified soil.

Seepage- Laplace equation of continuity, flow nets, seepage calculation from a flow net, flownets in anisotropic soils, seepage through earthdam, critical hydraulic gradient and quicksand condition.

Module-III (6classes)

Soil Compaction: mechanism and principles,

Laboratory compaction, factors affecting compaction, effect of compaction on soil properties, field compaction techniques.

Module-IV (12classes)

Stress Distribution: Normal and shear stresses on a plane, Boussinesq's solution for a point load, line load, strip load, uniformly loaded circular and rectangular areas, Isobar and pressure bulb concept, stress distribution on horizontal and vertical planes, Newmark's chart and its application, contact pressure.

Shear Strength: Mohr-Coulomb failure criterion, shear strength parameters and determination: direct and tri-axial shear test, unconfined compression test, vane shear test. Other methods of determining the un-drained shear strength of soil, sensitivity and thixotropy of clay.

Module-V (6classes)

Consolidation of soils: Consolidation and compaction, primary and secondary consolidation, Terzaghi's theory of one-dimensional consolidation, consolidation test, coefficient of consolidation.

TEXT BOOKS

1. Principles of Geotechnical Engineering by Braja M. Das, Cengage Learning
2. Soil Mechanics and Foundation Engineering by B. C Punmia et al., Laxmi Publications Pvt Ltd
3. Soil Mechanics and Foundation Engineering, by K.R. Arora, Standard Publishers
4. Soil Mechanics and Foundation Engineering by B.N.D. Narasinga Rao, Wiley India Pvt. Ltd

REFERENCE BOOKS

1. Basic and applied soil mechanics, New Age International Publishers
2. Geotechnical Engineering by T.N. Ramamurthy & T.G. Sitharam, S. Chand & Co.
3. Geotechnical Engineering, S.K. Gulati and M. Datta, McGraw Hill

Digital Learning Resources:

<https://nptel.ac.in/courses/105/101/105101201/>

<https://nptel.ac.in/courses/105/105/105105168/>

Course Outcomes (CO)	Relationship of Course Outcomes (CO) to Program Outcomes (PO)											
	1 – Slightly			2 – Moderately				3 – Substantive				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
	2	3	3	3	2	2	2	2	1	1	1	3
	3	3	3	2	2	2	2	2	1	1	2	3
	3	3	3	3	2	2	1	1	1	1	1	2
	3	3	3	3	2	1	1	2	2	1	1	3
	2	3	3	2	2	2	1	2	1	1	1	2
	3	3	3	2	2	1	1	1	1	1	1	2
Gravity of contribution	88%	100%	100%	83%	67%	56%	44%	55%	38%	33%	39%	83%
	Above 70% is considered as Strong contribution											
	Above 50% below 70% is considered as Average contribution											
	below 50% is considered as Some contribution											

	Relationship of Course Outcomes (CO) to Program Specific Outcomes (PSO)			
	1 – Slightly	2 – Moderately	3 – Substantive	
	PSO1	PSO2	PSO3	PSO4
CO1	2	3	3	3
CO2	3	2	2	2
CO3	3	3	3	3
CO4	3	3	3	3
CO5	3	3	2	3
CO6	3	3	3	3

4th Semester

Category	Course Code	Course Title	L-T-P	Credit
Theory				
BS	20BTCETBS405	Engineering Mathematics III	3-0-0	3
PC	20BTCETPC405	Transportation Engineering -1	3-0-0	3
PC	20BTCETPC406	Structural Analysis - I	3-0-0	3
PC	20BTCETPC407	Water and Waste Water Engineering	3-0-0	3
HS	20BTCETHS404	Engineering Economics and Costing	0-0-2	2
PE -1		Construction Technology	3-0-0	3
	20BTCETPE401	Concrete Technology		
		Advanced Construction Materials		
MC	20BTCETMC403	Constitution of India	1-0-0	0
		Sub Total		17
Practical				
PC	20BTCEPPC405	Transport Engineering Lab	0-0-2	1
PC	20BTCEPPC406	Environmental Engineering lab	0-0-2	1
PC	20BTCEPPC407	Civil Engineering Drawing	0-0-2	1
PC	20BTCEPPC408	Employability Skill 2	0-0-3	1
PC	20BTCEPPC409	Mini Project I	0-0-2	1
		Sub Total		5
Total				22
		Summer internship training for 45 Days		

Total Credit in 2nd Year = 44

Name of the Subject: **TRANSPORTATION ENGINEERING**

Subject Code: 20BTCETPC405

Semester: 4TH Semester

LTP: 3-0-0

Credit: 3

Programme Educational Objectives (PEOs)

PEO1: Our graduates will apply their knowledge and skills to succeed in a Civil Engineering career and/or obtain an advanced degree.

PEO2: Our graduates will apply basic principles of engineering in various practical fields to meet customer business objectives and/or productively engage in research.

PEO3: Our students will be able to apply creative thinking to design Civil Engineering equipment and processes including interdisciplinary technologies.

PEO4: Our graduates will function ethically and responsibly and will remain informed and involved fully in their profession and in society.

PEO5: Our graduates will successfully function in multi-disciplinary teams.

PEO6: Our students will be able to communicate well with others to share the ideas and to cooperate, thus establishing the leadership to manage the organization effectively.

Programme Specific Outcome (PSOs)

PSO1. Professional Design Engineering Skill: Skill to apply the latest Structural Design procedures for civil engineering structures through developing and applying the latest software design, by implementation of complex model analysis.

PSO2. Professional Construction Engineering Skill: Civil Engineering Construction being the heart of the infrastructural development, adoption of latest construction procedures through use and application latest equipment and machineries are to be encouraged.

PSO3. Innovative Skill: An ability to explore new ideas in the field of Civil Engineering with the help of Development of high-quality technical knowledge through application of software and field observed data.

PSO4. Civil Engineering Entrepreneurships: Scope of Civil and Construction Engineering Entrepreneurships are huge and attractive. Students of having right attitude of being entrepreneurs are encouraged and they can avail Institutional incubation cells and MSME inspiration.

Programme outcome (POs)

PO1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems in Civil and Construction Engineering.

PO2. Problem analysis: Identify, formulate, review research literature, and analyze complex Structural engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/development of solutions: Design solutions for complex Civil and Structural Engineering problems and design of various structural components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct investigations of complex problems: Use research-based knowledge and research methods related to Civil Engineering including laboratory experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern Civil, Structural and construction Engineering and related IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice

PO7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

PO11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Course Objectives (CO):

CO1: To give overall idea to the students about transportation system, history of highway engineering and economics spreading over the time.

CO2: To impart knowledge regarding computation and design the different component of the highway such as sight distances, horizontal curves, super elevation, extra widening, transition curves and gradient, vertical curves etc.

CO3: To introduce to the students regarding the design criteria of pavements by IRC guideline.

CO4: To give knowledge about the traffic engineering and components of traffic such as traffic signs, signals, design of traffic signals design, rotary intersection, Volume studies, speed studies

CO5: To educate the students regarding the testing of construction materials used in highway such as Soil, Stone Aggregate, Bitumen, and Marshal Stability Test etc.

CO6: To impart practical knowledge regarding construction of highway.

DEPARTMENT OF CIVIL ENGINEERING

Name of the Subject: **Structural Analysis-I**

Subject Code: 20BTCETPC406

Semester: 4th Semester

LTP: 3-0-0

Credit: 3

Programme Educational Objectives (PEOs)

PEO1: Our graduates will apply their knowledge and skills to succeed in a Civil Engineering career and/or obtain an advanced degree.

PEO2: Our graduates will apply basic principles of engineering in various practical fields to meet customer business objectives and/or productively engage in research.

PEO3: Our students will be able to apply creative thinking to design Civil Engineering equipment and processes including interdisciplinary technologies.

PEO4: Our graduates will function ethically and responsibly and will remain informed and involved fully in their profession and in society.

PEO5: Our graduates will successfully function in multi-disciplinary teams.

PEO6: Our students will be able to communicate well with others to share the ideas and to cooperate, thus establishing the leadership to manage the organization effectively.

Programme Specific Outcome (PSOs)

PSO1. Professional Design Engineering Skill: Skill to apply the latest Structural Design procedures for civil engineering structures through developing and applying the latest software design, by implementation of complex model analysis.

PSO2. Professional Construction Engineering Skill: Civil Engineering Construction being the heart of the infrastructural development, adoption of latest construction procedures through use and application latest equipment and machineries are to be encouraged.

PSO3. Innovative Skill: An ability to explore new ideas in the field of Civil Engineering with the help of Development of high-quality technical knowledge through application of software and field observed data.

PSO4. Civil Engineering Entrepreneurships: Scope of Civil and Construction Engineering Entrepreneurships are huge and attractive. Students of having right attitude of being entrepreneurs are encouraged and they can avail Institutional incubation cells and MSME inspiration.

Programme outcome (POs)

PO1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems in Civil and Construction Engineering.

PO2. Problem analysis: Identify, formulate, review research literature, and analyze complex Structural engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/development of solutions: Design solutions for complex Civil and Structural Engineering problems and design of various structural components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct investigations of complex problems: Use research-based knowledge and research methods related to Civil Engineering including laboratory experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern Civil, Structural and construction Engineering and related IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice

PO7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

PO11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

CO: CO1- To provide a holistic development of the students for the courses in sector of Structural Analysis

CO2-To present the foundations of many basic engineering concepts related to Analysis of structures

CO3-To give an experience for implementation of analysis concepts which are applied in the field of structural design.

CO4-To involve in the application of scientific and technological principles of Analysis

CO5-To enable the students realize the real-life behavior of Civil Engineering structures

CO6-To make the students familiar with latest computational techniques and software used for structural analysis.

Syllabus

Module- I (15hrs)

Concept of determinate and indeterminate structures, determination of degree of static and kinematic indeterminacy in plane frame and continuous structures. Methods of Analysis: Equilibrium equations, compatibility requirements, Introduction to force and displacement methods. Analysis of propped cantilever by consistent deformation method, Analysis of fixed and continuous beams by Moment-Area method, Conjugate beam method and theorem of three moments.

Module- II (5hrs)

Energy theorems and its application, Strain energy method, Virtual work method, unit load method, Betti's and Maxwell's laws, Castigliano's theorem, concept of minimum potential energy.

Module- III (4hrs)

Analysis of redundant plane trusses.

Deflection of pin jointed plane trusses. Analytical method and Williot –Mohr diagram. Introduction to space truss.

Module- IV (8hrs)

Rolling loads and influence lines for determinate structures, simply supported beams, cantilever, ILD for reaction, shear force and bending moment at a section, ILD for wheel loads, point loads and udl, maximum bending moment envelope.

Module- V (8hrs)

Analysis of three hinged arches, Suspension cable with three hinged stiffening girders subjected to dead and live loads, ILD for Bending Moment, Shear Force, normal thrust and radial shear for three hinged arches.

Text Books:

- Theory and Problems in Structural Analysis by L Negi, McGraw Hill
- Structural Analysis by T.S. Thandamoorthy, Oxford University Press
- Basic Structural Analysis by C S Reddy, McGraw Hill
- Elementary Structural Analysis by Norris and Wilber, McGraw Hill
- Structural Analysis by Aslam Kassimali, Cengage Learning
- Structural Analysis by R.C. Hibbeler, Pearson Education

Reference Books:

- Structural Analysis-I, 4th Edition by S.S Bhavikatti, Vikas Publishing House Pvt. Ltd.
- Theory of Structures by S. Ramamrutham, Dhanpat Rai Publishing Company Private Limited.

E-Resource: <https://nptel.ac.in/courses/105/105/105105166/>

Course Outcomes (CO)	Relationship of Course Outcomes (CO) to Program Outcomes (PO)											
	1 – Slightly			2 – Moderately			3 – Substantive					
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
7.	2	3	3	2	2	3	3	2	2	2	3	3
8.	1	2	2	1	2	2	3	2	2	3	3	2
9.	3	3	3	2	3	3	1	2	1	3	2	2
10.	2	2	3	2	2	1	2	2	1	3	3	2

11.	3	2	3	2	1	3	1	1	1	3	1	1
12.	3	1	3	3	2	2	3	1	2	3	3	2
Gravity of contribution	77%	72%	94%	67%	67%	77%	72%	55%	50%	94%	83%	67%
			Above 70% is considered as Strong contribution									
			Above 50% below 70% is considered as Average contribution									
			below 50% is considered as Some contribution									

Relationship of Course Outcomes (CO) to Program Specific Outcomes (PSO)				
	1 – Slightly	2 – Moderately	3 – Substantive	
	PSO1	PSO2	PSO3	PSO4
CO1	2	3	1	3
CO2	3	2	2	3
CO3	2	3	2	2
CO4	3	2	3	1
CO5	3	3	3	3
CO6	1	2	3	3

DEPARTMENT OF CIVIL ENGINEERING

Name of the Subject: **CONCRETE TECHNOLOGY**

Subject Code: 20BTCETPE401

Semester: 4TH sem

L-T-P 3-0-0

Credit - 3

Programme Educational Objectives (PEOs)

PEO1: Our graduates will apply their knowledge and skills to succeed in a Civil Engineering career and/or obtain an advanced degree.

PEO2: Our graduates will apply basic principles of engineering in various practical fields to meet customer business objectives and/or productively engage in research.

PEO3: Our students will be able to apply creative thinking to design Civil Engineering equipment and processes including interdisciplinary technologies.

PEO4: Our graduates will function ethically and responsibly and will remain informed and involved fully in their profession and in society.

PEO5: Our graduates will successfully function in multi-disciplinary teams.

PEO6: Our students will be able to communicate well with others to share the ideas and to cooperate, thus establishing the leadership to manage the organization effectively.

Programme Specific Outcome (PSOs)

PSO1. Professional Design Engineering Skill: Skill to apply the latest Structural Design procedures for civil engineering structures through developing and applying the latest software design, by implementation of complex model analysis.

PSO2. Professional Construction Engineering Skill: Civil Engineering Construction being the heart of the infrastructural development, adoption of latest construction procedures through use and application latest equipment and machineries are to be encouraged.

PSO3. Innovative Skill: An ability to explore new ideas in the field of Civil Engineering with the help of Development of high-quality technical knowledge through application of software and field observed data.

PSO4. Civil Engineering Entrepreneurships: Scope of Civil and Construction Engineering Entrepreneurships are huge and attractive. Students of having right attitude of being entrepreneurs are encouraged and they can avail Institutional incubation cells and MSME inspiration.

Programme outcome (POs)

PO1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems in Civil and Construction Engineering.

PO2. Problem analysis: Identify, formulate, review research literature, and analyze complex Structural engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/development of solutions: Design solutions for complex Civil and Structural Engineering problems and design of various structural components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct investigations of complex problems: Use research-based knowledge and research methods related to Civil Engineering including laboratory experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern Civil, Structural and construction Engineering and related IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice

PO7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

PO11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Course Outcomes (CO):

1. Get the detail knowledge of various building materials used in construction.
2. Clear the concept of fresh and hardened properties of concrete.
3. Get the knowledge to design the concrete mix and find the proportional quantity by using IS code.
4. Develop the knowledge about the technique behind construction work.
5. Well understanding of the mechanism of construction by using different equipments.
6. Get the knowledge to understand the building maintenance requirement and process.

Syllabus

Introduction

Introduction of concrete, Historic development, Composition of concrete, Advantages of concrete over other materials, Advances and future trends in concrete, Overview of Sustainability and Concrete development.

Module I: Concrete Ingredients (6 Hours)

Cement – Manufacturing Process of cement, Chemical composition, Hydration of cement, Test on cement as per Indian Standard, Types of cement (Special cement). Aggregates – Utility in concrete, Classification, IS specifications, Properties, Grading, Methods of combining aggregates, Specified gradings, Testing of aggregates. Water – General Requirements & limiting values of impurities. Chemical Admixtures – Plasticizers, Accelerators, Retarders and Air entraining agents.

Mineral Admixtures – Pozzolanic and Cementitious materials, Fly ash, GGBS, Silica fumes, Metakaolin and Rice husk ash. Introduction to pre-stressed concrete.

Module II: Fresh and Hardened Concrete (10 Hours)

Properties of fresh concrete, Definition and Measurement methods of workability as per Indian Standard, factors affecting workability, Segregation & Bleeding, Slump loss, Re-tempering, Site preparations for concreting, Mixing, Conveying, Placing, Compaction, Finishing of concrete, Curing & various methods of curing. Hardened Concrete: Factors influencing strength – i.e. W/C ratio, gel/space ratio, Maturity concept, Strengths of Hardened concrete (Tensile & Compressive strength, Flexural & Bond strength), Dimensional stability – Creep & Shrinkage, factors affecting

creep, plastic shrinking and drying shrinkage, Factors affecting shrinkage, Definition and significance of durability, Internal and external factors influencing durability, Mechanisms - Sulphate attack, chloride attack, carbonation, freezing and thawing. Corrosion, Overview of Modulus of elasticity, In situ testing of concrete - Penetration and pull out test, rebound hammer test, ultrasonic pulse velocity,

Module III: Mix design of Concrete (4 Hours)

Principles of concrete mix design with and without admixtures, Parameters and factors influencing mix design, variables in proportioning and Exposure conditions, Selection criteria of ingredients used for mix design, Procedure of mix proportioning, Numerical Examples of Mix Proportioning using IS-10262:2019.

Module IV: (10 Hours)

Earthwork: Introduction, Classification of soil, project site development, setting out, mechanized excavation, ground water control. Piling: classification of piles, pile driving methods, load test and quality control.

Concrete and Concreting: Introduction, Important properties of concrete, Use of admixtures, formwork, shotcrete, lightweight and heavyweight concrete, ready-mix concrete, high performance concrete, self-compacting concrete, extreme weather concreting, prestressed concrete, under water concreting, curing of concrete, non destructive testing of hardened concrete.

Roof and roofing: Introduction, cast-in-situ reinforced concrete roofs, precast reinforced concrete roofs, roofs covered with sheets, water proofing over roofs.

Finishing Work: Introduction, plastering, pointing, facing, glazing, flooring, painting, Construction joints - need and materials used, Plumbing and electrification- various Types of fittings and laying procedure,

Module V: Construction Equipments(10 Hours)

Mechanized Construction: Introduction, general consideration, plants for earthwork - tractor, bulldozer, ripper, scraper, face shovel, backhoe, dragline, clamshell etc., roller, plants for transportation, movement and handling-derrick, crane, hoist, concrete mixers and pumps, scaffolding Building items: Plastering & pointing- its purpose, various types, construction procedures, advantages and disadvantages, suitability of each, Damp proof course (DPC), Anti-termite measures and treatment, Construction joints-need and materials used, Plumbing and electrification-various types of fittings and laying procedure, Building Maintenance of and Safety Measures: Purpose, need, importance, methods, Causes and types of defects in buildings, Preparation of report on maintenance work, Remedial measures and execution procedure of any one type of building maintenance work, Importance of various Laws / Norms / Regulations / Acts for safety, Precautions and precautionary Measures, Post-accident procedures.

Test Books:

1. M.S. Shetty, Concrete Technology - Theory and Practice Published by S. Chand and Company, New Delhi.
2. M.L. Gambhir, Concrete Technology Published by Tata McGraw Hill.
3. G.C. Sahu and Joygopal Jena, Building Material and Construction Published by Tata McGraw Hill.
4. Construction Technology, Subir Sarkar and SubhajtSaraswati, Oxford University Press.
5. Construction Planning and Management, U. K. Srivastava, Galgotia Publications PvtLtd.

Reference Books:

1. A.R. Santhakumar, Concrete Technology Published by Oxford University Press.
2. A.M. Neville, Properties of Concrete, published by Pearson Education.

3. Construction Engineering and Management, S. Seetharaman, Umesh Publications.

Course Outcomes (CO)	Relationship of Course Outcomes (CO) to Program Outcomes (PO)											
	1 – Slightly			2 – Moderately			3 – Substantive					
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
13.	3	1	1	1	1	3	3	3	3	1	1	3
14.	3	1	2	2	2	2	1	1	2	1	1	3
15.	3	2	2	2	1	2	1	1	2	1	1	2
16.	3	2	1	2	2	2	1	2	3	2	1	2
17.	3	1	2	1	1	2	2	1	2	1	1	2
18.	3	1	2	1	2	3	2	2	3	1	1	2
Gravity of contribution	100%	44%	55%	50%	50%	77%	55%	55%	83%	39%	33%	83%
	Above 70% is considered as Strong contribution											
	Above 50% below 70% is considered as Average contribution											
	below 50% is considered as Some contribution											

	Relationship of Course Outcomes (CO) to Program Specific Outcomes (PSO)			
	1 – Slightly	2 – Moderately	3 – Substantive	
	PSO1	PSO2	PSO3	PSO4
CO1	3	3	1	1
CO2	3	2	2	1
CO3	2	3	1	1
CO4	3	3	2	1
CO5	3	3	1	1
CO6	3	3	2	1

Syllabus

Module 1 (10 hrs)

Modes of transportation, importance of highway transportation, history of road construction. Principle of highway planning, road development plans, highway alignments requirements, engineering surveys for highway location.

Geometric design- Design controls, highway cross section elements, cross slope or camber, road width, road margins, typical cross sections of roads, design speed, sight distance, design of horizontal and vertical alignments, horizontal and vertical curves.

Module 2 (10 hrs)

Highway Materials:- Properties of subgrade , sub-base , base course and surface course materials, test on subgrade soil, aggregates and bituminous materials.

Traffic Engineering: - definition, fundamentals of traffic flow, traffic management, prevention of road accidents, elements of transport planning, highway drainage

Module 3 (8 hrs)

Design of Highway Pavements: Flexible pavements and their design, review of old methods, CBR method, (IRC:37-2012,2018) equivalent single wheel load factor, rigid pavements, stress in rigid pavement, IRC design method (IRC:58-2011,2015).

Module 4(8 hrs)

Highway Construction: Construction of various layers, earthwork, WBM, GSB, WMM, various types of bituminous layers, joints in rigid pavements, Hot Mix Plants, Construction of Rigid Pavements.

Module 5 (04 hrs)

Highway Maintenance: Various types of failures of flexible and rigid pavements.

Text Books:

Highway Engineering, by S.K.Khanna and CEG Justo, Nem Chand & Bros.

Transportation Engineering-Highway Engineering by C Venkatramaiah, Universities Press.

A course in Highway Engineering by Dr. S.P. Bindra, Dhanpat Rai Publications.

Reference Books:

Principles of Highway Engineering and Traffic Analysis by Mannering Fred L., Washburn Scott S. and Kilaresk Walter P., Wiley India Pvt. Ltd

Traffic Engineering and Transportation Planning by Kadiyali, L.R., Khanna Publishers

Transportation Engineering and Planning by Papa Costas, C.S. and Prevedouros, P.D., Prentice Hall.

Course beyond Syllabus (if any):

Competitive examination questionnaires' discussed to appear for Competitive exam like GATE, ESE. Transportation problem practice

Name of the Subject: **CIVIL ENGINEERING DRAWING**

Subject Code: 20BTCEPPC407

Semester: 4TH Semester

LTP: 0-0-2

Credit: 1

1. Plan, elevation, side view of single story residential/office building.
2. Plan, elevation, side view and staircase section in details of two story 2BHK / 3BHK houses.
3. Ground and first floor plans, elevation and section for load bearing and framed structures
4. Draw the types of doors and windows with all details.
5. Drawing of several types of footing, bricks work, floor, staircases, masonry, arches and lintels.
6. Draw the types of steel roof trusses.
7. Project on establishments like Bank building/ Post office/ Hostel/ Library/ Hospital/Auditorium etc.

5th Semester

Category	Course Code	Course Title	L - T- P	Credit
		Theory		
PC		Design of Concrete Structure	3-0-0	3
PC		Hydrology and Open channel Hydraulics	3-0-0	3
PC		SA - II	3-0-0	3
PE 2		Foundation Engineering	3-0-0	3
		Environmental Geo-technique		
		Ground Improvement Technique		
OE		Remote Sensing and GIS	3-0-0	3
		Solid Waste Management		
		Water Power Engineering		
MC		Essence of Indian Knowledge Tradition-I	1-0-0	0
		Sub total		15
		Practical		
PC		Structure Engineering lab	0-0-2	1
PC		Design of concrete Structure Practice		1
PC		Concrete Technology Lab		1
PSI		Evaluation of Summer Internship	0-0-2	1
PC		Employability Skill 3	0-0-3	1
PC		Mini Project II	0-0-2	1
		Sub Total		6
Total				21

6th Semester

Category	Course Code	Course Title	L- T- P	Credit
		Theory		
PC		Design of Steel Structures	3-0-0	3

PC		Irrigation Engineering and Hydraulic Structures	3-0-0	3
PC		Estimation and Professional Practice	2-0-0	2
PE 3		Advance Surveying	3-0-0	3
		AMOS		
		Earthquake Engineering		
PE 4		Water Resources Planning and Management	3-0-0	3
		Ground water Hydrology		
		Watershed Management		
OE		IOT	3-0-0	3
		Optimization Engineering		
		Computational Methods		
MC		Essence of Indian Knowledge Tradition-II		0
		Sub Total		17
		Practical		
PC		Hydraulic Structures Design Practice	0-0-2	1
PC		Design of Steel Structures Practice	0-0-2	1
PC		Employability Skill 4	0-0-2	1
PSI		Seminar	0-0-2	1
PSI		Minor Project	0-0-3	2
		Sub Total		6
Summer internship training for 45 days			Total	23

Total Credit in 3rd Year = 44

7th Semester

Category	Course Code	Course Title	L-T-P	Credit
HS		Organizational Behaviour	2-0-0	2
PE 5		Pavement Design	3-0-0	3
		Transportation Engineering- II		
		Traffic Engineering		
PE 6		Pre-stressed Concrete	3-0-0	3
		Advanced Design of Concrete Structure		
		Composite structure		
OE		Disaster Management	3-0-0	3
		Global warming and Climate Change		
		Environmental Impact Assessment of Projects		
OE		Environmental Science and Engineering	3-0-0	2
		Entrepreneurship Development		
		Human resources Management		
OE		Green Building	3-0-0	2
		Safety Engineering		
		Construction Equipment and Construction Management		
MC		Essence of Indian Knowledge Tradition-2	1-0-0	0
		Sub Total		15
		Practical		
PSI		Industrial Lecture & Visit	0-0-2	0
PSI		Evaluation of Summer Internship		1

		Comprehensive Viva		1
PSI		Major Project		-----
		Sub total		2
Total				17

8th Semester

Category	Course Code	Course Title	LTP	Credit
PSI		Major Project		8
PSI		External Internship		8
PSI		Project Viva Voce		2
Total				18