



# **COURSE HAND-OUT**

**IKGPTU B.TECH - SEMESTER I-II**

**DEPARTMENT OF CIVIL ENGINEERING**  
**BHAI GURDAS INSTITUTE OF ENGINEERING AND**  
**TECHNOLOGY (BGIET)**

## **VISION**

To impart value based multidisciplinary quality education to the students which can enable them to contribute their knowledge in industrial development, technology revolution and economic growth of the nation with global perspective.

## **MISSION**

<b>Mission No.</b>	<b>Mission Statements</b>
M1	To develop technical manpower of quality standards with capabilities of accepting new challenges.
M2	To provide teaching and research environment.
M3	To promote collaborative coexistence amongst academic institute and industries for resources sharing.

## **DEPARTMENT OF CIVIL ENGINEERING (CE)** **BGIET**

## **VISION**

To impart knowledge and excellence in Civil Engineering with a global perspective and to groom professionals with ethical values to meet the current and future challenges for nation building.

## **MISSION**

<b>Mission No.</b>	<b>Mission Statements</b>
M1	To promote quality education, research & consultancy for Industrial and societal needs.
M2	To inculcate professionalism and moral values in budding Civil Engineers through sustainable engineering practices.
M3	To inspire the new generation of Civil Engineers with innovative ideas and creativity for lifelong learning, to meet the current and future challenges of nation in a global perspective.

## B.TECH PROGRAMME

### **PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)**

PEO No.	Program Educational Objectives Statements
PEO1	The Graduate will be able to implement domain knowledge of core courses for developing effective computing solutions by incorporating creativity and logical reasoning.
PEO2	The Graduate will be able to deliver professional services in the field of Computer Science to respond swiftly to the challenges of 21st century.
PEO3	The Graduate will be able to develop leadership and interpersonal skills with effective communication & time management in the profession.
PEO4	The Graduates will be able to competent globally with moral values and ethics for personal and professional development.

### **PROGRAMME OUTCOMES(POs) & PROGRAM SPECIFIC OUTCOMES (PSOs)**

<b>Program Outcomes(Common for all branches)</b>	
PO1	<b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	<b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering Problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	<b>Design/development of solutions:</b> 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	<b>Conduct investigations of complex problems:</b> 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	<b>Modern tool usage:</b> 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	<b>The engineer and society:</b> 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	<b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	<b>Individual and teamwork:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multi disciplinary settings.
PO10	<b>Communication:</b> 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	<b>Project management and finance:</b> 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	<b>Life-long learning:</b> 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.
<b>Program Specific Outcomes (CE)</b>	
PS O1	To develop and apply innovative, state-of-the-art practices and technologies and provide sustainable solutions to the civil engineering problems.
PS O2	To plan, design and construct the various structural elements so as to complete the civil engineering project within specified time and funds.

**INDEX**  
**SCHEME: B.TECH 1<sup>ST</sup> SEMESTER**  
(Civil Engineering)

I.K.G Punjab Technical University Revised Scheme for B.Tech Syllabus 2018

Slot	Course No.	Subject	L-T-P	Hours	Credits
A	BTCH101-18	Chemistry-I	3-1-0	4	4
B	BTCH102-18	Chemistry-I (Lab)	0-0-3	3	1.5
C	BTAM101-18	Mathematics –I	3-1-0	4	4
D	BTPS101-18	Programming for problem solving	3-0-0	3	3
E	BTPS102-18	Programming for problem solving (Lab)	0-0-4	4	2
F	BTHU101-18	English	2-0-0	2	2
G	BTHU102-18	English(Lab)	0-0-2	2	1
H	BMPD201-18	Mentoring and Professional Development	0-0-2	2	-
I	BTMP101-18	Workshop/Manufacturing Practices	1-0-4	5	3

**Total Credits=20.5 Hours: 29**

## Chemistry-I

### COURSE INFORMATION SHEET

PROGRAMME: ENGINEERING	DEGREE: B.TECH
COURSE-CHEMISTRY-I	SEMESTER-1 CREDITS-4
COURSE CODE – BTCH 101-18 Year of introduction –2018	COURSE TYPE –BASIC SCIENCE COURSE
COURSE AREA/DOMAIN-CHEMISTRY	CONTACT HOURS:3-1-0
CORRESPONDING LAB COURSE CODE: BTCH102-18	LAB COURSE NAME: CHEMISTRY-I LAB

### SYLLABUS:

MODULE	DETAILS	HOURS
I	<b>Atomic and molecular structure:</b> Schrodinger equation. Particle in a box solutions and their applications for conjugated molecules and nanoparticles. Forms of the hydrogen atom wave functions and the plots of these functions to explore their spatial variations. Molecular orbitals of diatomic molecules and plots of the multicenter orbitals. Equations for atomic and molecular orbitals. Energy level diagrams of diatomic. Pi-molecular orbitals of butadiene and benzene and aromaticity. Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties. Band structure of solids and the role of doping on band structures	12
II	<b>Spectroscopic techniques and applications</b> Principles of spectroscopy and selection rules. Electronic spectroscopy. Fluorescence and its applications in medicine. Vibrational and rotational spectroscopy of diatomic molecules. Applications. Nuclear magnetic resonance and magnetic resonance imaging, surface characterization techniques. Diffraction and scattering.	8
III	<b>Intermolecular forces and potential energy surfaces</b> Ionic, dipolar and vanDerWaals interactions. Equations of state of real gases and critical phenomena. Potential energy surfaces of H <sub>3</sub> , H <sub>2</sub> F and HCN and trajectories on these surfaces	4
IV	<b>Use of free energy in chemical equilibria</b> Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies. Free energy and emf. Cell potentials, the Nernst equation and applications. Acid base, oxidation reduction and solubility equilibria. Water chemistry. Corrosion. Use of free energy considerations in metallurgy through Ellingham diagrams	6
V	<b>Periodic properties</b> Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases, molecular geometries	4
VI	<b>Stereochemistry</b> Representations of 3 dimensional structures, structural isomers and stereoisomers, configurations and symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis. Isomerism in transitional metal compounds	4
VII	<b>Organic reactions and synthesis of a drug molecule</b> Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings. Synthesis of a commonly used drug molecule	4

**Total hours–54**

### **TEXT/REFERENCE BOOKS**

S.No.	BOOKTITLE/AUTHORS
1.	University chemistry, by B. H. Mahan
2.	Chemistry: Principles and Applications, by M. J. Sienko and R.A. Plane
3.	Fundamentals of Molecular Spectroscopy, by C. N. Banwell
4.	Physical Chemistry, by P. W. Atkins
5.	Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5th Edition

### **BOOKS RECOMMENDED BY FACULTY**

1.	Engineering Chemistry by Jain and Jain; Dhanpat Rai Publication Co.
2.	Engineering Chemistry by Shikha Agarwal; Cambridge University Press.
3.	S. S. Dara, Mukkanti, "Text of Engineering Chemistry", S. Chand & Co, New Delhi.

### **DELIVERY/INSTRUCTIONAL METHODOLOGIES/ TEACHING PEDAGOGY:**

Chalk & Talk  
Small Group Instruction  
Making real world connections  
Presentations

#### **E- content used:**

<https://youtu.be/LL3RXm8Y17g>

<https://youtu.be/z9CmSAV1wcY>

#### **Additional topics:**

Raman Spectroscopy  
Valence Bond Theory  
Molecular Docking in drug design  
Thermodynamics

## COURSE OBJECTIVES

1.	To impart a scientific approach and to familiarize the applications of chemistry in the field of technology.
2.	To familiarize the students with different application oriented topics like new generation engineering materials, storage devices, different instrumental methods etc.
3.	To develop abilities and skills that are relevant to the study and practice of chemistry.

## COURSE OUTCOMES

SLNO	DESCRIPTION	BT Level
1.	Illustrate the structures of diatomic and polyatomic in terms of molecular orbital's and relate intermolecular forces.	2
2.	Interpret the molecular interactions by choosing suitable spectroscopic methods and interpreting corresponding data.	2
3.	Make use of free energy in chemical equilibria and relate intermolecular forces.	3
4.	Analyze periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity	4
5.	Determine the stereochemistry of organic compounds and major chemical reactions that are used in the synthesis of molecules.	5
6.	Formulate the reactivity/stability of compound and identification of drug molecule.	6

## COPO MAPPING WITH PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1												1		1
CO2	2	2	1									1	1	1
CO3												1		
CO4	2	2	1									1	1	1
CO5												1		
CO6												1		1

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## Chemistry-I Lab

### COURSE INFORMATION SHEET

PROGRAMME: ENGINEERING	DEGREE:B.TECH
COURSE - CHEMISTRY-I LAB	SEMESTER-1 CREDITS-4
COURSE CODE - BTCH102-18 Year of introduction –2018	COURSE TYPE –BASIC SCIENCE COURSE
COURSE AREA/DOMAIN - CHEMISTRY	CONTACT HOURS:0-0-3

1.	Determination of surface tension and viscosity
2.	Thin Layer Chromatography
3.	Ion exchange column for removal of hardness of water
4.	Colligative properties using freezing point depression
5.	Determination of the rate constant of a reaction
6.	Determination of cell constant and conductance of solutions
7.	Potentiometry – determination of redox potentials and emf
8.	Synthesis of a polymer/drug
9.	Saponification / acid value of an oil
10.	Chemical analysis of a salt
11.	Lattice structures and packing of spheres
12.	Models of potential energy surfaces
13.	Chemical oscillations – Iodine clock reaction
14.	Determination of the partition coefficient of a substance between two immiscible liquids
15.	Adsorption of acetic acid by charcoal
16.	Use of the capillary viscometers to demonstrate of the isoelectric point as the pH of minimum viscosity for gelatine sols and/or coagulation of the white part of egg.

Choice of 10-12 experiments from the following



**TEXT/REFERENCE BOOKS:**

S. No	BOOKTITLE/AUTHORS
1.	Vogel A-I, Quantitative Inorganic Analysis, Oxford ELBS

**BOOKS RECOMMENDED BY FACULTY**

1.	Bharat- Chemistry Practical Record Book-R K CHAUHAN
2.	Engineering Chemistry Practical Book-Dipika Jaspal, Arti Malviya

**DELIVERY/INSTRUCTIONAL METHODOLOGIES/ TEACHING PEDAGOGY:**

Chalk & Talk  
Small Group Instruction  
Making real world connections  
Inquiry-based Learning  
Research-based Learning

**E- content used:**

<https://youtu.be/FXsdHlxYDqc>

<https://youtu.be/E5qbNS0IH9k>

<https://youtu.be/9S74uk4OEcc>

## **Laboratory Objectives :**

The chemistry laboratory course will consist of experiments illustrating the principles of chemistry relevant to the study of science and engineering. The students will learn to:

Estimate rate constants of reactions from concentration of reactants/products as a function of time.

Measure molecular/system properties such as surface tension, viscosity, conductance of solutions, redox potentials, chloride content of water, etc.

Synthesize a small drug molecule and analyze a salt sample.

<b>Course: CHEMISTRY-I LAB.</b>		
<b>Course Code-BTCH102-18</b>		
<b>S. No.</b>	<b>Description</b>	<b>BT Level</b>
1.	Classify different physical properties such as surface tension and viscosity of unknown liquids.	2
2.	Build skills in method of creating different chromatographic techniques.	3
3.	Make use of the rate constants, cell constant, redox potentials and conductance for different chemical solutions.	3
4.	Survey basic techniques and procedures in laboratory for synthesis and purification of any organic compounds	4
5.	Inspect acid value of oil and analysis of salt.	4
6.	Measure the partition coefficient of substance and adsorption of acetic acid by different methods.	5

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1												1		
CO2	2	1	1									1		
CO3	2	1	1									1	1	
CO4												1	1	
CO5												1		
CO6												1		

**Prepared by**

**HOD**

**Approved By**

# MATHEMATICS-I

## COURSE INFORMATION SHEET

PROGRAMME: ENGINEERING	DEGREE: BTECH
COURSE: CALCULUS & LINEAR ALGEBRA	SEMESTER: 1 CREDITS: 4
COURSE CODE: BTAM-101-18 REGULATION: 2018	COURSE TYPE: CORE
COURSE AREA/DOMAIN: MATHEMATICS	CONTACT HOURS: 4-1-0
CORRESPONDING LAB COURSE CODE: NIL	LAB COURSE NAME: NIL

## SYLLABUS:

UNIT	DETAILS	HOURS
I	<b>Calculus</b> Rolle's theorem, Mean value theorems, Taylor's and Maclaurin theorems with remainders; Indeterminate forms and L' Hôpital's rule; Maxima and minima; Evaluation of definite and Improper integrals; Applications of definite integrals to evaluate surface areas and volumes of revolutions.	10
II	<b>Multivariable Calculus</b> Limit, continuity and partial derivatives, Total derivative; Tangent plane and normal line; Maxima, minima and saddle points; Method of Lagrange multipliers; Multiple Integration: double and triple integrals (Cartesian and polar), change of order of integration in double integrals, Change of variables (Cartesian to polar), Applications: areas and volumes by (double integration), Center of mass and Gravity (constant and variable densities)	15
III	<b>Sequences and Series</b> Convergence of sequence and series, tests for convergence of positive term series: root test, ratio test, p-test, comparison test; Alternate series and Leibnitz's test; Power series, Taylor's series, series for exponential, trigonometric and logarithmic functions	12
IV	<b>Matrices</b> Algebra of matrices, Inverse and rank of a matrix, introduction of null space and kernel, statement of rank-nullity theorem; System of linear equations; Symmetric, skew-symmetric and orthogonal matrices; Determinants; Eigen values and eigenvectors; Similar matrices; Diagonalization of matrices; Cayley-Hamilton Theorem.	13

**TEXT/REFERENCE BOOKS:**

S.NO.	BOOK TITLE/AUTHORS
1.	G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2.	Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3.	T. Veerarajan, Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
4.	B.V. Ramana, Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
5.	D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
6.	N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008
7.	Grewal, B.S., Higher Engineering Mathematics, Khanna Publishers, New Delhi. Taneja, H.C., Engineering Mathematics, Volume-I & Volume-II, I.K. Publisher.

**BOOKS RECOMMENDED BY FACULTY**

1.	Dr. Hari Arora :Engineering Mathematics-I (Calculus & Linear Algebra)
2.	Engineering Mathematics - I   Calculus, Linear Algebra, and Differential Equations by Pearson

**DELIVERY/INSTRUCTIONAL METHODOLOGIES/ TEACHING PEDAGOGY:**

Chalk & Talk

Small Group Instruction.

Making real world connections

**E- content used:**

<https://youtu.be/KSntcGOFdUc>

<https://youtu.be/vfg1mmsSMMM>

<https://youtu.be/p5rBJj5CKCg>

**ADDITIONAL TOPICS:**

The fundamental theorem of line integrals

Raabe's test

Cauchy's Root test

**COURSE OBJECTIVES:**

The objective of this course is to familiarize the prospective engineers with techniques in calculus, multivariate analysis and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

**COURSE OUTCOMES:**

<b>Course: MATHEMATICS-I</b>		
<b>Course Code:BTAM101-18</b>		
	<b>Course Outcomes</b>	<b>BT Level</b>
<b>1.</b>	Understand the fundamental concepts of pure and applied mathematics to enhance mathematical skills	2
<b>2.</b>	Apply differential and integral calculus to evaluate definite, improper integrals and its applications.	3
<b>3.</b>	Make use of limit, continuity, differentiation and determine the optimal points of single variable and multivariable functions	3
<b>4.</b>	Simplify the integration w.r.t multiple variables and also apply the same to determine the areas and volumes using double integration using change of order or change of variables, if needed.	4
<b>5.</b>	Determine the convergence and divergence conditions of various types of infinite series.	5
<b>6.</b>	Solve linear system of equations, find the Eigen values and Eigen vectors and also apply Cayley Hamilton theorem.	6

**COPO MAPPING WITH PSOs**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>	<b>PSO1</b>	<b>PSO2</b>
<b>CO1</b>		2		1									1	
<b>CO2</b>	3		3		2								1	
<b>CO3</b>	3		2											
<b>CO4</b>	3				2									1
<b>CO5</b>			1	3										
<b>CO6</b>	3	3			2								1	1

**Prepared by**  
**HOD**

**Approved By**

## PROGRAMMING FOR PROBLEM SOLVING

### COURSE INFORMATION SHEET

PROGRAMME:ENGINEERING	DEGREE:B.TECH
COURSE:PROGRAMMING FOR PROBLEM SOLVING	SEMESTER-1 CREDITS-3
COURSE CODE-BTPS101-18 Year of introduction –2018	COURSE TYPE -CORE
COURSE AREA/DOMAIN-PPS	CONTACT HOURS:3-0-0
CORRESPONDING LAB COURSE CODE(IF ANY):BTPS102-18	LAB COURSE NAME:PPS - LAB

### SYLLABUS:

MODULE DETAILS		HOURS
1.	Introduction to Programming, Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.) Idea of Algorithm: steps to solve logical and numerical problems. Representation of algorithm Flowchart/ Pseudo code with examples. Syntax and logical errors in compilation	8
2.	Introduction about constants, variables, data types, operators, precedence and expressions. Evaluation of conditional Branching and loops	14
3.	1-D and 2-D Arrays, Character Array and strings.	6
4.	Searching, Sorting algorithms (Bubble, insertion and selection) quick sort and merge sort.	6
5.	Functions, Parameter passing in functions, call by value and call by reference, passing array to functions.	6
6.	Recursion, as a different pointers, Use of Pointers in self-referential structures, notion of linked list	5
7.	Defining structures and Array of structures	4
8.	Idea of pointers, Use of pointers in structure.	2
9.	Introduction, File reading/writing in different modes	3

Totalhours–52

**TEXT/REFERENCEBOOKS:**

<b>S. No.</b>	<b>BOOKTITLE/AUTHORS/PUBLICATION</b>
1.	“The Programming Language”, Braian W. Kernighan and Desnnis M. Ritchie.
2.	“Let Us C”, By Yashwant Kanetkar, Saurav Kulkarni.
3.	“C Programming Language”, A step by step beginner’s guide to learn C programming by Darel L Graham.
4.	“Programming in C”, by Reema Thareja
5.	“C in Depth”, by Deepali Srivastava and S K Srivastava
6.	Computer Programming using C language – Vipana Arora, Eagle’s Publications.

**DELIVERY/INSTRUCTIONAL METHODOLOGIES/ TEACHING PEDAGOGY:**

Chalk & Talk  
Small Group Instruction.  
Making real world connections  
Presentations

**E- content used:**

<https://www.youtube.com/watch?v=8PopR3x-VMY>  
<https://www.youtube.com/watch?v=3lqgdqoY83o>  
<https://www.youtube.com/watch?v=08LWytg6PNI>

**Additional topics:**

Object Oriented Programming Concepts  
Use of Class in OOPS  
Use of Inheritance  
Introduction about N/w Security  
Introduction about Web Technology

**COURSE OBJECTIVES:**

The aim and objective of the course on English is to introduce the students of B. Tech. class to the formal structure of English so that they can use these in Engineering as per their requirement.

**COURSE OUTCOMES:**

<b>Course: PPS</b>		
<b>Subject Code- BTPS101-18</b>		
	<b>Course Outcomes</b>	<b>BT Level</b>
1.	Explore the working of program development, characteristics of C, compilation process, Flowchart and it's working.	1
2.	Explain the use of different data types, operators, expressions, Input / Output statements, Library Functions.	2
3.	Run programs based on control statements like if-else, if-else-if, for loop, while loop, do-while loop, Switch statement and break statement.	3
4.	Identify the use of functions (Call by value, call by reference), parameter passing in functions, Passing array to functions, Categorize sorting algorithms (Bubble, Insertion and Selection)	4
5.	Order of complexity through Programs, Use of array (1-d Array & 2-d Array), Relate the use of structures, Array of structures, Use of pointer in C	4
6.	Describe Strings, reading & writing strings, standard library string functions, Study of reading from a file, writing to a file, structure of file program, Error handling in file and command line arguments in file.	6

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	2	1	1	-	-	-	-	-	-	-	2	1	1
CO2	2	1-	-	-	3	-	2	-	-	1	-	1	-	2
CO3	1	-	-	2	2	-	3	-	-	-	-	3	2	1
CO4	3	-	3	2	2	-	-	-	-	-	3	2	-	2
CO5	2	3	-	2	2	-	-	-	-	-	-	3	3	2
CO6	2	-	3	-	3	-	1	-	-	-	1	1	-	2

Prepared by

HOD

Approved By



## PROGRAMMING FOR PROBLEM SOLVING (LAB)

### COURSE INFORMATION SHEET

PROGRAMME:ENGINEERING	DEGREE:B.TECH
COURSE:PROGRAMMING FOR PROBLEM SOLVING LAB	SEMESTER-1 CREDITS-2
COURSE CODE-BTPS102-18 Year of Introduction -2018	COURSE TYPE -CORE
COURSE AREA/DOMAIN-PPS	CONTACT HOURS: 0-0-4
CORRESPONDING LAB COURSE CODE(IF ANY):NA	

### **List Of Practicals:**

S. No	DETAILS	HOURS
1.	Familiarization with programming environment	3
2.	Simple computational problems using arithmetic expressions	4
3.	Problems involving if-then-else structures.	2
4.	Iterative Problems	1
5.	1D Array manipulation	2
6.	Matrix problems, String operations	2
7.	Simple functions	1
8.	Pointers and structures	2
9.	File handling	3

## **TEXT/REFERENCEBOOKS:**

<b>S.No</b>	<b>BOOKTITLE/AUTHORS/PUBLICATION</b>
1.	"The Programming Language", Braian W. Kernighan and Desnnis M. Ritchie.
2.	"Let Us C", By Yashwant Kanetkar, Saurav Kulkarni.
3.	"C Programming Language", A step by step beginner's guide to learn C programming by Darel L Graham.
4.	"Programming in C", by Reema Thareja
5.	"C in Depth", by Deepali Srivastava and S K Srivastava.
6.	Computer Programming using C language – Vipran Arora, Eagle's Publications.

## **DELIVERY/INSTRUCTIONAL METHODOLOGIES/ TEACHING PEDAGOGY:**

Chalk & Talk

Small Group Instruction.

Making real world connections

Presentations

## **E- CONTENT'**

[https://youtu.be/GIqcZXtqh\\_U](https://youtu.be/GIqcZXtqh_U)

[https://youtu.be/dQa4A2Z0\\_Ro](https://youtu.be/dQa4A2Z0_Ro)

## **ADDITIONAL TOPIC**

Basic programs of OOPS

Program of class in C++

Practical work related to network security

**COURSE OBJECTIVES:**

The aim and objective of the course on English is to introduce the students of B. Tech. class to the formal structure of English so that they can use these in Engineering as per their requirement.

**COURSE OUTCOMES:**

<b>Course: PPS LAB</b>		
<b>Subject Code- BTPS102-18</b>		
	<b>Course Outcomes</b>	<b>BT Level</b>
1.	Familiarization with programming environment	1
2.	Simple computational problems using arithmetic expressions	2
3.	Problems involving if-then-else structures, 1D Array manipulation	3
4.	Matrix problems, String operations	4
5.	Simple functions	4
6.	Pointers and structures, File handling	6

**COPO MAPPING with PSOs:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>CO1</b>	2	2	1	-	1	-	-	-	-	-	-	2	1	1
<b>CO2</b>	2	1	1	-	-	-	-	-	-	-	-	1	-	1
<b>CO3</b>	3	1	2	-	-	-	-	-	-	-	-	2	-	-
<b>CO4</b>	1	2	1	1	-	-	-	-	-	-	2	2	2	1
<b>CO5</b>	1	2	1	-	-	-	-	-	-	-	-	1	1	1
<b>CO6</b>	2	1	1	1	-	-	-	-	-	-	-	-	-	-

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**ENGLISH****COURSE INFORMATION SHEET**

PROGRAMME: ENGINEERING	DEGREE: B.TECH
COURSE: ENGLISH	SEMESTER-1 CREDITS-2
COURSE CODE - BTHU101-18 Year of introduction –2018	COURSE TYPE -CORE
COURSE AREA/DOMAIN-ENGLISH	CONTACT HOURS:2-0-0
CORRESPONDING LAB COURSE CODE (IF ANY): BTHU102-18	LAB COURSE NAME: ENGLISH-LAB

**SYLLABUS:**

MODULE	DETAILS	HOURS
<b>I</b>	<b>Vocabulary Building &amp; Basic Writing Skills</b>  The concept of Word Formation  Root words from foreign languages and their use in English Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives. Synonyms, antonyms, and standard abbreviations. Sentence Structures Use of phrases and clauses in sentences Importance of proper punctuation Creating coherence Organizing principles of paragraphs in documents Techniques for writing precisely	4
<b>II</b>	<b>Identifying Common Errors in Writing</b>  Subject-verb agreement  Noun-pronoun agreement Misplaced modifiers Articles Prepositions Redundancies Cliché	6
<b>III</b>	<b>Mechanics of Writing</b>  Writing introduction and conclusion  Describing Defining Classifying Providing examples or evidence	4
<b>IV</b>	<b>Writing Practices</b>  Comprehension  Précis Writing Essay Writing Business Writing-Business letters, Business Emails, Report Writing, Resume/CV	4

Total hours –42

**TEXT/REFERENCEBOOKS:**

S. No.	BOOKTITLE/AUTHORS
1.	Practical English Usage. Michael Swan. OUP. 1995.
2.	Remedial English Grammar. F.T. Wood. Macmillan.2007
3.	On Writing Well. William Zinsser. Harper Resource Book. 2001
4.	Study Writing. Liz Hamp-Lyons and Ben Heasley. Cambridge University Press. 2006

**BOOKS RECOMMENDED BY FACULTY**

1.	Communication Skills. Sanjay Kumar and Pushp Lata. Oxford University Press. 2011.
2.	Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

**DELIVERY/INSTRUCTIONAL METHODOLOGIES/ TEACHING PEDAGOGY:**

Chalk & Talk  
Small Group Instruction

**E- content used:**

[https://youtu.be/64XIkMqPm\\_8](https://youtu.be/64XIkMqPm_8)

<https://youtu.be/BcIKzx9xizc>

<https://youtu.be/afDVM0LvFTM>

**Additional topics:**

1. Bibliography
2. Report writing
3. Four modules

**COURSE OBJECTIVES:**

The aim and objective of the course on English is to introduce the students of B. Tech. class to the formal structure of English so that they can use these in Engineering as per their requirement.

**COURSE OUTCOMES:**

<b>Course: ENGLISH</b>		
<b>Subject Code- BTHU-101-18</b>		
	<b>Course Outcomes</b>	<b>BT Level</b>
1.	Choose basic proficiency in listening and speaking skills.	1
2.	Interpret the independent user of English language.	2
3.	Make use of communication training.	3
4.	Discover different strategy of effective communication and select the most appropriate mode of communication for a given situation.	4
5.	Distinguish effectively and assertively.	4
6.	Combine effectively through different mode of written communication.	6

**COPO MAPPING WITH PSOs**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>CO1</b>						1			2	3		2	1	1
<b>CO2</b>						1			2	3		2	1	1
<b>CO3</b>						1			2	3		2	1	
<b>CO4</b>						1			1	3		2	1	1
<b>CO5</b>						1			1	2		2	1	1
<b>CO6</b>						1			1	2		2		1

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**English Lab****COURSE INFORMATION SHEET**

PROGRAMME:ENGINEERING	DEGREE:B.TECH
COURSE:ENGLISH LAB	SEMESTER-2CREDITS-1
COURSE CODE-BTHU102-18 Year of introduction –2018	COURSE TYPE -CORE
COURSE AREA/DOMAIN-ENGLISH LAB	CONTACT HOURS:0-0-2
CORRESPONDING LAB COURSE CODE(IF ANY):NIL	LAB COURSE NAME:NIL

**SYLLABUS:**

<b>MODULE</b>	<b>DETAILS</b>
<b>I</b>	Listening Comprehension
<b>II</b>	Self-Introduction, Group Discussion and Role Play
<b>III</b>	Common Everyday Situations: Conversations and Dialogues
<b>IV</b>	Communication at Workplace
<b>V</b>	Interviews
<b>VI</b>	Formal Presentations

Totalhours–42

**TEXT/REFERENCEBOOKS:**

<b>S. No</b>	<b>BOOKTITLE/AUTHORS</b>
1.	Practical English Usage. Michael Swan. OUP. 1995.
2.	Communication Skills. Sanjay Kumar and Pushp Lata. Oxford University Press. 2011.
3.	Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

**BOOKS RECOMMENDED BY FACULTY**

1	Freeman, Sarah: Study Strategies. Oxford University Press, 1979.
2	Mohan Krishna & Singh N.P.: Speaking English Effectively. Macmilian, 1995

**DELIVERY/INSTRUCTIONAL METHODOLOGIES/ TEACHING PEDAGOGY:**

Chalk & Talk  
Small Group Instruction

**E- content used:**

<https://youtu.be/6QCrT1yhNRA>

**Additional topics:**

Tongue Twister  
Phonetics  
Linguistics  
Speaking Skills



**COURSE OBJECTIVES:**

The aim and objective of the course on English Lab is to introduce the students of B. Tech. class to the formal structure of English Lab so that they can use these in Engineering as per their requirement

**COURSE OUTCOMES:**

<b>Course: ENGLISH LAB</b>		
<b>Subject Code- BTHU-102-18</b>		
	<b>Course Outcomes</b>	<b>BT Level</b>
<b>1.</b>	Choose basic proficiency in listening and speaking skills.	1
<b>2.</b>	Interpret the independent user of English language.	2
<b>3.</b>	Make use of communication training.	3
<b>4.</b>	Discover different strategy of effective communication and select the most appropriate mode of communication for a given situation.	4
<b>5.</b>	Distinguish effectively and assertively.	4
<b>6.</b>	Combine effectively through different mode of written communication.	6

**COPO MAPPING WITH PSOs**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>CO1</b>						1			2	3		2	1	1
<b>CO2</b>						1			2	3		2	1	1
<b>CO3</b>						1			2	3		2	1	
<b>CO4</b>						1			1	3		2	1	1
<b>CO5</b>						1			1	2		2	1	1
<b>CO6</b>						1			1	2		2		1

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**INDEX**  
**SCHEME: B.TECH 2<sup>ND</sup> SEMESTER**  
**(Civil Engineering)**

I.K.G Punjab Technical University Revised Scheme for B.Tech Syllabus 2018

Slot	Course No.	Subject	L-T-P	Hours	Credits
A	BTPH101-18	Physics	3-1-0	4	4
B	BTPH111-18	Physics (Lab)	0-0-3	3	1.5
C	BTAM202-18	Mathematics –II	4-1-0	5	4
D	BTEE101-18	Basic Electrical Engineering	3-1-0	4	4
E	BTEE102-18	Basic Electrical Engineering (Lab)	0-0-2	2	1
F	BTME101-18	Engineering Graphics & Design	1-0-5	6	3
G	BMPD201-18	Mentoring and Professional Development	0-0-2	2	-

**Total Credits=17.5 Hours: 26**

## Mechanics of Solids

### COURSE INFORMATION SHEET

PROGRAMME:ENGINEERING	DEGREE:B.TECH
COURSE-MECHANICS OF SOLIDS	SEMESTER-2 CREDITS-4
COURSE CODE-BTPH101-18 Year of introduction –2018	COURSE TYPE -CORE
COURSE AREA/DOMAIN-PHYSICS	CONTACT HOURS:3-1-0
CORRESPONDING LAB COURSE CODE(IF ANY):BTPH111-18	LAB COURSE NAME:MECHANICS OF SOLIDS LAB

### SYLLABUS:

MODULE	DETAILS	HOURS
I	<b>Vector mechanics</b> Physical significance of gradient, Divergence and curl. Potential energy function, $F = -\text{Grad } V$ , equi potential surfaces, Forces in Nature, Newton's laws and its completeness in describing particle motion, Conservative and non-conservative forces, curl of a force field; Central forces; Conservation of Angular Momentum and Energy, Introduction to Cartesian, spherical and cylindrical coordinate system, Inertial and Non-inertial frames of reference; Rotating coordinate system :- Centripetal and Coriolis accelerations.	10
II	<b>Simple harmonic motion, damped and forced simple harmonic oscillator</b> Mechanical simple harmonic oscillators, damped oscillations, damped harmonic oscillator – heavy, critical and light damping, energy decay in a damped harmonic oscillator, quality factor, forced mechanical oscillators, resonance.	8
III	<b>Planar rigid body mechanics</b> Definition and motion of a rigid body in plane; Rotation in the plane, Angular momentum about a point of a rigid body in planar motion; center of mass, moment of inertia, theorems of moment of inertia, inertia of plane lamina, circular ring, moment of force, couple, Euler's laws of motion	10
IV	<b>Mechanics of solids</b> Friction: Definitions: Types of friction, Laws of static friction, Limiting friction, Angle of friction, angle of repose; motion on horizontal and inclined planes. Methods of reducing friction, Concept of stress and strain at a point; Concepts of elasticity, plasticity, strain hardening, failure (fracture/yielding), one dimensional stress-strain curve; Generalized Hooke's law. Force analysis — axial force, shear force, bending moment and twisting moment. Bending stress; Shear stress; Concept of strain energy; Yield criteria...	12

Totalhours–40

**TEXT/REFERENCEBOOKS:**

S. No.	BOOKTITLE/AUTHORS/PUBLICATION
1.	Engineering Mechanics, by- MK Harbola
2.	Mechanics by- DS Mathur
3.	Classical Mechanics by- H. Goldstein
4.	Analytical Mechanics by-Satish K Gupta
5.	Engineering Physics, by HK Malik and AK Singh

S. No.	BOOK TITLE SUGGESTED BY FACULTY
1	Analytical Mechanics-Satish K Gupta, Modern Publishers.
2	Mechanics - JP Den Hartog, Dover Publications Inc, 1961.

**DELIVERY/INSTRUCTIONAL METHODOLOGIES/ TEACHING PEDAGOGY:**

Chalk & Talk

Small Group Instruction.

Making real world connections

Presentations

**E- content used:**

<https://www.youtube.com/watch?v=4q1TyyWo4nI>

<https://www.youtube.com/watch?v=3XCvIpgK1Wc>

<https://www.youtube.com/watch?v=gYjWWjVMmoU>

**Additional topics:**

Galilian transformation, Lorentz transformation, Gravitational and Electrostatic self-energy

**COURSE PRE-REQUISITES:**

C.CODE	COURSE NAME	DESCRIPTION SEM
BTPH-101-18	Higher secondary Education	Introduction to Mechanics Of Solids 1 & 2

**COURSE OBJECTIVES**

The aim and objective of the course on Physics is to introduce the students of B. Tech. class to the formal structure of Physics so that they can use these in Engineering as per their requirement.

Course: MECHANICS OF SOLIDS		
Subject Code- BTPH101-18		
	Course Outcomes	BT Level
1.	Explain the vector mechanics for a classical system.	2
2.	Identify various types of forces in nature, frame of reference and conservation laws.	3
3.	Classify the simple harmonic, damped and forced simple harmonic oscillator for a mechanical system.	4
4.	Analyze the planar rigid body dynamics for a mechanical system.	4
5.	Justify the concept of laws of friction, stress-strain and force analysis.	5
6.	Construct the knowledge obtained in this course to the related problems.	6

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3		2									1		1
CO2		2		2									1	
CO3			2									1		
CO4	3			2										1
CO5	3	2		2								1		
CO6		2										1		

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## Mechanics of solids Lab

### COURSE INFORMATION SHEET

PROGRAMME:ENGINEERING	DEGREE:B.TECH
COURSE-MECHANICS OF SOLIDS LAB	SEMESTER-2 CREDITS-1.5
COURSE CODE-BTPH111-18 Year of introduction -2018	COURSE TYPE -CORE
COURSE AREA/DOMAIN-PHYSICS	CONTACT HOURS:0-0-3
CORRESPONDING LAB COURSE CODE(IF ANY):NIL	LAB COURSE NAME:NIL

### SYLLABUS:

#### Choice of 10-12 Experiments from the following:

1.	Measurements of length (or diameter) using vernier caliper, screw gauge, and travelling microscope. Use of Plumb line and Spirit level.
2.	To determine the horizontal distance between two points using a Sextant.
3.	To determine the vertical distance between two points using a Sextant. .
4.	To determine the height of an inaccessible object using a Sextant.
5.	To determine the angular acceleration $\alpha$ , torque $\tau$ , and Moment of Inertia of flywheel
6.	To study the Motion of a Spring and calculate (a) Spring Constant (b) Value of g and (c) Modulus of rigidity .
7.	To determine the time period of a simple pendulum for different length and acceleration due to gravity
8.	To determine the Young's Modulus of a Wire by Optical Lever Method.
9.	To determine the Modulus of Rigidity of a Wire by Maxwell's needle.
10.	To find the moment of inertia of an irregular body about an axis through its C.G with the torsional pendulum
11.	To determine g and velocity for a freely falling body using Digital Timing Technique.
12.	To find out the frequency of AC mains using electric-vibrator.
13.	Calculation of the Momentum, Kinetic energy, and Velocity after collision.
14.	To find the Time of flight, Horizontal range and maximum height of a projectile for different velocity, angle of projection, cannon height and environment.
15.	To determine the Modulus of Rigidity of brass using Searle's method.
16.	To determine g and velocity for a freely falling body using Digital Timing Technique.

**TEXT/REFERENCEBOOKS:**

S. No	BOOKTITLE/AUTHORS/PUBLICATION
1.	Practical Physics, C L Arora, S. Chand.

**E- content used:**

**<https://www.youtube.com/watch?v=n4Vw8H5T2CI>**

**<https://www.youtube.com/watch?v=MBet3VwrXI4>**

## COURSE OBJECTIVES

The aim and objective of the Lab course on Physics Lab is to introduce the students of B.Tech. class to the formal structure of Physics so that they can use these in Engineering as per their requirement.

<b>Course: MECHANICS OF SOLIDS LAB</b>		
<b>Subject Code- BTPH111-18</b>		
	<b>Course Outcomes</b>	<b>BT Level</b>
<b>1.</b>	Understand the concept learned in the mechanics of solids.	2
<b>2.</b>	Identify the concept of theory courses.	3
<b>3.</b>	Make use of measurements and handling sensitive equipment.	3
<b>4.</b>	Examine the principles of error.	4
<b>5.</b>	Develop skills in experimental design.	6
<b>6.</b>	Elaborate a technical report which communicates scientific information in a clear and concise manner.	6

## COURSE OUTCOMES

### CO mapping with PO, PSO's

### **MATHEMATICS –II**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>CO1</b>	3													
<b>CO2</b>	3													
<b>CO3</b>			2											
<b>CO4</b>	3													
<b>CO5</b>					2						1	1		
<b>CO6</b>														

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## COURSE INFORMATION SHEET

PROGRAMME: ENGINEERING	DEGREE: BTECH
COURSE: Differential Equations & Numerical Methods	SEMESTER: 2 CREDITS: 4
COURSE CODE: BTAM-202-18 REGULATION: 2018	COURSE TYPE: CORE
COURSE AREA/DOMAIN: MATHEMATICS	CONTACT HOURS:
CORRESPONDING LAB COURSE CODE(IFANY):NIL	LAB COURSE NAME:NIL

## SYLLABUS:

UNIT	DETAILS	HOURS
I	<b>Ordinary differential equations: First and Higher order</b> Exact, linear and Bernoulli's equations, Euler's equations, Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type. Second order linear differential equations with variable coefficients, method of variation of parameters, Cauchy-Euler equation; Power series solutions.	13
II	<b>Partial Differential Equations: First order</b> First order partial differential equations, solutions of first order linear and non-linear PDEs. Solution to homogenous and non-homogenous linear partial differential equations second and higher order by complimentary function and particular integral method.	12
III	<b>Partial Differential Equations: Higher order</b> Second-order linear equations and their classification, Initial and boundary conditions (with an informal description of well-posed problems), D'Alembert's solution of the wave equation. Separation of variables method to simple problems in Cartesian coordinates.	12
IV	<b>Partial Differential Equations: higher order (contd.)</b> The Laplacian in plane, cylindrical and spherical polar coordinates. One dimensional diffusion equation and its solution by separation of variables. Boundary-value problems: Solution of boundary-value problems for various linear PDEs.	13

**TEXT/REFERENCE BOOKS:**

S.NO.	BOOK TITLE/AUTHORS/PUBLICATION
1.	Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2.	W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9th Edition, Wiley India, 2009.
3.	S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.
4.	E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.
5.	E. L. Ince, Ordinary Differential Equations, Dover Publications, 1958
6.	G.F. Simmons and S.G. Krantz, Differential Equations, Tata McGraw Hill, 2007.
7.	Manish Goyal and N.P. Bali, Transforms and Partial Differential Equations, University Science Press, Second Edition, 2010

S.No.	BOOK TITLE SUGGESTED BY FACULTY
1	Bill Goodwine : Engineering Differential Equations: Theory and Applications
2	Jibeesh P : Differential Equations for B.tech

**DELIVERY/INSTRUCTIONAL METHODOLOGIES/ TEACHING PEDAGOGY:**

Chalk & Talk

Small Group Instruction.

Making real world connections

Presentations

**E- content used:**

<https://youtu.be/F0bWYmDsOsA>

<https://youtu.be/eTp5wq-cSXY>

<https://youtu.be/tHqx1qxA8q4>

**ADDITIONAL TOPICS:**

Linear Equations with Variable Coefficients

Boundary value problem

Polynomial interpolation

**COURSE OBJECTIVES:**

The objective of this course is to familiarize the prospective engineers with techniques in linear algebra, transform calculus and numerical methods. It aims to equip the students with standard concepts and tools of integral transforms, matrices and numerical techniques that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

<b>Course: MATHEMATICS-II</b>		
<b>Course Code:BTAM202-18</b>		
	<b>Course Outcomes</b>	<b>BT Level</b>
<b>1.</b>	Understand concept of linear differential equations	2
<b>2.</b>	Understand concept of Cauchy–Euler equation and power series solution	2
<b>3.</b>	Develop the concept of partial differentials.	3
<b>4.</b>	Apply the knowledge of partial differential equation to solve initial value problem	3
<b>5.</b>	Explain the ability of using D’Alembert’s solution of wave equation	4
<b>6.</b>	Formulate the idea of cylindrical and spherical polar co-ordinates and one dimension diffusion equation.	6

**COURSE OUTCOMES:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>CO1</b>		3											1	
<b>CO2</b>	3	3	3		2									
<b>CO3</b>	3					2							1	
<b>CO4</b>	3				3	3	2							
<b>CO5</b>		2				2	3						1	
<b>CO6</b>		3			2	3								1

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## Basic Electrical Engineering

### COURSE INFORMATION SHEET

<b>PROGRAMME: B.Tech</b>	
<b>COURSE: Basic Electrical Engineering</b>	<b>SEMESTER: 2<sup>nd</sup> CREDITS: 05</b>
<b>COURSE CODE: BTEE-101-18</b>	<b>COURSE TYPE: Regular</b>
<b>COURSE AREA/ DOMAIN: Basic Electrical</b>	<b>CONTACT HOURS: L T P</b> <b>3 1 2</b>
<b>CORRESPONDING LAB CODE: BTEE102-18</b>	<b>LAB COURSE NAME: Basic Electrical Engineering Laboratory</b>

#### SYLLABUS:

UNIT	DETAILS	HOURS
1	<b>Module 1: DC Circuits</b> Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff's current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin's and Norton's Theorems. Time-domain analysis of first-order RL and RC circuits.	9
2	<b>Module 2: AC Circuits</b> 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, RL, RC, RLC combinations series resonance. Parallel resonance. Three-phase balanced circuits, voltage and current relations in star and delta connections.	13
3	<b>Module 3: Electrical Machines</b> Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections. Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor. Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited dc motor. Construction and working of synchronous generators.	12
4	<b>Module 4: Electrical Installations</b> Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.	5
<b>TOTAL HOURS</b>		39

**TEXT/ REFERENCE BOOKS:**

S. No.	BOOK TITLE/ AUTHORS/ PUBLICATION
1.	D. P. Kothari and I. J. Nagrath, “Basic Electrical Engineering”, Tata McGraw Hill, 2010
2.	D. C. Kulshreshtha, “Basic Electrical Engineering”, McGraw Hill, 2009
3.	L. S. Bobrow, “Fundamentals of Electrical Engineering”, Oxford University Press, 2011
4.	E. Hughes, “Electrical and Electronics Technology”, Pearson, 2010
5.	V. D. Toro, “Electrical Engineering Fundamentals”, Prentice Hall India, 1989

T/R	BOOK TITLE SUGGESTED BY FACULTY
1	S.K Sehdev by Unique Publisher
2	J.B gupta by S. Chand Publisher

**DELIVERY/INSTRUCTIONAL METHODOLOGIES/ TEACHING PEDAGOGY:**

Chalk & Talk

Small Group Instruction.

Making real world connections

Presentations

**ADDITIONAL TOPICS:**

Providing knowledge about generation, transmission, distribution

Providing additional knowledge on protection of electrical machines, drives and power system

**Recommended NPTEL/ MOOCS/Swayam Courses/ Videos**

<https://www.coursera.org/learn/electric-power-systems> (Electric Power System)

<https://www.youtube.com/watch?v=U3CubKnkO4c> (Transformer 3D Animation )

<https://www.youtube.com/watch?v=DsVbaKZZOFQ> (three phase induction motor working)

<https://www.youtube.com/watch?v=tiKH48EMgKE&list=PLZY3vNTgIlyWtOLxTI9ZlAK9zIgPK3H9d> (working of alternator)

<https://www.youtube.com/watch?v=gW45N2WpD64> (working of DC generator)

<https://www.youtube.com/watch?v=QkbnOga09Vg> (flip flops)

**Web Source References:**

1	<a href="https://nptel.ac.in/courses/108108076/">https://nptel.ac.in/courses/108108076/</a> (1-39) (covering Transformer, Machines, power factor etc.)
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## **COURSE OBJECTIVES:**

1. Impart a basic knowledge of electrical quantities such as current, voltage, power, energy and frequency to understand the impact of technology in a global and societal context.
2. Provide working knowledge for the analysis of basic DC and AC circuits used in electrical and electronic devices.
3. To explain the working principle, construction, applications of DC machines, AC machines & the importance of transformers in transmission and distribution of electric power.
4. To Gain knowledge about the fundamentals of LT components of switchgear, wiring and earthing.

## **COURSE OUTCOMES:**

**CO-1:-**Understand & apply Kirchoff's laws, network theorems, time domain analysis for RL&RC series circuit.

**CO:-2** Understand and analyse phasor diagram and waveforms for purely resistive, purely inductive and purely capacitive as well as series and parallel R-L, R-C & R-L-C circuits and also circuit Resonance.

**CO-3:-**Understand concepts of Real, Reactive & apparent power and Power factor. Understand 3- phase supply and star and delta connection and their relationships. Power measurement by wattmeter

**CO:-4** Understand construction & working principle of 1- phase and 3- phase transformers. Understand Ideal and practical transformer and auto-transformer and its applications as well.

**CO:-5** Understand generation of rotating magnetic fields. Understand construction and working of 3-phase induction motor, 1-phase induction motor, DC motors& synchronous generators.

**CO:-6** Understand LT Switchgear such as Switch Fuse Unit (SFU), MCB, ELCB, and MCCB. Understand about wires, cables, earthing & its importance. Understand about types of batteries & it's important Characteristics. Understand basic calculations for energy consumption & power factor improvement.

## **CO MAPPING WITH POS**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1			1							2		
CO2	3	1			1							2		1
CO3	3	1			1							2		
CO4	1		1									2		
CO5	2		1									1		
CO6	2		1			1						2		

**Prepared by**

**HOD**

**Approved By**

## Basic Electrical Engineering Lab

### COURSE INFORMATION SHEET

<b>PROGRAMME: B.Tech</b>	
<b>COURSE: Basic Electrical Engineering Lab</b>	<b>SEMESTER: 2<sup>nd</sup> CREDITS: 01</b>
<b>COURSE CODE: BTEE-102-18</b>	<b>COURSE TYPE: Regular</b>
<b>COURSE AREA/ DOMAIN: Basic Electrical Engineering</b>	<b>CONTACT HOURS: L T P</b> <b>0 0 2</b>
<b>CORRESPONDING LAB CODE: NIL</b>	

#### List of experiments/demonstrations:

1. Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors.
2. Measuring the steady-state and transient time-response of R-L, R-C, and R-L-C circuits to a step change in voltage (transient may be observed on a storage oscilloscope). Sinusoidal steady state response of R-L, and R-C circuits – impedance calculation and verification. Observation of phase differences between current and voltage. Resonance in R-L-C circuits.
3. Transformers: Observation of the no-load current wave form on an oscilloscope (non-sinusoidal wave-shape due to B-H curve nonlinearity should be shown along with a discussion about harmonics). Loading of a transformer: measurement of primary and secondary voltages and currents, and power.
4. Three-phase transformers: Star and Delta connections. Voltage and Current relationships (line-line voltage, phase-to-neutral voltage, line and phase currents). Phase-shifts between the primary and secondary side. Cumulative three-phase power in balanced three-phase circuits.
5. Demonstrate of cut-out sections of machines: dc machine (commutator-brush arrangement), induction machine (squirrel cage rotor), synchronous machine (field winding - slip ring arrangement) and single-phase induction machine.
6. Torque Speed Characteristic of separately excited dc motor.
7. Synchronous speed of two and four-pole, three-phase induction motors. Direction reversal by change of phase-sequence of connections. Torque-Slip Characteristic of an induction motor. Generator operation of an induction machine driven at super-synchronous speed.
8. Synchronous Machine operating as a generator: stand-alone operation with a load. Control of voltage through field excitation.

#### DELIVERY/INSTRUCTIONAL METHODOLOGIES/ TEACHING PEDAGOGY:

First-Hand Experience In Observation

Making Real World Connections

Implement Peer-Instruction.

## COURSE OUTCOME

Apply KCL, KVL and ohms law to Simple circuits.

Determine the inductance of the coil & BH curve loops

Performing the operation & tests of transformer and rotating machines ac & dc machines

Analyse the differences in operation of different DC machine configurations.

Experimentally verify the basic circuit theorems

Measure power and power factor in ac circuits or in ac machines

## MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1			1							1		1
CO2	2	1			1							1		1
CO3	2	1			1							1		
CO4	1		1									1	1	1
CO5	1		1									1		1
CO6	2		1			1						1		1

**Prepared by**

**HOD**

**Approved By**



## ENGINEERING GRAPHICS AND DESIGN

### COURSE INFORMATION SHEET

<b>PROGRAMME: CIVIL ENGINEERING</b>	<b>DEGREE: BTECH</b>
<b>COURSE: ENGINEERING GRAPHICS AND DESIGN (THEORY &amp; LAB)</b>	<b>SEMESTER: 1 CREDITS: 3</b>
<b>COURSE CODE: BTME101-21</b> <b>REGULATION:2021</b>	<b>COURSE TYPE: CORE</b>
<b>COURSE AREA/DOMAIN: ENGINEERING DRAWING</b>	<b>CONTACT HOURS: 1(L) + 5(P) hours/Week.</b>

### SYLLABUS:

UNIT	DETAILS	HOURS
<b>I</b>	<b>INTRODUCTION TO ENGINEERING DRAWING:</b> Principles of engineering drawing / engineering graphics / technical drawing and their significance –Drawing Instruments: their Standard and uses – symbols and conventions in drawing practice – lettering & numbering – BIS conventions. Types of lines and their uses, Drawing Sheets: sizes and layout, methods of folding drawing sheet, Grades of pencils used, Dimensioning: definition, types and methods of dimensioning, geometrical construction, concept of scales in drawing, types of scales, construction of plane and diagonal scales	<b>18</b>
<b>II</b>	<b>ORTHOGRAPHIC PROJECTIONS:</b> Relevance of projection, Types of projections, Principles of orthographic projections in reference to quadrants – conventions – first and third angle projections, illustration through simple problems of projection; Projections of points in quadrants. Projections and trace of a line with different possible orientations in a quadrant. Methods to find true length and inclination of a line with principal planes.	<b>12</b>
<b>III</b>	<b>PROJECTIONS OF PLANES AND SOLIDS:</b> Concept of plane and lamina, Projections of a lamina when; parallel to any reference plane, perpendicular to any reference plane, inclined to reference plane. Traces of planes. Definition of solid, types of solids – conventions-different possible orientations of solid in a quadrant. Projections of solid when; axis parallel to reference plane, perpendicular to reference plane, inclined to one and parallel to other reference plane, parallel to both horizontal and vertical planes.	<b>18</b>
<b>IV</b>	<b>ISOMETRIC PROJECTIONS:</b> Principles of Isometric Projections-Isometric Scale-Isometric Views or drawing- Conventions. Isometric drawing / projections of solids such as cube, prisms, pyramids, cylinder, and cone.	<b>12</b>
<b>V</b>	<b>Practice using Computer Aided Drafting (CAD) tools:</b> Hands on training on any CAD software to strengthen the understanding of the engineering drawing wherein the students will be introduced to a number of assignments as mentioned in the syllabus.	<b>12</b>

**TEXT/REFERENCE BOOKS:**

S.NO	BOOK TITLE/AUTHORS/PUBLICATION
1	Engineering Drawing- Basant Agarwal, TMH
2	D. M. Kulkarni, A. P. Rastogi, and A. K. Sarkar (2009), Engineering Graphics with AutoCAD, PHI Learning Private Limited, New Delhi.
3	P.S Gill, "Engineering Drawing", S K Kataria and sons, 18th edition, 2017 reprint
4	Jolhe, Dhananjay (2006), Engineering Drawing: With an Introduction to CAD, Tata Mc Graw Hill, India.
5	N. D. Bhat (2006), Engineering Drawing, Charotar Publications, New Delhi
6	Venugopal (2010), Engineering Drawing and Graphics, 2nd edition, New Age Publications, New Delhi
7	Trymbaka Murthy (2007), Computer Aided Engineering Drawing, I.K. International Publishers, New Delhi.
8	R.B. Choudary (2005), Engineering graphics with Auto CAD, Anuradha Publishers, New Delhi

T/R	BOOK TITLE SUGGESTED BY FACULTY
1	Harwinder Singh, Engineering Drawing and Computer Graphics , Dhanpat Rai Publishing Co.
2	R.K Dhawan, Text Book of Engineering Drawing, S Chand Publication.

**DELIVERY/INSTRUCTIONAL METHODOLOGIES/ TEACHING PEDAGOGY:**

Chalk & Talk

Small Group Instruction.

Making real world connections

Presentations

**E- content used:**

<https://archive.nptel.ac.in/courses/112/102/112102304/>

**Additional topics:****1. Intersection of Surfaces/Solids**

Purpose of intersection of surfaces, Intersection between the two cylinder, two prisms, prism and pyramid, pyramid and pyramid, cylinder and prism, cone and cylinder, sphere and cylinder etc., use of cutting plane and line method.

**2. Development of Surface**

Purpose of development, Parallel line, radial line and triangulation method. Development of prism, cylinder, cone and pyramid surface for both right angled and oblique solids, and development of surface of sphere.

**COURSE OBJECTIVES:**

1. To understand the basic principles of engineering drawing
2. To have the knowledge of generating the pictorial views
3. To understand the development of surfaces
4. Use CAD tools for making drawings of machine components and assemblies.
5. To have the knowledge of interpretation of dimensions of different quadrant projections.

**COURSE OUTCOMES:**

S.NO	DESCRIPTION	Bloom's Level (B.L)
CO1	Prepare and <b>understand</b> drawings	B.L -1
CO2	<b>Use</b> the principles of orthographic projections.	B.L -3
CO3	By studying about projections of solids, students will be <b>able to visualize</b> three dimensional objects and that will <b>enable</b> them to design new products.	B.L-2 B.L -3
CO4	<b>Design and fabricate</b> surfaces of different shapes.	B.L- 6
CO5	<b>Apply</b> Computer-aided design (CAD) software to modeling of parts and assemblies, dimensions, and annotations to drawing.	B.L -3
CO6	<b>Represent</b> and <b>create</b> the objects in three dimensional appearances.	B.L -1B.L -6

**CO –PO-PSO MAPPING**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	1	1
CO2	3	3	-	-	-	-	-	-	-	-	-	-	1	1
CO3	-	3	3	3	-	-	-	-	-	-	-	3	1	2
CO4	-	-	2	-	-	-	-	-	-	2	-	-	1	2
CO5	-	-	-	-	-	-	-	-	3	3	-	3	2	2
CO6	-	-	-	-	3	-	-	-	-	-	-	3	1	2

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HOD

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**INDEX**  
**SCHEME: B.TECH 3<sup>rd</sup> SEMESTER**  
**(Civil Engineering)**

I.K.G Punjab Technical University Revised Scheme for B.Tech Syllabus 2018

Slot	Course No.	Subject	L-T-P	Hours	Credits
A	BTCE-301-18	Surveying & Geomatics	3-1-0	4	4
B	BTCE-302-18	Solid Mechanics	3-0-0	3	3
C	BTCE-303-18	Fluid Mechanics	3-0-0	3	3
D	BTAM-301-18	Mathematics-III (Transform & Discrete Mathematics)	4-0-0	4	4
E	BTEC- 305-18	Basic Electronics & Applications in Civil Engineering	3-0-0	3	3
F	HSMC-132-18	Civil Engineering- Introduction, Societal & Global Impact	3-0-0	3	3
G	BTCE-306-18	Surveying & Geomatics Lab	0-0-2	2	1
H	BTCE-307-18	Fluid Mechanics Lab	0-0-2	2	1
I	BTCE-308-18	Solid Mechanics Lab	0-0-2	2	1
J	BMPD-301-18	Mentoring and Professional Development	0-0-2	2	0

**Total Credits=23 Hours: 28**

# SURVEYING & GEOMATICS

## COURSE INFORMATION SHEET

<b>PROGRAMME:</b> ENGINEERING	<b>DEGREE:</b> B. TECH (CIVIL ENGINEERING)
<b>COURSE:</b> SURVEYING& GEOMATICS	<b>SEMESTER:</b> III
<b>COURSE CODE:</b> BTCE-301-18	<b>CREDITS:</b> 4
<b>COURSE TYPE:</b> PROFESSIONAL CORE	<b>CONTACT HOURS:</b> 3-1-0
<b>CORRESPONDING LAB COURSE CODE(IFANY):</b> BTCE-306-18	<b>LAB COURSE NAME:</b> SURVEYING& GEOMATICS LAB

### SYLLABUS:

UNIT	DETAILS	HOURS
<b>I</b>	<b>Introduction to Surveying:</b> Principles, Survey stations, Survey lines- ranging, direct & indirect ranging, Bearing and its measurement with prismatic compass, calculation of angles from bearings, Local Attraction, Levelling: Principles of levelling- booking and reducing levels; differential, reciprocal levelling, profile levelling and cross sectioning. Digital and Auto Level, Errors in levelling; Contouring: Characteristics, methods, uses; areas and volumes. Setting up the plane table and methods of plane tabling (Radiation and three-point problem only).	10
<b>II</b>	<b>Triangulation and Trilateration:</b> Theodolite survey: Instruments, Measurement of horizontal and vertical angle; Balancing of Traverse, Omitted Measurements, Tachometry: Definition, determination of tachometer constants and reduced level from tachometric observations. Triangulation - network- Signals. Baseline choices - extension of base lines - corrections - Trigonometric levelling.	12
<b>III</b>	<b>Curves:</b> Elements of simple and compound curves – Method of setting out transition curve – length of curve – Elements of transition curve. <b>Photogrammetry Surveying:</b> Introduction, Basic concepts, flight planning; Stereoscopy, photographic mapping-mapping using paper prints, mapping using stereo plotting instruments, mosaics, map substitutes.	10
<b>IV</b>	<b>Modern Field Survey Systems:</b> Principle of Electronic Distance Measurement, Modulation, Types of EDM instruments, Distomat, Total Station – Parts of a Total Station – Accessories –Advantages and Applications, Field Procedure for total station survey, Errors in Total Station Survey; Global Positioning Systems- Segments, GPS measurements, errors and biases, Surveying with GPS, LADAR (drone and vehicle <b>Remote Sensing:</b> Introduction – Electromagnetic Spectrum, interaction of electromagnetic radiation with the atmosphere and earth surface, remote sensing data acquisition: platforms and sensors.	12

**Total hours–44**

### **TEXT/REFERENCEBOOKS**

1.	Duggal, S.K., Surveying Vol I& II, Tata McGraw Hill
2.	Punmia, B.C., Jain, A.K. and Jain, A.K., Surveying Vol. I, II & III, Laxmi Publications
3.	Agor, R., Surveying, Khanna Publishers
4.	Bhavikatti, S.S., Surveying & Levelling Volume I & II

<b>T/R</b>	<b>Book title suggested by faculty</b>
<b>1</b>	Duggal, S.K., Surveying Vol I& II, Tata McGraw Hill
<b>2</b>	Punmia, B.C., Jain, A.K. and Jain, A.K., Surveying Vol. I, II & III, Laxmi Publications

### **E- content used:**

<https://nptel.ac.in/courses/105107122>

### **Additional topics:**

Chain and Tape survey (Corrections), Overview of Indian Topographic Map, Reliability and Quality of Measurement.

### **DELIVERY/INSTRUCTIONAL METHODOLOGIES/ TEACHING PEDAGOGY:**

Formal method of teaching

Team teaching method

Apparatus demonstrations

Presentations

### COURSE OUTCOMES

S.NO	DESCRIPTION	Bloom's Level (B.L)
1.	Understand the concept, various methods and techniques of surveying.	2
2.	Compute angles, distances and levels for given area.	5
3.	Apply the concept of tachometry survey in difficult and hilly terrain.	3
4.	Select appropriate instruments for data collection and survey purpose.	1
5.	Analyze and retrieve the information from remotely sensed data and interpret the data for survey.	4
6.	Understand the concepts related to GIS and GPS and analyse the geographical data.	2

### CO MAPPING WITH PO/PSO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	2	1				2			1	1	1
CO2	3	2	2	2	2				2			1	1	2
CO3	3	2	2	2	2				2			1	1	1
CO4	2	2	3	2	3				1			2	2	2
CO5	1	2	2	3	2				1			2	2	1
CO6	2	1	1	2	3							2	2	1

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HOD

## SOLID MECHANICS

### COURSE INFORMATION SHEET

<b>PROGRAMME:</b> ENGINEERING		<b>DEGREE:</b> B. TECH (CIVIL ENGINEERING)
<b>COURSE:</b> SOLID MECHANICS		<b>SEMESTER:</b> III
<b>COURSE CODE:</b> BTCE-302-18		<b>CREDITS:</b> 3
<b>COURSE TYPE:</b> PROFESSIONAL CORE		<b>CONTACT HOURS:</b> 3-0-0
<b>CORRESPONDING LAB COURSE CODE(IF ANY):</b> BTCE-308-18		<b>LAB COURSE NAME:</b> SOLID MECHANICS LAB
UNIT	DETAILS	HOURS
I	<p><b>Concept of Equilibrium:</b> Loads, supports, reactions, displacements; General equilibrium equations; Equilibrium of a point and a member; Concept of free body diagram; Statical determinacy of a problem.</p> <p><b>Stresses and Strains:</b> Concept of stress and strain; Type of stresses and strains; Stress-strain diagrams for ductile, brittle materials; Generalized Hooke's law; Concept of working stress and factor of safety; Lateral strain, Poisson's ratio and Volumetric strain; Elastic moduli and relationship between them; Bars of varying section, composite bars, thermal stresses.</p>	08
II	<p><b>Principal Stresses and Strains:</b> Concept of principal stresses, principal strains and principal planes; use of Mohr circle in computation of stresses and strains; Rectangular block subjected to normal stress along and across two planes, combination of normal and tangential stress also with shear stress.</p> <p><b>Shear Force and Bending Moment Diagrams:</b> Introduction to the concept of shear force, bending moment and the sign convention; Shear force and bending moment diagrams for cantilever, simply supported and overhang beams subjected to point loads, uniformly distributed loads, uniformly varying loads, moments or their combination, point of contra flexure.</p>	10
III	<p><b>Slope and deflection-</b>Relationship between moment, slope and deflection, Moment area method, Macaulay's method. Use of these methods to calculate slope and deflection for determinant beams.</p> <p><b>Bending and Shear Stresses:</b> Assumptions - theory of simple bending; Derivation of bending equation; Centroid and section modulus of various cross-sectional shapes including rectangular, circular, I, channel, angle etc. ; Determination of bending stresses, bending stress distribution across various beam sections; Determination of shear stress, shear stress distribution across various beam sections.</p>	08
IV	<p><b>Columns and Struts:</b> Stability of Columns; buckling load of axially loaded columns with various end conditions; Euler's and Rankine's formula; Columns under eccentric load, lateral load.</p> <p><b>Torsion of Circular Shafts:</b> Derivation of torsion equation and its assumptions, application of equation to circular shafts; combined torsion and bending of circular shafts, principal stress and maximum shear stress under combined loading of torsion and bending.</p> <p><b>Stresses and strains in thin cylinders:</b> spherical shells subjected to internal pressures; Normal stress, tangential stress.</p>	10

**Total hours-36**



**TEXT/REFERENCEBOOKS**

1.	'Elements of Strength of Materials', Timoshenko, S. and Young, D.H., DVNC, New York, USA.
2.	'Solid Mechanics', Kazmi, S.M.A., TMH, New Delhi.
3.	'Mechanics of Materials', Hibbeler, R.C., Pearson Prentice Hall.
4.	'An Introduction to the Mechanics of Solids', Crandall, S.H., N.C. Dahl, and T.J. Lardner, McGraw Hill.
5.	'Mechanics of Materials', Ferdin and P.Beer, E.Russel Jhonston Jr. and John T.D.E wolf, TMH.
6.	'Strength of Materials', James M.Gere and Barry J.Good no,Cengage Learning India Pvt. Ltd., New Delhi.
7.	'Strength of Materials', R.Subramanian, Oxford University Press, New Delhi.

S. No.	Book title suggested by faculty
1	'Strength of Materials', R.Subramanian, Oxford University Press, New Delhi.
2	'An Introduction to the Mechanics of Solids', Crandall, S. H., N. C. Dahl, and T. J. Lardner, McGraw Hill.

**E- content used:**

<https://nptel.ac.in/courses/112102284>

**Additional topics:**

Mathematical Concepts: Working with Vectors & Tensors, Theories of Failure, Moment of Inertia for different types of bodies/shapes.

**DELIVERY/INSTRUCTIONAL METHODOLOGIES/ TEACHING PEDAGOGY:**

Formal method of teaching, Inquiry guided instructions, Presentations

### COURSE OUTCOMES

S.NO	DESCRIPTION	BT Level
1.	Understand the concept of static equilibrium, deformations, and material constitutive behaviour.	2
2.	Describe the concepts of stress, strain and elastic behaviour of materials including Hooke's law relationships to analyse structural members subjected to tension, compression and torsion.	3
3.	Apply the concept of Mohr's circle in the stress/strain calculations.	3
4.	Develop SFD and BMD for different type of beams subjected to different types of loads.	6
5.	Plot elastic curves for beams undergoing displacements under different loadings.	6
6.	Understand the behaviour of columns and struts under axial loading.	2

### CO MAPPING WITH PO/PSO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	1	1								2		
CO2	3	3	1	2								2	1	
CO3	3	2	3	3	1								2	2
CO4	3	2	3	3	1								3	2
CO5	2	3	3	2	2								2	3
CO6	2	2		1								1		

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