

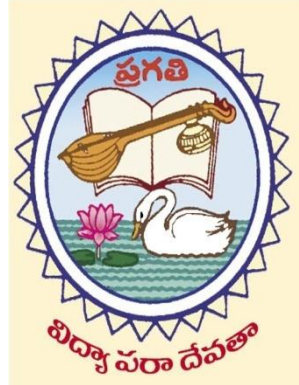
COURSE STRUCTURE & SYLLABUS

For

B.Tech.

CIVIL ENGINEERING

(Applicable for batches admitted from 2019-20)



PRAGATI ENGINEERING COLLEGE (AUTONOMOUS)

Permanently Affiliated to JNTUK, Kakinada, Accredited by NAAC with "A" Grade
Recognized by UGC 2(f) and 12(b) under UGC act, 1956
1-378, ADB Road, Surampalem – 533 437
Near Peddapuram, E.G.Dist, Andhra Pradesh



**PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous R19)**

Zero Semester:

Induction Programming (Mandatory)	3 weeks duration
Induction program for students to be offered at the start of the first year.	<ol style="list-style-type: none">1. Physical activity2. Creative arts3. Universal human values4. Literary5. Proficiency modules6. Lectures by eminent peoples7. Visit local areas8. Familiarization of dept./branch and innovation

When new students enter an institution, they come with diverse thoughts, backgrounds and preparations. It is important to help them adjust to the new environment and inculcate in them the ethos of the institution with a sense of large purpose. Precious little is done by most of the institutions, except for an orientation program lasting a couple of days. We propose a 3 week long induction program for U G students entering the institution, right at start. Normal classes start only after induction program is over. Its purpose is to make the students feel comfortable in their new environment, open them up, set a healthy daily routine, create bonding in the batch as well as between faculty and students, develop awareness, sensitivity and understanding of the self, people around them, society at large and nature. The time during the induction program is also used to rectify some critical lacunas, for example, English background, for those students who have deficiency in it. The following are the activities under induction program in which the student would be fully engaged throughout the day for entire duration of induction program.



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I Year – I Semester

S. No.	Course Category	Subject Code	Subject	L	T	P	C
1	Humanities, Social Science including Management Studies	19HE1T01	Professional Communicative English	3	--	--	3
2	Basic Sciences	19BM1T01	Linear Algebra and Differential Equations	3	--	--	3
3	Basic Sciences	19BC1T01	Engineering Chemistry	3	--	--	3
4	Engineering Sciences	19CS1T01	Programming for Problem Solving using C	3	--	--	3
5	Engineering Sciences	19ME1T02	Engineering Mechanics	3	--	--	3
6	Humanities, Social Science including Management Studies	19HE1L01	Professional Communicative English Laboratory - I	--	--	3	1.5
7	Engineering Sciences	19CS1L01	Programming for Problem Solving using C Laboratory	--	--	3	1.5
8	Basic Sciences	19BC1L01	Engineering Chemistry Laboratory	--	--	3	1.5
9	Mandatory Courses	19BE1T01	Environmental Science	2	--	--	0
Total Credits							19.5

I Year – II Semester

S. No.	Course Category	Subject Code	Subject	L	T	P	C
1	Basic Sciences	19BM2T02	Numerical Methods & Multivariable Calculus	3	--	--	3
2	Basic Sciences	19BM2T03	Integral Transforms and Vector Calculus	3	--	--	3
3	Basic Sciences	19BP2T01	Engineering Physics	3	--	-	3
4	Professional Core	19CE2T01	Construction Materials	3	--	--	3
5	Professional Core	19CE3T05	Geodesy	3	--	--	3
6	Engineering Sciences	19ME2T01	Engineering Drawing	1	--	3	2.5
7	Engineering Sciences	19ME2L01	Engineering Workshop & IT Workshop	--	--	3	1.5
8	Basic Sciences	19BP2L01	Engineering Physics Laboratory	--	--	3	1.5
9	Humanities, Social Science including Management Studies	19HM2T05	Constitution of India	2	--	--	0
Total Credits							20.5



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II Year – I Semester

S. No.	Course Category	Subject Code	Subject	L	T	P	C
1	Engineering Sciences	19EE3T02	Basic Electrical and Electronics Engineering	3	--	--	3
2	Basic Sciences	19BM3T04	Probability and Statistics	3	--	--	3
3	Professional Core	19CE3T02	Building Planning & Drawing	1	--	4	3
4	Professional Core	19CE3T03	Fluid Mechanics	3	--	--	3
5	Professional Core	19CE3T04	Strength of Materials-I	3	--	--	3
6	Professional Core	19CE3L01	Strength of Materials Laboratory	--	--	3	1.5
7	Professional Core	19CE3L02	Geodesy Laboratory-I	--	--	3	1.5
8	Project Work	19CE3P01	Socially Relevant Activity*	--	--	--	0.5
9	Humanities, Social Science including Management Studies	19HM3T07	Professional Ethics & Human Values	2	--	--	0
Total Credits							18.5

* 15hours per semester

II Year – II Semester

S. No.	Course Category	Subject Code	Subject	L	T	P	C
1	Professional Core	19CE4T06	Strength of Materials-II	3	--	-	3
2	Professional Core	19CE4T07	Concrete Technology	3	--	--	3
3	Professional Core	19CE4T08	Engineering Geology	3	--	--	3
4	Professional Core	19CE4T09	Hydraulics & Hydraulic Machinery	3	--	--	3
5	Professional Core	19CE4T10	Highway Engineering	3	--	--	3
6	Professional Core	19CE4T11	Structural Analysis –I	3	--	--	3
7	Professional Core	19CE4L03	Fluid Mechanics & Hydraulic Machinery Laboratory	--	--	3	1.5
8	Professional Core	19CE4L04	Engineering Geology Laboratory	--	--	3	1.5
9	Humanities, Social Science including	19HE2L02	Professional Communicative English Laboratory – II	--	--	3	1.5
10	Humanities, Social Science including Management Studies	19HM4T06	Essence of Indian Traditional Knowledge	2	--	--	0
Total Credits							22.5



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III Year – I Semester

S. No.	Course Category	Subject Code	Subject	L	T	P	C
1	Humanities, Social Science including Management Studies	19HM5T01	Managerial Economics and Financial Analysis	3	--	--	3
2	Professional Core	19CE5T12	Estimation, Specifications and Contracts	3	--	--	3
3	Professional Core	19CE5T13	Design & Detailing of Reinforced Concrete	3	--	--	3
4	Professional Core	19CE5T14	Geotechnical Engineering-I	3	--	--	3
5	Professional Core	19CE5T15	Structural Analysis – II	3	--	--	3
6	Professional Core	19CE5T16	Railways, Airports and Seaports	3	--	--	3
7	Professional Core	19CE5L05	Geotechnical Engineering Laboratory	--	--	3	1.5
8	Professional Core	19CE5L06	Concrete Technology Laboratory	--	--	3	1.5
9	Professional Core	19CE5L07	Geodesy Laboratory-II	--	--	3	1.5
10	Mandatory Course	19CE5T17	MOOCs**	--	--	--	0
11	Humanities, Social Science including Management Studies	19HM5T08	IPR & Patents	2	--	--	0
Total Credits							22.5

**Student can select the course of any discipline under MOOCs. However, the agency will be decided by the respective BOS.

III Year – II Semester

S. No.	Course Category	Subject Code	Subject	L	T	P	C
1	Professional Core	19CE6T19	Water Supply & Waste Water Engineering	3	--	--	3
2	Professional Core	19CE6T20	Geotechnical Engineering-II	3	--	--	3
3	Professional Core	19CE6T21	Design & Detailing of Steel Structures	3	--	--	3
4	Professional Core	19CE6T22	Water Resource Engineering -I	3	--	--	3
5	Open Elective		Open Elective-I:	3	--	--	3
6	Professional Core	19CE6L08	Environmental Engineering Laboratory	--	--	3	1.5
7	Professional Core	19CE6L09	Transportation Engineering Laboratory	--	--	3	1.5
8	Professional Core	19CE6L10	Computer Aided Engineering Drawing	--	--	3	1.5
9	Project Work	19CE6P02	Mini Project	--	--	2	1
Total Credits							20.5



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IV Year – I Semester

S. No.	Course Category	Subject Code	Subject	L	T	P	C
1	Professional Core	19CE7T25	Foundation Engineering	3	--	--	3
2	Professional Core	19CE7T26	Water Resource Engineering-II	3	--	--	3
3	Open Elective		Open Elective-II	3	--	--	3
4	Professional Elective		Professional Elective –I	3	--	--	3
5	Professional Elective		Professional Elective –II	3	--	--	3
6	Professional Core	19CE7L11	Irrigation Drawing Laboratory	--	--	3	1.5
7	Professional Core	19CE7L12	GIS & STAAD Pro Laboratory	--	--	3	1.5
Total Credits							18

IV Year – II Semester

S. No.	Course Category	Subject Code	Subject	L	T	P	C
1	Professional Core	19CE8T39	Construction Technology & Management	3	--	--	3
2	Professional Core	19CE8T40	Pre-Stressed Concrete	3	--	--	3
3	Professional Elective		Professional Elective – III	3	--	--	3
4	Project Work	19CE8P03	Project Work	--	--	18	9
Total Credits							18

Total course Credits: 40 + 41 + 43 + 36 = 160

S No	Code	Open Elective-I
1	19HM6T03	Entrepreneurship
2	19BP6T03	Nuclear Science & Technology
3	19EE6T36	Power Safety & Management
4	19ME6T22	Industrial Engineering & Management
5	19EC6T39	Electronic Measurements & Instrumentation
6	19CS6T05	Object oriented Programming through Java

S No	Code	Open Elective-II
1	19HM7T02	Management Science
2	19BC7T03	Material Chemistry & Engineering Applications
3	19EE7T24	Energy Audit, Conservation & Management
4	19ME7T47	Non Destructive Evaluation
5	19EC7T10	Internet of Things
6	19CS7T03	Python Programming



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S No	Code	Professional Elective-I
1	19CE7T27	Ground Improvement Techniques
2	19CE7T28	Repair & Maintenance of Structures
3	19CE7T29	Transportation Planning Engineering
4	19CE7T30	Industrial Waste Management
5	19CE7T31	Urban Hydrology
6	19CE7T32	Air Pollution & Control

S No	Code	Professional Elective-II
1	19CE7T33	Advanced Foundation Engineering
2	19CE7T34	Advanced Structural Engineering
3	19CE7T35	Pavement Analysis & Design
4	19CE7T36	Municipal Solid Waste Management
5	19CE7T37	Ground Water Development
6	19CE7T38	Remote Sensing & GIS Applications

S No	Code	Professional Elective-II
1	19CE8T41	Soil Dynamics & Machine Foundation
2	19CE8T42	Bridge Engineering
3	19CE8T43	Traffic Engineering
4	19CE8T44	Earthquake Engineering
5	19CE8T45	Water Resource System Planning
6	19CE8T18	Environmental Impact Assessment & Management



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I B.Tech. - I Semester



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Subject Code: 19HE1T01

L	T	P	C
3	0	0	3

PROFESSIONAL COMMUNICATIVE ENGLISH

Introduction:

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training the students to acquire communicative competence, the syllabus has been designed to develop linguistic and communicative competence of the students of Engineering.

As far as the detailed Textbooks are concerned, the focus is on the skills of listening, speaking, reading and writing. The non-detailed Textbooks are meant for extensive reading for pleasure and profit. Thus the stress in the syllabus is primarily on the development of communicative skills and fostering ideas.

Objectives:

1. To improve the language proficiency of the learners in English with emphasis on LSRW skills.
2. To enable the learners to study and comprehend the prescribed course effectively relating to their theoretical and practical components.
3. To develop the communication skills of the learners in both formal and informal situations.

LISTENING SKILLS

Objectives:

1. To enable the learners to appreciate the role of listening skill and improve their pronunciation.
2. To enable the learners to comprehend the speech prescribe of people belonging to different backgrounds and regions.
3. To enable the learners to listen for general content, to fill up information and infer the content.

SPEAKING SKILLS

Objectives:

1. To make the learners aware of the importance of speaking for their personal and professional communication.
2. To enable the learners to express themselves fluently and accurately in social and professional set up.
3. To help the learners describe objects, situations and people.
4. To make the learners participate in group activities like role-plays, discussions and debates.
5. To make the learners participate in Just a Minute talks.

READING SKILLS

Objectives:

1. To enable the learners to comprehend a text through silent reading.
2. To enable the learners to guess the meanings of words, messages and inferences of texts in given contexts.



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3. To enable the learners to skim and scan a text.
4. To enable the learners to identify the topic sentence.
5. To enable the learners to identify discourse features.
6. To enable the learners to make intensive and extensive reading.

WRITING SKILLS

Objectives:

1. To make the learners understand that writing is an exact formal skill.
2. To enable the learners to write sentences and paragraphs coherently and cohesively.
3. To make the learners identify and use appropriate vocabulary.
4. To enable the learners to narrate and describe.
5. To enable the learners capable of note-making.
6. To make the learners to write formal and informal letters.
7. To enable the learners to describe graphs using expressions of comparison.
8. To enable the learners to write technical reports.

Methodology:

1. The classes are to be learning-centred where the learners participate in the language learning activities with the peer group and the facilitator.
2. Integrated skill development methodology has to be adopted with focus on individual language skills as per the tasks/exercise.
3. The tasks/exercises at the end of each unit should be animated with the help of learning positive activities such as pair work, Group Discussion and so on.
4. The facilitator is expected to use supplementary material wherever necessary and also generate activities/tasks as per the requirement.
5. The facilitator activities the learning in a particular mode.

The following text books are recommended for study in I B.Tech I Semester (Common for all branches) of Pragati Engineering College, Surampalem from the academic year 2019-20 (R-19 Regulations)

DETAILED TEXTBOOK:

- **PROFESSIONAL COMMUNICATIVE ENGLISH** *Published by Maruthi Publishers.*

NON-DETAILED TEXTBOOK:

- *-PANORAMA: A COURSE ON READING, Published by Oxford University Press India*
The course content along with the study material is divided into six units.



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COURSE CONTENT	
UNIT I	Solving system of linear equations, Eigen Values and Eigen vectors Rank of a matrix by echelon form and normal form – Solving system of homogeneous and non-homogeneous linear equations – Gauss elimination method for solving system of equations – Eigenvalues and Eigen vectors and their properties.
UNIT II	Cayley-Hamilton Theorem and Quadratic forms Cayley-Hamilton theorem (without proof) – Finding inverse and powers of a matrix by Cayley-Hamilton theorem – Reduction to diagonal form-Quadratic forms-nature of the quadratic form - reduction of quadratic form to canonical form by orthogonal transformation.
UNIT III	Differential equations of first order and first degree Linear – Bernoulli – Exact – Reducible to exact. Applications: Newton’s Law of cooling – Law of natural growth and decay – Orthogonal trajectories.
UNIT IV	Linear differential equations of higher order Non-homogeneous equations of higher order with constant coefficients with RHS term of the type e^{ax} , $\sin ax$, $\cos ax$, polynomials in x^n , $e^{ax}V(x)$, $x^mV(x)$ - Method of Variation of parameters.
UNIT V	Partial differentiation Introduction – Homogeneous function – Euler’s theorem – Total derivative – Chain rule – Generalized Mean value theorem for single variable (without proof) – Taylor’s and Maclaurin’s series expansion of functions of two variables – Jacobian – Functional dependence. Applications: Maxima and Minima of functions of two variables without constraints and Lagrange’s method (with constraints).

TEXT BOOKS	
1.	B.S.Grewal , Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2.	Erwin Kreyszig , Advanced Engineering Mathematics, 10th Edition, Wiley-India
REFERENCE BOOKS	
1.	Micheael Greenberg , Advanced Engineering Mathematics, 9th edition, Pearson edn
2.	Dean G. Duffy , Advanced engineering mathematics with MATLAB, CRC Press
3.	Peter O’neil , Advanced Engineering Mathematics, Cengage Learning.
4.	Srimanta Pal, Subodh C.Bhunia , Engineering Mathematics, Oxford University Press.
5.	T.K.V. Iyengar et. al. , Engineering Mathematics Volume I & III S Chand Publications.
WEB RESOURCES	
1.	UNIT I: Solving system of linear equations, Eigen Values and Eigen vectors https://en.wikipedia.org/wiki/System_of_linear_equations https://en.wikipedia.org/wiki/Eigenvalues_and_eigenvectors



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2.	UNIT II: Cayley-Hamilton Theorem and Quadratic forms https://www.math.hmc.edu/calculus/tutorials/eigenstuff/ https://en.wikipedia.org/wiki/Quadratic_form
3.	UNIT III: Differential equations of first order and first degree https://en.wikipedia.org/wiki/Differential_equation http://um.mendelu.cz/maw-html/index.php?lang=en&form=ode https://www.khanacademy.org/math/differential-equations/first-order-differential-equations
4.	UNIT IV: Linear differential equations of higher order https://en.wikipedia.org/wiki/Differential_equation http://um.mendelu.cz/maw-html/index.php?lang=en&form=ode https://nptel.ac.in/courses/122107037/20
5.	UNIT V: Partial Differentiation https://en.wikipedia.org/wiki/Partial_derivative https://www.whitman.edu/mathematics/calculus_online/section14.03.html



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**ENGINEERING CHEMISTRY
(Civil Engineering)**

Course Category	Basic Sciences	Course Code	19BC1BS01
Course Type	Theory	L-T-P-C	3-0-3-4.5
Prerequisites	Intermediate Chemistry	Internal Assessment Semester End Examination Total Marks	40 60 100

COURSE OBJECTIVES

1	To learn about the hardness of water, boiler troubles, Drinking water standards and methods of removal of hardness of water
2	To get knowledge on Electrochemical cells, Batteries and fuel cells and their applications
3	To study about the factors affecting corrosion, controlling methods and about organic coatings
4	To learn about Cement, its setting and hardness, methods of polymerization, Plastics and Elastomers
5	To study about Nano materials, their preparation and applications and to gain awareness on smart materials,

COURSE OUTCOMES

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

CO1	Distinguish between temporary and permanent hardness of water.
CO2	Illustrate the principles and applications of Batteries and Fuel cells
CO3	Identify different types of corrosion and their controlling methods.
CO4	Illustrate the principles of setting and hardening of cement and explain about polymers and their engineering applications.
CO5	Analyze the importance of nano and smart materials and Illustrate the principle of BET & TEM.

Contribution of Course Outcomes towards achievement of Program : Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		2	1	2		3	3				3	1	1		1
CO2	2	1			2		1				2	2			
CO3	1		2		2		1				1			1	
CO4	3		1	2		1	1				2		1		
CO5	2		3			2	2				1	1			

COURSE CONTENT

UNIT I	WATER TECHNOLOGY	9 hrs
	Introduction –Hard and Soft water, Estimation of hardness by EDTA Method - Boiler troubles - scale and sludge-priming and foaming and Caustic Embrittlement; Specifications for drinking water, Bureau of Indian Standards (BIS) and World health organization (WHO) standards, Industrial water – Primary and secondary treatments, zeolite and ion-exchange processes- desalination of brackish water, reverse osmosis (RO) and electro dialysis.	



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	<p>Learning outcomes: After the completion of the Unit I, the student will be able to</p> <ul style="list-style-type: none"> • explain the principles of reverse osmosis and electro dialysis. (L-2) • compare the quality of drinking water with BIS and WHO standards. (L-2) • illustrate boiler troubles associated with hard water. (L-2) • demonstrate the Industrial water treatment processes. (L-2)
<p align="center">UNIT II</p>	<p align="right">9 hrs</p> <p>ENERGY SOURCES AND APPLICATIONS Electrode potential, determination of single electrode potential –Nernst’s equation, Reference electrodes: Hydrogen and calomel electrodes – electrochemical series and its applications Batteries: Primary cell- dry or Leclanche cell, Secondary cell- Nickel-Cadmium cell – lithium batteries (Lithium-MnO₂); Fuel cells- H₂-O₂ fuel cell Solar energy: Photovoltaic cell and its applications. Fuels- Classification and characteristics-Liquid fuels- Refining of petroleum; gaseous fuels-LPG and CNG applications</p> <p>Learning outcomes: After the completion of the Unit II, the student will be able to</p> <ul style="list-style-type: none"> • define electrode potential. (L-1) • derive Nernst’s equation. (L-2) • outline the difference between primary and secondary cells. (L-2) • identify the applications of photo voltaic cell. (L-2) • discuss the applications of LPG and CNG (L-2)
<p align="center">UNIT III</p>	<p align="right">6+6 hrs</p> <p>CORROSION ENGINEERING III-A: Corrosion: Definition – theories of corrosion-Dry corrosion: Metal oxide formation - pilling bed worth ratio; Electro chemical corrosion: Mechanism, Factors affecting corrosion (nature of the metal and nature of the environment). III-B: Corrosion controlling methods: Sacrificial and Impressed current cathodic protection. Metallic coatings – Galvanizing and Tinning- Electro plating and Electro less plating; Anodic inhibitors and Cathodic inhibitors. Organic coatings – Paints and Varnishes (constituents and their functions).</p> <p>Learning outcomes: After the completion of the Unit III, the student will be able to</p> <ul style="list-style-type: none"> • explain theories of corrosion. (L-2) • identify the various factors affecting corrosion. (L-3) • classify different inhibitors of corrosion (L-2) • choose different organic coatings. (L-3) • apply the principles of corrosion control. (L-3)
<p align="center">UNIT IV</p>	<p align="right">10 hrs</p> <p>ENGINEERING MATERIALS AND POLYMERS Cement: Portland cement, constituents, Manufacture of Portland Cement, Chemistry of setting and hardening of Cement (hydration, hydrolysis, equations). Refractories-Classification, properties(refractoriness, refractoriness under load, porosity) Polymers: Introduction-Methods of Polymerization (Emulsion and Suspension), Conducting polymers – Mechanism of conduction in poly acetylene – applications, Bio – degradable polymers. Plastics: Thermoplastics and thermo setting resins; Moulding of plastics – Compression and Injection moulding - Preparation, properties and applications of Polystyrene and Bakelite. Elastomers: Natural Rubber, Vulcanization of rubber; Synthetic Rubbers -Preparation, properties and applications of Buna-S and Thiokol.</p> <p>Learning outcomes: After the completion of the Unit IV, the student will be able to</p> <ul style="list-style-type: none"> • illustrate the chemical reactions involved in the manufacturing of cement and properties of refractories. (L-2) • identify preparation and properties of different polymers. (L-3) • distinguish between thermoplastic and thermo setting resins. (L-4) • identify applications of conducting polymers (L-3)



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UNIT V	<p>NANO AND SMART MATERIALS 8 hrs</p> <p>Nano Materials: Introduction to Nano materials, Preparation of Carbon Nano Tubes(CNTs) by Laser Ablation and Chemical Vapor Deposition Methods, Fullerenes -Preparation, Properties and Applications; Chemical synthesis of nano materials : Sol-gel method, Characterization of nano materials by BET & TEM (basic principles), Applications of nano materials in waste water treatment, lubricants, Medicine and sensors.</p> <p>Smart Materials: Introduction – Types of smart materials-Self healing materials, Shape memory alloys and uses of smart materials.</p> <p>Learning outcomes: After the completion of the Unit V, the student will be able to</p> <ul style="list-style-type: none"> • classify nano materials. (L-2) • explain the synthesis and characterization methods of nano materials. (L-2) • explain principles of BET & TEM. (L-4) • identify different types of smart materials. (L-2)
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TEXT BOOKS	
1.	P.C. Jain and M. Jain, Engineering Chemistry, 15/e, Dhanapat Rai & Sons, Delhi (2014).
2.	Engineering Chemistry by Shikha Agarwal: Cambridge University Press,2019 edition .
REFERENCE BOOKS	
1.	Sashi Chawla, A Textbook of Engineering Chemistry, Dhanapath Rai and sons, (2003)
2.	S.S. Dara, A Textbook of Engineering Chemistry, S.Chand & Co, (2010)
3.	N. Krishna Murthy and Anuradha, A text book of Engineering Chemistry, Murthy Publications (2014)
WEB RESOURCES	
1.	Water Technology 1. https://www.scribd.com/document/.../Engineering-Chemistry-Unit-I-Water-Treatment 2. www.lenntech.com/applications/process/boiler/boiler-water-treatment.htm
2.	Energy Sources and Applications https://en.wikipedia.org/wiki/Electrochemical_cell
3.	Corrosion Engineering & Corrosion controlling methods https://en.wikipedia.org/wiki/Corrosion
4.	Engineering Materials and Polymers https://en.wikipedia.org/wiki/Polymer_chemistry
5.	Nano and Smart Materials https://en.wikipedia.org/wiki/Nanomaterials



**PRAGATI ENGINEERING COLLEGE: SURAMPALEM
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Programming for Problem solving using C

(Common to CE, ME, EEE, ECE, CSE, IT)

Course Category	Engineering Science	Course Code	19CS1T01
Course Type	Theory	L-T-P-C	3-0-0-3
Prerequisites		Internal Assessment	40
		Semester End Examination	60
		Total Marks	100

COURSE OBJECTIVES

1	To impart adequate knowledge on the need of programming languages and problem solving techniques.
2	To develop programming skills using the fundamentals of C Language.
3	To enable effective usage of arrays, structures, functions, pointers and dynamic memory allocation.
4	To make use of file handling functions in programming.

COURSE OUTCOMES

BTL

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

CO1	Apply the fundamentals of C Programming for Problem solving.	L3
CO2	Identify the appropriate Decision statement and Loops for a given Problem.	L2
CO3	Make use of Arrays and Strings to solve the problems in C.	L3
CO4	Apply the concepts of Functions and Pointers in Problem solving.	L3
CO5	Develop solutions for problems using Structures, Unions and Files.	L3

Contribution of Course Outcomes towards achievement of Program

Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	1	0	0	0	0	0	0	0	1	1	0
CO2	3	3	3	3	1	0	0	0	0	0	0	0	1	1	0
CO3	3	3	3	2	1	0	0	0	0	0	0	0	2	1	0
CO4	2	3	3	3	1	0	0	0	0	0	0	0	2	2	0
CO5	3	3	3	3	1	0	0	0	0	0	0	0	2	2	0



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COURSE CONTENT	
UNIT I	<p>Introduction to Programming—Introduction to Computer Software, Classification of Computer Software, Representation of Data – Bits and Bytes, Programming Languages – High and Low Level Languages, Generation of Programming Languages, Program Design Tools: Algorithms, Flowcharts, Pseudocode, Types of Errors, Testing & Debugging Approaches.</p> <p>Introduction to C – Structure of a C Program, Writing the First C Program, Header Files used in C Program, Compiling and Executing C Programs.</p>
UNIT II	<p>Tokens in C: Basic Data Types in C – Keywords, Identifiers, Variables, Constants, Input / Output statements in C, Operators in C, Precedence and Associativity Rules, Type Casting Types.</p> <p>Decision Control: Decision Control Statements: Conditional Branching Statements - if, if – else, nested if, if – else – if, and Switch – Case.</p> <p>Basic Loop Structures: Iterative Statements - for, while and do - while, Nested Loops, The ‘Break’, ‘Continue’, and ‘goto’ statements.</p>
UNIT III	<p>Arrays: Declaration and Initialization of Arrays, Accessing & Storing the elements of an Array, Operations on Arrays: Traversing, Inserting, Deleting, Searching, Two Dimensional Arrays: Declaring, Initializing, Accessing, Operations on Two Dimensional Arrays (Matrices), Applications of Arrays.</p> <p>Strings: String Fundamentals, String Input and Output, String Library Functions</p>
UNIT IV	<p>Functions: Function Declaration / Function Prototypes, Function Definition, Function Call (Call by Value), Passing Parameters to Functions, Return Statement, Storage Classes, Recursive Functions, Arrays as Function Arguments.</p> <p>Pointers: Declaring Pointer Variables, Pointer Arithmetic, Passing Arguments to Function using Pointers (Call by Reference), Pointers and Arrays, Pointer to Pointer, Dynamic Memory Allocation – Malloc, Calloc, Realloc, Free.</p>
UNIT V	<p>Structures: Introduction to Structures, Nested Structures, Array of Structures.</p> <p>Unions: Introduction, Array of Union Variables, Union inside Structure, Enumerated Data Types, Bit Fields.</p> <p>Files: Declaring, Opening, and Closing File, Reading from and Writing to Text Files.</p>



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TEXT BOOKS

1. Programming in C, Reema Thareja, 2nd Edition, Oxford University Press.
2. The C programming Language, Dennis Richie and Brian Kernighan, Pearson Education

REFERENCE BOOKS

1. Programming in C – Ashok N.Kamthane, Amit Ashok Kamthane, 3rd Edition, Pearson.
2. C Programming-A Problem Solving Approach, Forouzan, Gilberg, Cengage.
3. Programming in C (A Practical Approach) – Ajay Mittal, First Edition, Pearson.

WEB RESOURCES

1. <http://nptel.ac.in/courses/106104128/>
2. <http://students.iitk.ac.in/programmingclub/course/#notes>
3. <http://c-faq.com/~scs/cclass/cclass.html>
4. <http://www.youtube.com/watch?v=b00HsZvg-V0&feature=relmfu>
5. <http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-087-practical-programming-in-c-january-iap-2010/>



**PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous R19)**

**ENGINEERING MECHANICS
(Common to CE & ME)**

Course Category	Engineering Science	Course Code	19ME1T02
Course Type	Theory	L-T-P-C	3-0-0-3
Prerequisites	Exposure to Engineering Physics and Applied Mathematics	Internal Assessment Semester End Examination Total Marks	40 60 100

COURSE OBJECTIVES	
1	To study forces, free body diagrams & equations of equilibrium of coplanar systems and its applications.
2	To study Trusses, friction and its applications.
3	To learn about centroid and moments of Inertia of simple and composite figures.
4	To learn various paths of velocity and acceleration computation.
5	To study about work, energy and particle motion for engineering applications.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		Cognitive Level*
CO1	Analyze the Forces, Free Body Diagrams & Equations of Equilibrium of Coplanar Systems.	k4
CO2	Analyze the trusses ,friction and its applications.	k4
CO3	Evaluate the centroid and moments of Inertia of Composite Figures.	k5
CO4	Determine the paths of velocity and acceleration computation.	k5
CO5	Adapt the concepts of work, energy and particle motion for engineering applications.	k6

*k1- Remembering, k2- Understanding, k3- Applying, k4- Analyzing, k5- Evaluating, k6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	1	-	-	-	-	-	-	-	-	-	2	-
CO2	3	3	3	2	-	1	-	-	-	-	-	-	-	2	-
CO3	3	3	3	2	-	-	-	-	-	-	-	-	-	3	-
CO4	3	3	3	2	-	-	-	-	-	-	-	-	-	3	-
CO5	2	1	1	2	-	-	-	-	-	-	-	-	-	2	-



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COURSE CONTENT	
UNIT I	Introduction to Engineering Mechanics: Basic Concepts of mechanics, System of Forces. Resultant System of Forces: Resultant of Coplanar Concurrent Force System - Moment of a Force, Couple, Varignon's Theorem, Resultant of Coplanar Non-Concurrent Force System. Equilibrium System of Forces: Equations of Equilibrium of Coplanar Systems, Free Body Diagrams, Lami's Theorem, Equilibrium of Connected Bodies.
UNIT II	Friction: Introduction, types of friction, Coulomb's laws of dry friction, coefficient of friction, cone of friction. Trusses: Introduction, Assumptions and Equilibrium analysis of plane trusses by using method of joints.
UNIT III	Centroid: Introduction, Centroids of simple and composite sections. Centre of Gravity: Simple bodies and Composite bodies, Pappus Theorem. Moment of Inertia: Definition – Transfer Theorem, Perpendicular Theorem, Polar Moment of Inertia, Moment of Inertia of Simple and Composite Figures, mass moment of inertia of simple bodies.
UNIT IV	Kinematics: D'Alembert's Principle, Rectilinear Motion and curvilinear motion, Motion with Uniform Velocity, Motion with Uniform Acceleration. Kinetics: Analysis as a Particle and Analysis as a Rigid Body in Translation, Equations of Plane Motion – Fixed Axis Rotation.
UNIT V	Work – Energy Method: Equations for Translation, Motion of Connected Bodies Fixed Axis Rotation and Plane Motion. Impulse momentum method.

TEXT BOOKS	
1	Engineering Mechanics - S.Timoshenko, D.H.Young., 5 th Edition - , Mc Graw Hill.
2	Engineering Mechanics - S. S. Bhavikatti, K G Rajasekharappa, Revised Edition, New Age International.
REFERENCE BOOKS	
1	Engineering Mechanics, N.H.Dubey, McGraw Hill, 2013.
2	Engineering Mechanics, A.K.Tayal, 14 th edition, 2 nd reprint, Umesh Publications, 2012.
3	Engineering Mechanics, R.K.Bansal, 3 rd edition, Laxmi Publications, 1996.
4	Engineering Mechanics: Statics & Dynamics, A. Nelson, Tata McGraw-Hill Education, 2009.
5	Engineering Mechanics, Ferdinand . L. Singer, Harper – Collins.
WEB RESOURCES	
1	http://nptel.ac.in/courses/Webcourse-contents/IITKANPUR/engg_mechanics/ui/Course_home_3.htm



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2	http://nptel.ac.in/courses/122104015/
3	https://nptel.ac.in/courses/122104015/
4	https://freevidelectures.com/course/2264/engineering-mechanics
5	https://nptel.ac.in/courses/112103108/3
6	https://nptel.ac.in/courses/115104094/54



**PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous R19)**

Subject Code: 19HE1L01

**Professional Communicative English Lab – I
(For CE, EEE, ME, CSE & IT)**

L	T	P	C
0	0	3	1.5

PRESCRIBED LAB MANUAL FOR SEMESTER I:

‘**STRENGTHEN YOUR STEPS: A Multimodal Course in Communication Skills**’ Published by Maruthi Publications.

Objectives:

To enable the students to learn the communication skills; listening, speaking, reading and writing.

Outcome:

The course enables the learner to acquire communication skills which will help the students to become successful in the competitive world.

The course content along with the study material is divided into six units.

UNIT 1:

Hello, I’m
Consonant Sounds

UNIT 2:

I would love to But,
Vowel Sounds

UNIT 3:

With your Permission, I would like to
Syllable and Accent

UNIT 4:

Why don’t we.....
Pronunciation and Rhythm

UNIT 5:

Could you please
Tones

UNIT-6:

Dialogues



**PRAGATI ENGINEERING COLLEGE: SURAMPALEM
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Programming for Problem solving using C Laboratory

(Common to CE, ME, EEE, ECE, CSE, IT)

Course Category	Engineering Science	Course Code	19CS1L01
Course Type	Laboratory	L-T-P-C	0-0-3-1.5
Prerequisites		Internal Assessment	40
		Semester End Examination	60
		Total Marks	100

COURSE OBJECTIVES

1	To learn various steps in program development using Raptor.
2	To write C programs using basic concepts in C like operators, control statements etc.,
3	To design modular, reusable and readable C programs using concepts like Arrays, Functions and Pointers.
4	To write programs using Structures and Unions.
5.	To write programs to perform file operations.

COURSE OUTCOMES

BTL

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

CO1	Translate given algorithms to a working programs.	L2
CO2	Design programs using Pointers to access Arrays, Strings and Functions.	L3
CO3	Develop programs using Structures, Unions and File operations.	L3

Contribution of Course Outcomes towards achievement of Program

Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	2	0	0	0	0	0	0	0	2	2	1
CO2	3	3	3	3	2	0	0	0	0	0	0	0	2	2	1
CO3	3	3	3	3	2	0	0	0	0	0	0	0	2	2	1

COURSE CONTENT

1.	Construct flowcharts using Raptor Tool to a) calculate the maximum, minimum and average of three numbers b) calculate area of a triangle given three sides using Heron's formula.
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13.	Write a C program on Strings to implement the following operations without string handling functions a) Concatenation of two given input strings. b) Length of a string. c) Reverse of a given string.
14.	Write C programs that use both recursive and non-recursive functions for the following i) To find the factorial of a given integer. ii) To find the GCD (greatest common divisor) of two given integers. iii) To find Fibonacci sequence
15.	Write a C program using Pointers to work on a) Matrix Addition. b) Transpose of a Matrix.
16.	Write a C program to read and print the details of an Employee (Name, Date of the Birth, Designation, Salary) using Structures.
17.	Write a C program a) to read and print the student details (Name, Register number, Address, Intermediate %) using Union. b) to display the name of the colour using Enum data type
18.	Write a C Program to a) Copy one file to another. b) Count the number of characters, words and lines in a file.



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COURSECONTENT

(Any 10 of the following listed 14 experiments)

LIST OF EXPERIMENTS:

Introduction to chemistry laboratory – Molarity, Normality, Primary, Secondary standard solutions, Volumetric titrations, Quantitative analysis

1. Estimation of HCl using standard Na_2CO_3 solutions
2. Determination of alkalinity of a sample containing Na_2CO_3 and NaOH
3. Estimation of KMnO_4 using standard Oxalic acid solution.
4. Estimation of Ferrous iron using standard $\text{K}_2\text{Cr}_2\text{O}_7$ solution
5. Determination of Temporary and permanent Hardness water using standard EDTA solution.
6. Determination of pH of the given sample solution using pH meter
7. Determination of Iron (III) using Colorimetric method
8. Conductometric Titrations between strong acid and strong base
9. Conductometric Titrations between strong acid and weak base
10. Estimation of Vitamin – C
11. Preparation of Phenol - Formaldehyde Resin
12. Determination of viscosity of a liquid
13. Determination of surface tension of a liquid
14. Preparation of Nano particles.(Cu/Zn)

TEXTBOOKS

1. Mendham J, Denney RC, Barnes JD, Thomas M and Sivasankar B Vogel's Quantitative Chemical Analysis 6/e, Pearson publishers (2000).
2. N.K Bhasin and Sudha Rani Laboratory Manual on Engineering Chemistry 3/e, Dhanpat Rai Publishing Company (2007).

REFERENCEBOOKS

[1] College designed manual

WEB-RESOURCES

www.bsau.ac.in/UploadImages/Downloads/Estimation%20of%20Hardness
<https://pubs.acs.org/doi/abs/10.1021/i560133a023>
<https://pdfs.semanticscholar.org/33d4/3b264bad212a14d660667298f12944ea11d5>



**PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous R19)**

Environmental Studies (Common to All Branches)

Course Category	Basic Sciences	Course Code	19BE1T01
Course Type	Theory	L-T-P-C	3 – 0 – 0 – 0
Prerequisites	Exposure Basic Knowledge in Environment and protection.	Internal Assessment Semester End Examination Total Marks	0 0 0

COURSE OBJECTIVE:

1

To make the students to get awareness on environment, to understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day to day activities of human life to save earth from the inventions by the engineers.

COURSE OUTCOMES

LEVEL

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

CO1	Recognize the interconnectedness of human dependence on the earth's ecosystems	K -II
CO2	Comprehend environmental problems from multiple perspectives with emphasis on human modern lifestyles and developmental activities	K -I
CO3	Demonstrate knowledge relating to the biological systems involved in the major global environmental problems of the 21st century	K -II
CO4	Gain a higher level of personal involvement and interest in understanding and solving environmental problems.	K -II
CO5	Learn the management of environmental hazards and to mitigate disasters and have a clear understanding of environmental concerns and follow sustainable development practices	K -III
CO6	Influence their society in proper utilization of goods and services.	K -I

Contribution of Course Outcomes towards achievement of Program

Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	0	1	0	0	1	2	0	0	0	1	0	0	0
CO2	0	1	0	0	0	0	1	0	0	0	0	0	0	0
CO3	0	0	0	0	2	0	1	0	0	0	0	0	0	0
CO4	0	0	0	0	1	1	3	0	0	0	0	0	0	0
CO5	0	0	0	0	0	0	3	1	0	0	0	0	0	0

Course contents:

UNIT – I

Multidisciplinary nature of Environmental Studies: Definition, Scope and Importance-Need for public awareness.

Natural Resources:

Forest resources : deforestation – Mining, dams and other effects on forest and tribal people.

Water resources : Use and over utilization of surface and groundwater.

Food resources: World food problems, effects of modern agriculture, fertilizer-pesticide problems.

Energy resources: renewable and nonrenewable energy sources.

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

LEARNING OUTCOMES:

Students will be able to

1. Articulate the basic structure, functions, and processes of key social systems affecting the environment
2. Explain why renewable and non-renewable energy resources are important..
3. Explain how water resources should be used.

UNIT-II: Ecosystems, Biodiversity and its conservation: Definition of Ecosystem and its structure, Functions

Biodiversity Definition-Value of biodiversity, India as a mega-diversity nation, Threats to biodiversity, Conservation of biodiversity



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LEARNING OUTCOMES:

Students will be able to

1. Get a clear picture of structure and functions of ecosystems.
2. Demonstrate knowledge and understanding of theories in the field of Biodiversity and Systematic in the broad sense.

UNIT-III: Environmental Pollution: Definition, Cause, Effects of Air pollution, Water pollution, Noise pollution, Radioactive pollution, Role of an individual in prevention of pollution.

Solid Waste Management: Sources, effects and control measures of urban and industrial waste.

LEARNING OUTCOMES Students will be able to

1. Understand Cause, effects and control measures of air pollution.
2. Explain the enforcement of Environmental legislation
3. Understand solid waste management.

UNIT-IV: Social Issues and the Environment: Air (Prevention and Control of Pollution) Act 1981. –Water (Prevention and control of Pollution) Act 1974, EPA act 1986 ,Issues involved in enforcement of environmental legislation, Rain water harvesting, Global Environmental challenges climate change and mitigations and Adaptations (Engineering technologies)

LEARNING OUTCOMES:

Students will be able to

1. Explain the enforcement of Environmental legislations
2. Acquire knowledge on various environmental challenges induced due to unplanned anthropogenic activities.

UNIT-V: Human population and the Environment:

Population growth, Women and child welfare, Role of Information technology in environment and human health Awareness to Environmental Assessment & clearance ,Audit .Environmental Governance in india

E-Waste management Rules (Biomedical Waste, Solid Waste) **Field work:** A mini project related to Environmental issues / To visit a local polluted site (Submission of project by every student)

LEARNING OUTCOMES Students will have

1. Explain various types of information technologies
2. Explain the theories of population explosion

TEXT BOOKS	
1.	Environmental Studies for undergraduate courses by Erach Bharucha, UGC.
2.	A Textbook of Environmental Studies by Dr.S.Azeem Unnisa, Academic publishing company.
3.	Environmental Studies by P.N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani; Pearson Education, Chennai
4.	A Textbook EIA Notification 2006(2019)
REFERENCE BOOKS	
1.	Text Book of Environmental Studies by Deeshita Dave & P. Udaya Bhaskar, Cengage learning.
2.	Glimpses of Environment by K.V.S.G. Murali Krishna Published by Environmental Protection Society, Kakinada, A.P.
3.	Environmental Studies by Benny Joseph, Tata McGraw Hill Co, New Delhi
WEB RESOURCES	
1.	UNIT-1: MULTI DISPLINARY NATURE OF ENVIRONMENT and NATURAL RESOURCES http://www.defra.gov.uk/environment/climatechange
2.	UNIT-2: ECOSYSTEM, BIODIVERSITY AND ITS CONSERVATION http://conbio.net/vl/ and www.biodiversitya-z.org/content/biodiversity
3.	UNIT-3: ENVIRONMENTAL POLLUTION https://www.omicsonline.org/environment-pollution-climate-change.php and
4.	UNIT-4: Social Issues and the Environment



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	http://www.publichealthnotes.com/solid-waste-management/
5.	UNIT-5: HUMAN POPULATION AND THE ENVIRONMENT http://IPCC.com



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I B.Tech. – II Semester



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COURSE CONTENT	
UNIT I	Interpolation Introduction– Errors in polynomial interpolation – Finite differences – Forward differences– Backward differences – Central differences – Symbolic relations and separation of symbols – Differences of a polynomial-Newton’s formulae for interpolation – Gauss formulae for interpolation- Interpolation with unequal intervals – Lagrange’s interpolation formula.
UNIT II	Solution of Algebraic and Transcendental Equations Introduction- Bisection method – Method of false position – Secant method- Iteration method – Newton-Raphson method (One variable).
UNIT III	Numerical Integration and solution of Ordinary Differential equations Trapezoidal rule- Simpson’s 1/3rd and 3/8th rule-Solution of ordinary differential equations by Taylor’s series-Picard’s method of successive approximations-Euler’s method - Runge-Kutta method (second and fourth order).
UNIT IV	Multiple integrals Multiple integrals: Double and triple integrals – Change of variables – Change of order of integration. Applications: Finding Areas and Volumes.
UNIT V	Partial Differential Equations Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – solutions of first order linear (Lagrange) equation and nonlinear (standard types) equations.

TEXT BOOKS	
1.	B. S. Grewal , Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2.	Erwin Kreyszig , Advanced Engineering Mathematics, 10th Edition, Wiley-India
REFERENCE BOOKS	
1.	Micheael Greenberg , Advanced Engineering Mathematics, 9th edition, Pearson edn
2.	Dean G. Duffy , Advanced engineering mathematics with MATLAB, CRC Press
3.	Peter O’neil , Advanced Engineering Mathematics, Cengage Learning.
4.	Srimanta Pal, Subodh C. Bhunia , Engineering Mathematics, Oxford University Press.
5.	T.K.V. Iyengar et. al. , Engineering Mathematics Volume I & III S Chand Publications.
6.	T.Amarnath , An Elementary Course in Partial Differential Equations, Narosa Publications
WEB RESOURCES	
1.	UNIT I: Interpolation https://en.wikibooks.org/wiki/Introduction_to_Numerical_Methods/Interpolation
2.	UNIT II: Solution of Algebraic and Transcendental Equations https://en.wikibooks.org/wiki/Numerical_Methods/Equation_Solving https://www.slideshare.net/100005232690054/algebraic-and-transcendental-equations
3.	UNIT III: Numerical Integration and solution of Ordinary Differential Equations https://nptel.ac.in/courses/111107063/



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4.	UNIT III: Multiple Integrals https://en.wikipedia.org/wiki/Multiple_integral http://tutorial.math.lamar.edu/Classes/CalcIII/MultipleIntegralsIntro.aspx
5.	UNIT V: Partial Differential Equations https://en.wikipedia.org/wiki/Partial_differential_equation



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COURSE CONTENT	
UNIT I	Laplace transforms: Laplace transforms of standard functions – Properties - Periodic functions - Unit step function – Dirac’s delta function.
UNIT II	Inverse Laplace transforms: Inverse Laplace transforms – Properties – Convolution theorem (without proof). Applications: Solving ordinary differential equations (initial value problems) using Laplace transforms.
UNIT III	Fourier Analysis: Introduction- Periodic functions – Dirichlet’s conditions - Fourier series of a function, even and odd functions –Change of interval – Half-range sine and cosine series. Fourier integral theorem (without proof) – Fourier sine and cosine integrals – sine and cosine transforms – Inverse transforms.
UNIT IV	Vector Differentiation: Gradient - Directional derivative - Divergence – Curl – Laplacian and second order operators – Vector identities.
UNIT V	Vector Integration: Line integral – Work done – Potential function – Area, Surface and volume integrals - Vector integral theorems: Greens, Stokes and Gauss Divergence theorems (without proof) and related problems.

TEXT BOOKS	
1.	B.S.Grewal , Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2.	Erwin Kreyszig , Advanced Engineering Mathematics, 10th Edition, Wiley-India
REFERENCE BOOKS	
1.	Micheael Greenberg , Advanced Engineering Mathematics, 9th edition, Pearson edn
2.	Dean G. Duffy , Advanced engineering mathematics with MATLAB, CRC Press
3.	Peter O’neil , Advanced Engineering Mathematics, Cengage Learning.
4.	Srimanta Pal, Subodh C.Bhunia , Engineering Mathematics, Oxford University Press.
5.	T.K.V. Iyengar et. al. , Engineering Mathematics Volume I & III S Chand Publications.
6.	Murray R Spiegel , Schaum's Outline of Vector Analysis, Schaum’s Outline.
7.	Shanti Narayan , Integral Calculus – Vol. 1 & II
WEB RESOURCES	
1.	UNIT I: Laplace transforms https://en.wikipedia.org/wiki/Laplace_transform https://web.stanford.edu/~boyd/ee102/laplace.pdf
2.	UNIT II: Inverse Laplace transforms https://www.intmath.com/laplace-transformation/7-inverse-laplace-transform.php
3.	Unit – III: Fourier Series



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	https://www.mathsisfun.com/calculus/fourier-series.html https://lpsa.swarthmore.edu/Fourier/Xforms/FXformIntro.html
4.	UNIT IV: Vector Differentiation https://en.wikipedia.org/wiki/Vector_calculus
5.	UNIT V: Vector Integration https://en.wikipedia.org/wiki/Divergence_theorem http://tutorial.math.lamar.edu/Classes/CalcIII/StokesTheorem.aspx



**PRAGATI ENGINEERING COLLEGE: SURAMPALEM
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CONSTRUCTION MATERIALS

Course Category	Professional Core	Course Code	19CE2T01
Course Type	Theory	L-T-P-C	3-0-0-3
Prerequisites		Internal Assessment	40
		Semester End Examination	60
		Total Marks	100

COURSE OBJECTIVES

1	To create a strong understanding on the importance of various building materials like bricks, tiles and lime used in Civil Engineering construction.
2	To create a strong knowledge on the manufacturing of various building materials like cement and other materials used in Civil Engineering construction.
3	To Identify the uses of wood, stones and their applications in Civil Engineering.
4	Identifying the various structural components of buildings, bridges, embankments, etc.
5	To create a strong understanding on the importance of surface finishing of a structure.

COURSE OUTCOMES

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

CO1	Know about various building materials like lime, brick, and tiles. (K1)
CO2	Understand about various types of cement and other construction materials. (K2)
CO3	Identify the various types of wood, stones and their uses. (K3)
CO4	Identify the structural components, sub-components and their applications. (K3)
CO5	Know the concepts of surface finishing of a structure. (K1)

Contribution of Course Outcomes towards achievement of Program

Outcomes (1 – Low, 2 - Medium, 3 – High)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	1	--	--	--	--	--	--	--	1	2	2	2
CO2	3	3	1	2	--	--	--	--	--	--	--	1	1	2	3
CO3	3	2	1	1	--	--	--	--	--	--	--	--	3	2	2
CO4	3	2	1	1	--	--	--	--	--	--	--	--	3	2	3
CO5	3	2	1	1	--	--	--	--	--	--	--	1	3	2	3

COURSE CONTENT

UNIT I	<p>BRICKS, TILES & LIME Composition of good brick, methods of manufacturing of bricks. Characteristics of good tile, manufacturing methods, Types of tiles. Uses of materials like Aluminum, Gypsum, Glass and Bituminous materials – their quality.</p> <p>LIME: Various ingredients, Constituents, classification and various methods of manufacture of lime.</p>
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UNIT II	<p>CEMENT & OTHER CONSTRUCTION MATERIALS CEMENT: Portland cement- Chemical Composition, Various types of cement and their properties. Other Construction Materials - Galvanized Iron, Fiber Reinforced Plastics, Steel, Aluminum and soil</p>
UNIT III	<p>STONE & TIMBER PRODUCTS WOOD: Structure, Properties, Seasoning of timber, Classification of various types of woods used in buildings, Defects in timber. STONE: Properties of building stones, classification of stones, stone quarrying, precautions in blasting, dressing of stone,</p>
UNIT IV	<p>BUILDING COMPONENTS Definitions of terms in masonry, Types of masonry-stone masonry, Brick masonry-English and Flemish bonds. Different types of floors - Cement Concrete Flooring, Marble Flooring, Tiled Flooring, Timber Flooring, and Rubber Flooring. STAIRS: Technical terms, Requirements of Good Stair, Classification of Stairs. LINTELS & ARCHES: Classification of Lintels and Arches. DOORS AND WINDOWS: Location of Doors and Windows-Types of Doors–Types of Windows.</p>
UNIT V	<p>FINISHINGS AND PIPES Damp Proofing and water proofing materials and uses, Plastering Pointing, white washing and distempering PAINTS: Constituents of paint, Types of paints, Painting of new/old wood, Varnish. Form Works and Scaffolding PIPES: Pipes used in building construction. ADHESIVES: Used in timber, tile fixing, Joining concrete, cladding, sealing compounds & joint fillers.</p>

TEXT BOOKS	
1.	Building Material & Construction by S.S. Bhavikatti, Vikas publishing House pvt ltd.
2.	Building Materials by B.C. Punmia, Laxmi Publications private ltd.
REFERENCE BOOKS	
1.	Building Materials by S.K.Duggal, New Age International Publications.
2.	Building Materials by P.C.Verghese, PHI learning (P) ltd.
WEB RESOURCES	
1.	http://freevidelectures.com/Course/86/Building-Materials-and-Construction



PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous R19)

COURSE CONTENT	
UNIT I	CRYSTALLOGRAPHY & X-RAY DIFFRACTION (10 hrs) Introduction-Basis and lattice – Unit cell - Coordination number -Packing fraction -Bravais lattice-Crystal Systems – packing fractions of SC,BCC and FCC-Crystal directions and planes-Miller indices – Separation between successive (h k l) planes – Bragg’s law - Bragg’s X-ray spectrometer.
UNIT II	MAGNETIC PROPERTIES (8hrs) Introduction-Magnetic-dipole-moment-Magnetization-Magnetic susceptibility and permeability- Origin of permanent magnetic moment -Classification of Magnetic materials(Analytical) - Wiess theory – Domain theory -Hysteresis-eddy currents- soft and hard magnetic materials - applications
UNIT III	ACOUSTICS (11 hrs) Introduction – Reverberation - Reverberation time - Sabine’s formula (Jaggers’ Method using Eyrings approximation)–absorption coefficient and its determination- factors affecting acoustics of buildings and their remedies. ULTRASONICS Introduction-Production of ultrasonic’s by Magneto-striction and piezoelectric methods – Detection of ultrasonic’s- Non-Destructive Testing- pulse echo system through transmission and reflection modes - Applications.
UNIT IV	LASERS (11 hrs) Introduction-Characteristics–Spontaneous and Stimulated emission of radiation – population inversion - Pumping Mechanisms - Ruby laser – Helium Neon laser –Semiconductor laser– Applications SENSORS (Qualitative description only): Introduction-Strain and Pressure sensors-Piezoelectric-Magnetostrictive sensors- Temperature sensor-smoke and fire detectors-Applications.
UNIT V	PHYSICS OF NANOMATERIALS (8hrs) Introduction to Basics of Nano materials, Properties - Preparation methods (Sol Gel Technique, Ball Milling) and characterization Methods Scanning tunneling Microscopy, Atomic Force Microscopy – CNTs Preparation (Arc Discharge method) and properties - Applications of NanoMaterials (CNTs).

TEXT BOOKS

- | | |
|---|---|
| 1 | “A text book of Engineering Physics” by P G Kshirsagar& M N Avadhanulu, S Chand & Company Ltd |
| 2 | “Solid State Physics” by SO Pilai., - New age International Publishers |
| 3 | “Engineering Physics by P.K.Palanisamy, Scitech publications (New Edition 2019) |

REFERENCE BOOKS

- | | |
|---|--|
| 1 | “Sensor and Transducers” by Ian R Sinclair, Elsevier (Newnes) 3rd Eds |
| 2 | Kettles Introduction to Solid state Physics-Charles Kittel,Wiley India Edition |

WEB RESOURCES



**PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous R19)**

1	http://youtu.be/OTDVov_kw6A https://slideplayer.com/slide/3866455/64/video/CHAPTER+3%3A+CRYSTAL+STRUCTURES+%26amp%3B+PROPERTIES.mp4 https://youtu.be/DYTCF01gdr0
2	https://nptel.ac.in/courses/113106032/15%20-%20Magnetic%20Properties.pdf
3	https://www.svce.ac.in/departments/physics/downloads/Notes/Unit-IV/UNIT%20IV%20Acoustics.pdf
4	https://youtu.be/UheTIVwukWg http://engineering.nyu.edu/gk12/amps-cbri/pdf/Intro%20to%20Sensors.pdf
5	https://nccr.iitm.ac.in/2011.pdf https://youtu.be/IFYs3XDu4fQ

**ENGINEERING DRAWING
(Only for CE)**



**PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous R19)**

Course Category	Engineering Science	Course Code	19ME2T01
Course Type	Theory	L-T-P-C	1-0-3-2.5
Prerequisites		Internal Assessment	40
		Semester End Examination	60
		Total Marks	100

COURSE OBJECTIVES

1	To introduce the students to use drawing instruments and to draw polygons, Engineering Curves and Scales.
2	To introduce the students to use orthographic projections, projections of points and lines.
3	To make the students draw the projections of the planes.
4	To make the students draw the projections of the various types of solids.
5	To represent the object in 3D view through isometric views.

COURSE OUTCOMES

Upon successful completion of the course, the student will be able to:		Cognitive Level*
CO1	Construct polygons, scales and engineering curves.	k3
CO2	Identify the position of points and lines with use of orthographic projections.	k3
CO3	Analyze the location and position of plane figures through orthographic projections.	k4
CO4	Analyze the location and position of solid bodies through orthographic projections.	k4
CO5	Develop 2D and 3D objects by converting their views.	k6

*k1- Remembering, k2- Understanding, k3- Applying, k4- Analyzing, k5- Evaluating, k6- Creating

**Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2 - Medium, 3 – High)**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	1	1	-	-	-	-	-	1	-	3	3	3
CO2	3	2	1	2	1	-	-	-	-	-	1	-	3	3	3
CO3	3	2	1	2	1	-	-	-	-	-	1	-	3	3	3
CO4	3	2	1	2	1	-	-	-	-	-	1	-	3	3	3
CO5	3	2	1	3	3	-	-	-	-	-	1	-	3	3	3

COURSE CONTENT

UNIT I	Introduction to Engineering Drawing. Polygons: Constructing regular polygons by general method.
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	<p>Curves: Parabola, Ellipse and Hyperbola by general methods tangent & normal for the curves. Cycloid and Involutés.</p> <p>Scales: Vernier and Diagonal scales.</p>
UNIT II	<p>Orthographic Projections: Introduction, importance of reference lines, projections of points in various quadrants. Projections of straight lines inclined to both the planes, determination of true lengths and angle of inclination.</p>
UNIT III	<p>Projections of planes: Regular planes perpendicular/parallel to one plane. Regular planes inclined to one plane and parallel to other, inclined to both the planes.</p>
UNIT IV	<p>Projections of Solids: Simple positions of Prisms, Pyramids, Cones and Cylinders. Solids inclined to both the planes.</p>
UNIT V	<p>Isometric Projections: Introduction, Conversion of isometric views to orthographic views, Conversion of orthographic views to isometric views.</p> <p>Introduction to AutoCAD (Demo only)</p>

TEXT BOOKS	
1	Engineering Drawing by N.D. Bhatt, Chariot Publications, 56 th Edition.
2	Engineering Drawing + AutoCad – K Venugopal, V. Prabhu Raja, New Age International (P) Limited (2008).
REFERENCE BOOKS	
1	Engineering Drawing by K.L.Narayana & P. Kannaiah, Scitech Publishers, 3 rd Edition.
2	Engineering Graphics for Degree by K.C. John, PHI Publishers.
3	Engineering Graphics by PI Varghese, Mc Graw Hill Publishers, 2013.
4	Engineering Drawing by Basant Agarwal, Tata McGraw Hill Publishers, 2014.
5	B.V.R. Gupta & M. Raja Roy, Engineering Drawing, I.K. International Publishing House Pvt. Ltd., 2009.
WEB RESOURCES	
1	http://nptel.ac.in/courses/112103019/
2	http://www.me.umn.edu/courses/me2011/handouts/drawing/blanco-tutorial.html
3	https://www.cartercenter.org/resources/pdfs/health/ephti/library/lecture_notes/env_health_scienc_e_students/engineeringdrawing.pdf



PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous R19)

ENGINEERING WORKSHOP & IT WORKSHOP*
(Only for CE)

Course Category	Engineering Science	Course Code	19ME2L01
Course Type	Laboratory	L-T-P-C	0-0-3-1.5



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Prerequisites	Internal Assessment	40
	Semester End Examination	60
	Total Marks	100

COURSE OBJECTIVES	
1	To familiarize with the basic material removal/shaping processes.
2	To study the various tools and equipment used in different hands on sessions.
3	To develop a skill in dignity of labor, precision, safety at work place.

COURSE OUTCOMES	
Upon successful completion of the course, the student will be able to:	
CO1	Practice on manufacturing of components using workshop trades including fitting and carpentry.
CO2	Design different types of models by using workshop trades including black smithy and tin smithy.
CO3	Apply basic electrical engineering knowledge for house wiring practice.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	3	-	3	-	-	-	-	-	-	-	3	3	3
CO2	3	-	3	-	3	-	-	-	-	-	-	-	3	3	3
CO3	3	-	3	-	3	-	-	-	-	-	-	-	3	3	3

LIST OF EXPERIMENTS
A. Carpentry: 1. T-Lap Joint 2. Cross Lap Joint



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(Autonomous R19)**

<ol style="list-style-type: none"> 3. Dovetail Joint 4. Mortise and Tenon Joint
B. Fitting: <ol style="list-style-type: none"> 1. V Fit 2. Square Fit 3. Half Round Fit 4. Dovetail Fit
C. Black Smithy: <ol style="list-style-type: none"> 1. Round rod to Square 2. S-Hook 3. U- Hook 4. Round Rod to Flat Ring
D. House Wiring: <ol style="list-style-type: none"> 1. Parallel Connection of three bulbs 2. Series Connection of three bulbs 3. Stair Case wiring 4. Florescent Lamp Fitting
E. Tin Smithy: <ol style="list-style-type: none"> 1. Square Box without lid 2. Open Scoop 3. Taper Tray 4. Funnel

Note: At least eight exercises to be done covering at least 4 trades.

IT WORKSHOP

COURSE CONTENT	
1	Identification of peripherals of a computer. To prepare a report containing the block diagram of the CPU along with the configuration of each peripheral and its functions. Description of various I/O devices, power rating of computers.
2	A practice on disassembling the components of a PC and assembling them to back to working condition.
3	Hardware trouble shooting (Demonstration): Identification of a problem and fixing a defective PC (improper assembly of peripherals)
4	Software troubleshooting (Demonstration): Identification of a problem and fixing the PC for any software issues.
5	MS Word –Formatting, Page Borders, Equations and Symbols . MS Excel -Organize data, Usage of formula, Graphs and Charts. MS PowerPoint -Guidelines for preparing an effective presentation.
6	Operating system installation:- Install Operating Systems like Windows, Linux along with necessary Device Drivers.



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*As a part of this course, 'Engineering Workshop' syllabus to be ratified by BoS-**Mechanical Engineering Department** and 'IT workshop' syllabus to be ratified by BoS-**CSE Department**, where as subject code to be given by Mechanical Engineering Department

Subject Code: 19HE2L02

L	T	P	C
0	0	3	1.5



**PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous R19)**

**PROFESSIONAL COMMUNICATIVE ENGLISH LAB- II
(For CE, EEE, CSE & IT)**

PRESCRIBED LAB MANUAL FOR SEMESTER II:

‘**STRENGTHEN YOUR STEPS: A Multimodal Course in Communication Skills**’, Published by Maruthi Publications.

OBJECTIVES: To enable the students to learn demonstratively the communication skills of listening, speaking, reading and writing.

OUTCOME: A study of the communicative items in the laboratory will help the students become successful in the competitive world.

The course content along with the study material is divided into six units.

UNIT-1:

Small Talk & JAM Session

UNIT-2:

Interviews

UNIT-3:

Effective Telephonic Interviews

UNIT-4:

Group Discussions

UNIT-5:

Presentations & Public Speaking

UNIT-6:

Debates

<ENGINEERING PHYSICS LABORATORY>

< Common to CE & ME)>

Course Category	BASIC SCIENCES	Course Code	19BP2T01
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(Autonomous R19)**

Course Type	Lab	L-T-P-C	0 - 0 - 3-1.5
Prerequisites	Intermediate Physics	Internal Assessment Semester End Examination Total Marks	40 60 100

COURSE OBJECTIVES

1	The student will have exposure to various experimental skills which is essential for an Engineering student.
2	To gain practical knowledge by applying the experimental methods to correlate with the Theoretical Physics.
3	Apply the Analytical techniques and graphical analysis to the experimental data

COURSE OUTCOMES		Cognitive Level
Upon successful completion of the course, the student will be able to:		
CO1	Understand the basics of Mechanics, Elasticity, Diffraction using instruments like Fly wheel, Stewart Gee's, Grating	Understanding(K2)
CO2	Understand the basics of Waves and Oscillations in Physics using instruments like Volume Resonator, Sonometer.	Application(K3)
CO3	Determine the Magnetic and Dielectric constants of materials	Application(K3)

Contribution of Course Outcomes towards achievement of Program

Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2														
CO2	2														
CO3	2	2	2												

COURSE CONTENT: (Any 10 of the following listed 12 experiments)

1.	Determination of Rigidity modulus of a material- Torsional Pendulum.
2.	Determination of Young's modulus by method of single cantilever oscillations.



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3.	Determination of Acceleration due to Gravity and Radius of Gyration - Compound Pendulum.
4.	Verification of laws of vibrations in stretched strings – Sonometer.
5.	Determination of ultrasonic velocity in liquid (Acoustic grating)
6.	Magnetic field along the axis of a current carrying coil – Stewart and Gee’s apparatus
7.	Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
8.	Determination of dielectric constant by charging and discharging method
9.	Determination of wavelength of Laser by diffraction grating
10.	Determination of particle size using Laser.
11.	Determination of Moment of Inertia of a Fly Wheel.
12.	Determination of Velocity of sound –Volume Resonator.

TEXT BOOKS

1. Laboratory Manual of Engineering Physics by Dr.Y.Aparna & Dr.K.Venkateswara Rao (V.G.S Publishers)

REFERENCE BOOKS

1. College customized manual

WEB RESOURCES

1. <https://youtu.be/P-eJIXZimmQ>
2. <https://youtu.be/iUhfstf10rk>
3. <https://www.youtube.com/watch?v=BX4QPdP7fT8>
4. <https://youtu.be/toggy3WVxV4>
5. <https://www.youtube.com/watch?v=AYQLmFqFtlw>
6. https://www.youtube.com/watch?v=9MBE5t1Sv_w

Constitution of India

(Common to all branches)

Code:19HM2T05

Course Category	Humanities including Management	Credits	0
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**PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous R19)**

Course Type	Theory	Lecture-Tutorial-Practice	2 -0 -0
Prerequisites		Total Marks (Internal Assessment)	100

Course Outcomes		Blooms Taxonomy Level
On successful completion of the course, the student will be able to		
CO 1	Understand the evolution of Constitution of India	Understanding
CO 2	Make use of their Fundamental rights.	Application
CO 3	Understand the functioning of the Union Government	Understanding
CO 4	Understand the functioning of the State and local self Government.	Understanding
CO 5	Understand the value of Indian Constitution in functioning of the country.	Understanding

Contribution of Course Outcomes towards achievement of Program												
Outcomes: 1 – Low, 2 - Medium, 3 – High												
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	0	0	0	0	0	3	0	3	0	1	0	2
CO2	0	0	0	0	0	1	0	2	1	1	0	1
CO3	0	0	0	0	0	1	0	1	1	1	0	0
CO4	0	0	0	0	0	1	0	1	1	1	0	0
CO5	0	0	0	0	0	1	1	1	1	1	0	2

Course Content :

Unit – I

Introduction to Indian constitution: Meaning of the term constitution - History and development – Preamble of the Constitution – Constituent Assembly – The salient features of Indian Constitution.

Unit –II

Fundamental Rights and Directive principles of state policy: Individual and Collective Rights – Limitations of the fundamental Rights – Judicial Interpretation of Fundamental Rights.

Unit –III



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Union Government: Union Legislature – Lok sabha and Rajya sabha (powers and functions) – President of India (powers and functions) – Prime minister of India (powers and functions) – Union Judiciary (supreme court powers and functions).

Unit – IV State and Local self Government:

State Government: State Legislature (Legislative Assembly / Vidhan Sabha, Legislative Council / Vidhan Parishad) – Powers and functions of state legislature – The Chief Minister of the state (powers and functions)

Local Self Government: Election commission of India (Powers and Functions)- The Union Public Service Commission (Powers and Functions)

Unit – V Working of the Indian Constitution

The values of the Indian Constitution and Ushering of Social Revolution in India – Nature and Role of Higher Judiciary in India – Amendments (Recent)

Reference Books :

1. 'Indian Polity' by Laxmikanth
2. 'Indian Administration' by Subhash Kashyap
3. 'Indian Constitution' by D.D. Basu
4. 'Indian Administration' by Avasti and Avasti

Web Resources:

1. <https://www.clearias.com/historical-background-of-indian-constitution/>
2. <https://www.civilserviceindia.com/subject/General-Studies/notes/functions-and-responsibilities-of-the-union-and-the-states.html>
3. https://www.tutorialspoint.com/indian_polity/indian_polity_how_constitution_works



PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous R19)

II B.Tech. – I Semester

BASIC ELECTRICAL AND ELECTRONICS ENGINEERING
(For B.Tech CE)



**PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous R19)**

Course Category	Engineering Sciences	Course Code	19EE3T02
Course Type	Theory	L-T-P-C	3-0-0-3
Prerequisites	NA	Internal Assessment Semester End Examination Total Marks	40 60 100

COURSE OBJECTIVES	
1	To learn the basic principles of electrical circuit analysis.
2	To understand constructional details and operating principle of DC machines & Transformers.
3	To understand constructional details and operating principle details of alternator and 3-Phase induction motor.
4	To study operation of PN junction diode, half wave, full wave rectifiers, PNP and NPN transistors and various semiconductor devices.
5	To study the operation of OP-AMPs.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		Cognitive Level
CO1	Analyze various electrical circuits	Analyzing
CO2	Understand constructional details and operating principle of DC machines, single phase transformer, tests and analyze their performance.	Analyzing
CO3	Explain operation of Three phase AC machines.	Understanding
CO4	Analyze operation of half wave, full wave bridge rectifiers and Explain single stage CE amplifier and concept of various semiconductor devices.	Analyzing
CO5	Analyze operation of OP-AMPs.	Analyzing

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	0	0	0	0	0	0	0	1	1	0	1
CO2	3	2	2	2	0	0	0	0	0	0	0	1	1	0	1
CO3	3	2	2	2	0	0	0	0	0	0	0	1	1	0	1
CO4	3	2	0	0	0	0	0	0	0	0	0	0	1	0	0
CO5	3	2	0	0	0	0	0	0	0	0	0	0	1	0	0

COURSE CONTENT	
UNIT I	Electrical Circuits Basic definitions – types of network elements – Ohm’s Law – Kirchoff’s Laws – inductive networks – capacitive networks – series – parallel circuits – star-delta and delta-star transformations.
UNIT II	DC Machines & Transformers Constructional details and operating principle – EMF equation –DC motor – torque equation – applications - speed control methods of DC motor – Swinburne’s Test. Constructional details and operating principle of single phase transformers – EMF equation – equivalent circuit – Losses – OC & SC tests – efficiency.



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(Autonomous R19)**

UNIT III	<p>AC Machines Constructional details and operating principle of alternators – types – Regulation of alternator by synchronous impedance method.</p> <p>Principle of operation of 3-Phase squirrel cage induction motor – electromagnetic torque equation - power flow - brake test - efficiency calculation – applications.</p>
UNIT IV	<p>Semiconductor Devices PN junction diodes – characteristics – half wave and full wave rectifiers - PNP and NPN junction transistor, transistor as an amplifier – transistor amplifier – frequency response of CE amplifier – concepts of feedback amplifier – SCR – MOSFET - IGBT.</p>
UNIT V	<p>Operational Amplifiers Introduction to operation amplifiers (Ideal OP-AMP) – Characteristics – applications (inverting, non-inverting, integrator and differentiator).</p>

TEXT BOOKS	
1.	William Hayt and Jack E. Kemmerley, Engineering Circuit Analysis, Mc Graw Hill Company, 6 th Edition.
2.	Surinder Pal Bali, Electrical Technology, Vol-I, Vol-II, Pearson Publications, 1 st Edition.
3.	Basic Electrical and Electronics Engineering by M.S. Sukhija and T.K. Naga Sarkar, Oxford University Press.
4.	R.L. Boylestad and Louis Nashelsky, Electronic Devices and Circuits, PEI/PHI 2006, 9 th Edition.
REFERENCE BOOKS	
1.	John Bird, Electrical Circuit Theory and Technology, Routledge Taylor and Francis Group, 5 th Edition.
2.	M.S.Naidu and S.Kamakshiah, Basic Electrical Engineering, TMH Publications, 1 st Edition.
3.	Rajendra Prasad, Fundamentals of Electrical Engineering, PHI Publications, 2 nd edition.
4.	R. S. Sedha, A Text Book of Electronic Devices and Circuits, S.Chand & Co. 2 nd Edition
5.	David A. Bell, Electronic Devices and Circuits, Oxford University Press, 5 th Edition.
WEB RESOURCES (Suggested)	
1.	http://www.ncert.nic.in/html/learning_basket/electricity/electricity/machine/motor.html
2.	www.electricaleasy.com
3.	www.nptel.ac.in/courses/108108076/
4.	https://nptel.ac.in/courses/122106025/

**Probability & Statistics
(Common to CE, CSE & IT)**

II B. Tech I Semester

Course Category	Basic Sciences	Course Code	
Course Type	Theory	L-T-P-C	3-0-0-3



**PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous R19)**

Prerequisites	NIL	Internal Assessment	40
		Semester End Examination	60
		Total Marks	100

COURSE OBJECTIVES

1	The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
2	The skills derived from the course will help the student form a necessary base to develop analytic and design concepts.

COURSE OUTCOMES

Upon successful completion of the course, the student will be able to:		Cognitive Level
CO1	apply Binomial and Poisson distributions for real data to compute probabilities, theoretical frequencies	K3
CO2	interpret the properties of normal distribution and its applications	K2
CO3	find the confidence intervals for a statistic from the given population	K3
CO4	apply the concept of hypothesis testing to real world problems	K2
CO5	find a curve which approximate the given data, coefficient of correlation and lines of regression.	K3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

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

COURSE CONTENT

UNIT I	Discrete Distributions: Introduction – Discrete Random variables – Distribution function – Discrete distribution: Binomial and Poisson distributions.
UNIT II	Continuous distributions: Introduction -Continuous Random variables – Normal distributions, standard normal distribution, normal approximation to Binominal, Gamma and Weibull distributions.
UNIT III	Sampling Theory: Introduction – Population and samples – Sampling distribution of means for large and small samples (with known and unknown variance) – Proportion, sums and differences of means – Sampling distribution of variance – Point and interval estimation.



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(Autonomous R19)**

UNIT IV	Test of Hypothesis: Introduction – Type I and Type II errors – Maximum error – One tail and two tail tests – Tests concerning single mean, two means and several means. Tests concerning single, two and several proportions – Problems using Z-test, t-test, F-test and Chi –square test.
UNIT V	Curve fitting and Correlation: Introduction- Method of least squares – Fitting a straight line – Second degree curve – exponential curve – power curve. Simple correlation and regression – rank correlation – multiple linear regression.

TEXT BOOKS

- 1. Miller and John E. Freund**, Probability and Statistics for Engineers, Prentice Hall of India.
- 2. B.V. Ramana**, Higher Engineering Mathematics, Tata Mcgraw Hill.

REFERENCE BOOKS

- 1. Micheael Greenberg**, Advanced Engineering Mathematics, 9th edition, Pearson edn
- 2. Peter O’neil**, Advanced Engineering Mathematics, Cengage Learning.
- 3. Srimanta Pal, Subodh C.Bhunia**, Engineering Mathematics, Oxford University Press.
- 4. S.L. Myers, K. Ye, Ronald E Walpole**, Probability and Statistics for Engineers and Scientists, Pearson, 8th Edition.

WEB RESOURCES

- 1. UNIT I: Discrete Distributions**
https://en.wikipedia.org/wiki/List_of_probability_distributions
https://en.wikipedia.org/wiki/Binomial_distribution
- 2. UNIT II: Continuous distribution**
https://en.wikipedia.org/wiki/Normal_distribution
- 3. UNIT III: Sampling Theory**
[https://en.wikipedia.org/wiki/Sampling_\(statistics\)](https://en.wikipedia.org/wiki/Sampling_(statistics))
<https://nptel.ac.in/courses/111104073/>
- 4. UNIT IV: Test of Hypothesis**
https://en.wikipedia.org/wiki/Statistical_hypothesis_testing
<https://machinelearningmastery.com/statistical-hypothesis-tests/>
- 5. UNIT V: Curve fitting and Correlation**
https://en.wikipedia.org/wiki/Regression_analysis
<https://www.surveysystem.com/correlation.htm>

BUILDING PLANNING AND DRAWING

Course Category	Professional Core	Course Code	19CE3T02
Course Type	Theory	L-T-P-C	1 - 0 - 4 - 3



**PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous R19)**

Prerequisites	Exposure to Construction Materials	Internal Assessment	40
		Semester End Examination	60
		Total Marks	100

COURSE OBJECTIVES	
1	Creating an idea to the student to different building bye-laws and regulations.
2	Imparting the planning aspects of residential buildings and public buildings.
3	Drawing the various signs and bonds and different components buildings..
4	Imparting the skills and methods of planning of various buildings.
5	

COURSE OUTCOMES	
Upon successful completion of the course, the student will be able to:	
CO1	Explain various building bye-Laws laid by town planning authorities and local regulatory bodies. (K2)
CO2	Apply techniques for effective project planning and management. (K3)
CO3	Plan the different types of residential buildings and various public buildings based on the minimum requirements. (K3)
CO4	Develop the building drawing as per standards in various phases of a project and detailing in construction. (K3)
CO5	Creating and awareness of basic elements of drawing. (K2)

Contribution of Course Outcomes towards achievement of Program															
Outcomes (1 – Low, 2 - Medium, 3 – High)															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	--	--	1	1	--	3	3	1	1	--	--	2	--	--	--
CO2	--	--	--	--	--	--	2	--	1	--	--	2	--	--	--
CO3	--	--	--	--	--	--	2	1	1	1	1	1	--	--	--
CO4	--	1	--	--	--	--	2	1	1	1	1	1	--	--	--
CO5	--	1	--	1	2	1	2	1	2	2	2	1	--	--	--

COURSE CONTENT	
UNIT I	BUILDING BYELAWS AND REGULATIONS Introduction- terminology- objectives of building byelaws - principles under laying building bye laws- classification of buildings- - Floor Area Ratio (FAR). Floor Space Index (FSI).Open space requirements – built up area limitations- height of buildings- wall thickness – lightening and ventilation requirements- Principles of Vaasthu in building planning.
UNIT II	PLANNING OF RESIDENTIAL BUILDING & PUBLIC BUILDINGS Planning of Residential building and grouping of rooms, planning of educational institutions, hospitals, dispensaries, office buildings, banks, industrial buildings, hotels & motels, buildings for recreation. Requirements and - Requirements and Minimum Standards for various Public Buildings.



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(Autonomous R19)**

UNIT III	<p>SIGN CONVENTIONS Brick, stone, plaster, sand filling, concrete, glass, steel, cast iron, copper alloys, aluminium alloys etc., lead, zinc, tin etc., earth, rock, timber and marbles. BONDS: English bond and Flemish bond- odd and even courses for one, one-half, two and two & half brick walls in thickness at the junction of a corner.</p>
UNIT IV	<p>DOORS, WINDOWS, VENTILATORS AND ROOFS Panelled door, panelled and glassed door, glassed windows, panelled windows, swing ventilators, fixed ventilators, coupled roof, collar roofs. King Post truss, Queen Post truss Sloped and flat roof buildings: drawing plans, Elevations and Cross Sections of given sloped roof buildings.</p>
UNIT V	<p>ELEVATION OF RESIDENTIAL BUILDING & PUBLIC BUILDINGS Draw the Plan, Elevation and sections of a Residential & Public buildings from the given line diagram-staircases.</p>

TEXT BOOKS	
1.	Planning and Design of buildings by Y.S. Sane
2.	Planning, designing and Scheduling by Gurucharan Singh and Jagadish Singh
REFERENCE BOOKS	
1.	Building drawing by Shah and Kale.
2.	The Hindu Science of Architecture and Vaasthu , D.N.Sukhla
3	Building planning and drawing by M. Chakravarthi

FLUID MECHANICS

Course Category	Professional Core	Course Code	19CE3T03
Course Type	Theory	L-T-P-C	3-0-0-3



**PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous R19)**

Prerequisites	Engineering Mechanics	Internal Assessment	40
		Semester End Examination	60
		Total Marks	100

COURSE OBJECTIVES	
1	To introduce and explain fundamentals of Fluid Mechanics, which is used in the applications of Hydraulics.
2	To develop understanding about hydrostatic law, principle of buoyancy and stability of a floating body and application of mass in fluid flow
3	To imbibe basic laws and equations used for analysis of dynamic fluids
4	To determine the losses in a flow system, flow through pipes, flow past immersed bodies
5	To study the applications of the Bernoulli's equation and different types of mouth piece

COURSE OUTCOMES	
Upon successful completion of the course, the student will be able to:	
CO1	Know the definitions of fundamental concepts of fluid mechanics. (K1)
CO2	Identify the nature of flow in pipe and hydrostatic forces acting on submerged static fluid. (K3)
CO3	Calculate the pressure and velocities by using the Bernoulli's equation and momentum equation. (K3)
CO4	Estimate the head losses in a closed conduit flow interconnected with Reynolds number. (K3)
CO5	Justify the rate of flow through channels by using flow measurement devices. (K5)

Contribution of Course Outcomes towards achievement of Program

Outcomes (1 – Low, 2 - Medium, 3 – High)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	--	--	--	--	--	--	--	--	--	--	--	--	--
CO2	2	2	1	--	--	--	--	--	--	--	--	--	1	--	2
CO3	2	2	--	--	--	1	--	--	--	--	--	--	1	--	2
CO4	2	1	1	--	--	1	--	--	--	--	--	--	1	--	2
CO5	2	1	--	--	--	1	--	--	--	--	--	--	1	--	1

COURSE CONTENT

UNIT I	<p>INTRODUCTION : Dimensions and units, Physical properties of fluids, specific gravity, viscosity, surface tension, vapour pressure and their influences on fluid motion, pressure at a point, Pascal's law, Hydrostatic law- Relationship between pressures.</p> <p>Measurement of pressure-Pressure gauges, Manometers: Differential and Micro Manometers.</p>
UNIT II	<p>HYDROSTATICS: Hydrostatic forces on submerged plane-Horizontal, Vertical, inclined and curved surfaces – Centre of pressure. Derivations and problems.</p> <p>FLUID KINEMATICS: Description of fluid flow, Stream line, path line and streak lines and stream tube. Classification of flows: Steady, unsteady, uniform, non-uniform, laminar, turbulent, rotational and irrotational flows – Equation of continuity for one, two , three dimensional flows – stream and velocity potential functions, Flow net; Vortex flow – free vortex and forced, vertex flow</p>



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UNIT III	<p>FLUID DYNAMICS: Surface and body forces: Euler's and Bernoulli's equations for flow along a stream line for 3-D flow, Navier – Stokes equations (Explanatory). Momentum equation and its application – forces on pipe bend.</p>
UNIT IV	<p>LAMINAR FLOW: Reynolds's experiment – Characteristics of Laminar & Turbulent flows. Flow between parallel plates, Flow through long tubes, flow through inclined tubes. CLOSED CONDUIT FLOW: Laws of Fluid friction – Darcy's equation, Minor losses – pipes in series – pipes in parallel – Total energy line and hydraulic gradient line. Pipe network problems, Moody's Chart.</p>
UNIT V	<p>MEASUREMENT OF FLOW: Pitot tube, Venturimeter and Orifice meter– classification of orifices, small orifice and large orifice, flow over rectangular, triangular and trapezoidal and stepped notches - Broad crested weirs. Classification of mouthpieces; Flow through external and internal cylindrical mouthpiece.</p>

TEXT BOOKS	
1.	C. S. P. Ojha, R. Berndtsson and P. N. Chadramouli, Fluid Mechanics and Machinery, Oxford University Press, 2010.
2.	R. K. Bansal, A text of Fluid mechanics and hydraulic machines, Laxmi Publications (P) Ltd., New Delhi.
REFERENCE BOOKS	
1.	P. M. Modi and S. M. Seth, Hydraulics and Fluid Mechanics, Standard Book House
2.	Introduction to Fluid Machines by Edward J. Shaughnessy, Jr, Ira M.Katz and James P. Schaffer, Oxford University Press, New Delhi
WEB RESOURCES	
1.	https://nptel.ac.in/courses/105101082/

STRENGTH OF MATERIALS - I

Course Category	Professional Core	Course Code	19CE3T04
Course Type	Theory	L-T-P-C	3-0-0-3



**PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous R19)**

Prerequisites	Exposure to Engineering Mechanics	Internal Assessment Semester End Examination Total Marks	40 60 100
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COURSE OBJECTIVES	
1	To impart preliminary concepts of Strength of Material and Principles of Elasticity and Plasticity Stress strain behavior of materials and their governing laws.
2	To impart concepts of Bending Moment and Shear force for beams with different boundary and loading conditions and to draw shear force and bending moment diagrams.
3	To give the concept of flexure stresses in beams of various cross sections
4	To give the concept of shear stress in beams of various cross sections
5	To give the concept of deflection of beams under various loading conditions

COURSE OUTCOMES	
Upon successful completion of the course, the student will be able to:	
CO1	Relate to simple stresses, strains, elastic moduli and temperature stress (K2)
CO2	Calculate and draw shear force and bending moment diagrams of beams for given boundary conditions and loading conditions. (K3)
CO3	Find the flexural stresses and draw stress distribution for various sections. (K1)
CO4	Determine and draw the shear stress distribution for various beam sections. (K3)
CO5	Measure the deflections in beams under various loading and support conditions. (K3)

Contribution of Course Outcomes towards achievement of Program																
Outcomes (1 – Low, 2 - Medium, 3 – High)																
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	
CO1	3	3	1	--	--	1	--	--	--	1	--	2	--	2	--	
CO2	3	3	2	2	--	1	--	--	--	2	--	2	--	2	--	
CO3	3	3	1	--	--	1	--	--	--	1	--	2	--	2	--	
CO4	3	3	1	--	--	1	--	--	--	1	--	2	--	2	--	
CO5	3	3	2	2	--	1	--	--	--	2	--	2	--	2	--	

COURSE CONTENT	
UNIT I	SIMPLE STRESSES AND STRAINS: Elasticity and plasticity – Types of stresses and strains – Hooke’s law – stress – strain diagram for mild steel – Working stress – Factor of safety – strain energy- gradual & sudden loads, Lateral strain, Poisson’s ratio and volumetric strain – Elastic moduli and the relationship between them – Bars of varying section – composite bars – Temperature stresses.
UNIT II	SHEAR FORCE AND BENDING MOMENT: Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, uniformly distributed load., uniformly varying loads and combination of these loads– Point of contra flexure – Relation between S.F., B.M and rate of loading at a section of a beam.
UNIT III	FLEXURAL STRESSES: Theory of simple bending – Assumptions – Derivation of bending equation: $M/I = f/y = E/R$



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	Neutral axis – Determination bending stresses. Section modulus of rectangular and circular sections (Solid and Hollow), I, T, Angle and Channel sections – Design of simple beam sections.
UNIT IV	SHEAR STRESSES: Derivation of formula – Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T angle sections, built up beams, shear centre for Channel Sections and I-Sections
UNIT V	DEFLECTION OF BEAMS: Bending into a circular arc – slope, deflection and radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay’s methods – Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, - U.D.L. Uniformly varying load.-Mohr’s theorems – Moment area method – application to simple cases including overhanging beams.

TEXT BOOKS	
1.	Mechanics of Materials- by R. C. Hibbler
2.	Strength of materials by R.K.Bansal
REFERENCE BOOKS	
1.	Fundamentals of Solid Mechanics M.L. Gambhir, PHI Learning Pvt. Ltd., New Delhi
2.	Introduction to text book of Strength of Material by U.C. Jindal, Galgotia publications.
3.	Strength of materials by S.S. Bhavakatti
WEB RESOURCES	
1.	www.nptel.ac.in/courses
2.	https://theconstructor.org/

GEODESY

Course Category	Professional Core	Course Code	19CE3T05
Course Type	Theory	L-T-P-C	3-0-0-3
Prerequisites	-----	Internal Assessment	40
		Semester End Examination	60
		Total Marks	100



**PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous R19)**

COURSE OBJECTIVES

1	To introduce the students to basic principles of surveying.
2	To demonstrate the basic surveying skills.
3	To perform various methods of linear and angles measurements.
4	To enable the students to use surveying equipments.
5	To integrate the knowledge and produce topographical map.

COURSE OUTCOMES

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

CO1	Illustrate the fundamentals in chain and plane table surveying. (K2)
CO2	Identify the angles on filed by compass survey. (K3)
CO3	Apply knowledge of leveling in surveying. (K3)
CO4	Measure the horizontal and vertical angles by using theodolite and Total Station instruments. (K3)
CO5	Estimate the volume and area of irregular boundaries of filed. (K3)

Contribution of Course Outcomes towards achievement of Program

Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	--	--	1	--	--	--	--	3	--	--	2	3	--	2
CO2	3	3	1	2	--	--	--	--	2	--	--	2	3	--	2
CO3	3	--	--	2	--	--	--	--	3	--	--		2	--	3
CO4	3	3	1	3	3	--	--	--	3	--	--	2	3	--	3
CO5	3	3	3	3	--	--	--	--	--	--	--	2	3	2	3

COURSE CONTENT

UNIT I	<p>INTRODUCTION: Definition-Uses of surveying, Objectives, Principles and Classifications of Surveying – Errors in survey measurements.</p> <p>DISTANCE MEASUREMENT CONVENTIONS AND METHODS: Use of chain and tape, Errors and corrections to linear measurements, overview of plane table surveying.</p>
UNIT II	<p>COMPASS SURVEY: Definition- Principles of Compass survey - Meridians, Azimuths and Bearings, declination. Computation of angle - Purpose and types of Traversing - traverse adjustments – Local attraction.</p> <p>CURVES: Types of curves, design and setting out.</p>
UNIT III	<p>LEVELING: Concept and Terminology, Leveling Instruments and their Temporary and permanent adjustments- method of leveling.</p> <p>CONTOURING: Characteristics and Uses of contours- methods of conducting contour surveys and their plotting.</p>
UNIT IV	<p>THEODOLITE: Theodolite, description, principles - uses – temporary and permanent adjustments, measurement of horizontal and vertical angles. Principles of Electronic Theodolite – Omitted Measurements. Introduction to geodetic surveying - Total Station and</p>



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(Autonomous R19)**

	Global Positioning System. TACHEOMETRIC SURVEYING: Stadia and tangential methods of Tachometry.
UNIT V	COMPUTATION OF AREAS AND VOLUMES: Computation of areas along irregular boundaries and regular boundaries. Embankments and cutting for a level section and two level sections with and without transverse slopes, determination of the capacity of reservoir, volume of barrow pits.

TEXT BOOKS	
1.	Basic Surveying by walter whyte & Raymond paul, phi publisher.
2.	Surveying (Vol No.1, 2 &3) by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain – Laxmi Publications (P) ltd, New Delhi.
REFERENCE BOOKS	
1.	Text book of Surveying by S.K. Duggal (Vol No. 1&2), Tata McGraw Hill Publishing Co. Ltd. New Delhi.
2.	Text book of Surveying by Arora (Vol No. 1&2), Standard Book House, Delhi.
3.	Text book of Surveying by C. Venkataramaiah, University press, India (P) limited.
WEB RESOURCES	
1.	https://lecturenotes.in/notes/2827-note-for-surveying-1-s-1-by-swadhina-priyadarsini
2.	https://nptel.ac.in/courses/105107122/1
3.	https://nptel.ac.in/courses/105107158/

STRENGTH OF MATERIALS LABORATORY

Course Category	Professional Core	Course Code	19CE3L01
Course Type	Practical	L-T-P-C	0-0-3-1.5
Prerequisites	Exposure to Engineering Mechanics	Internal Assessment Semester End Examination Total Marks	40 60 100

COURSE OBJECTIVES	
1	To determine the deflections, young's modulus in beams
2	To determine the torsion in circular shafts



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3	To determine the impact value for given specimen
4	To determine the spring constant in open and closed coiled helical springs
5	To determine compression in the given specimen

COURSE OUTCOMES

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

CO1	Develop the relationship between the stress and strain. (K3)
CO2	Find the deflections and flexural behavior of different beams. (K1)
CO3	Relate to the concept of the torsion. (K2)
CO4	Compute the impact value of the specimen. (K3)
CO5	Find the compression strength of the given specimen. (K1)

Contribution of Course Outcomes towards achievement of Program

Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	--	1	--	1	--	--	2	1	--	2	--	2	--
CO2	3	2	--	1	--	1	--	--	2	1	--	2	--	2	--
CO3	3	2	--	1	--	1	--	--	2	1	--	2	--	2	--
CO4	3	2	--	1	--	1	--	--	2	1	--	2	--	2	--
CO5	3	2	--	1	--	1	--	--	2	1	--	2	--	2	--

COURSE CONTENT

S.NO	NAME OF THE EXPERIMENT
1	Tension test on Mild Steel bar.
2	Bending test on (Steel / Wood) Cantilever beam.
3	Bending test on simple support beam
4	Torsion test
5	Hardness test
6	Spring test
7	Compression test on wood or concrete
8	Impact test
9	Shear test
10	Verification of Maxwell's Reciprocal theorem on beams.
11	Use of Electrical resistance strain gauges
12	Continuous beam – deflection test.

LIST OF MAJOR EQUIPMENT

S.NO	NAME OF THE EQUIPMENT
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1	UTM for conducting tension test on rods
2	Steel beam for flexure test
3	Wooden beam for flexure test
4	Torsion testing machine
5	Brinnell's / Rock well's hardness testing machine
6	Setup for spring tests
7	Compression testing machine
8	Izod & Charpy Impact machine
9	Shear testing machine
10	Beam setup for Maxwell's theorem verification.
11	Continuous beam setup
12	Continuous beam – deflection test.

TEXT BOOKS

1. Mechanics of Materials- by R. C. Hibbler
2. Strength of materials by R.K.Bansal
3. Strength of materials by S.S. Bhavakatti

REFERENCE BOOKS

1. Fundamentals of Solid Mechanics M.L. Gambhir, PHI Learning Pvt. Ltd., New Delhi
2. Introduction to text book of Strength of Material by U.C. Jindal, Galgotia publications.

WEB RESOURCES

1. www.nptel.ac.in/courses
2. <https://theconstructor.org/>

GEODESY LABORATORY-I

Course Category	Professional Core	Course Code	19CE3L02
Course Type	Practical	L-T-P-C	0-0-3-1.5
Prerequisites		Internal Assessment	40
		Semester End Examination	60
		Total Marks	100

COURSE OBJECTIVES

1	To accomplish the chain surveying for linear measurements.
2	To Decide the Horizontal angles by compass surveying.
3	To Draw the maps of the areas by plane table surveying.



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4	To discriminate the levels of undulated ground by auto level.
5	To implement the leveling to know the road profile.

COURSE OUTCOMES	
Upon successful completion of the course, the student will be able to:	
CO1	Compute the road widening and area by chain surveying. (K3)
CO2	Survey the given area by compass surveying. (K3)
CO3	Prepare maps for given land by plane table surveying. (K3)
CO4	Differentiate various levels for specified areas. (K2)
CO5	Design the road profile by auto level. (K3)

Contribution of Course Outcomes towards achievement of Program															
Outcomes (1 – Low, 2 - Medium, 3 – High)															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	--	--	1	--	--	--	--	3	--	--	2	3	--	2
CO2	3	3	1	2	--	--	--	--	2	--	--	2	3	--	2
CO3	3	--	--	2	--	--	--	--	3	--	--	--	2	--	3
CO4	3	3	1	3	3	--	--	--	3	--	--	2	3	--	3
CO5	3	3	3	3	--	--	--	--	--	--	--	2	3	2	3

COURSE CONTENT	
S.No	List of Experiments
1.	Survey by chain survey of road profile with offsets in case of road widening.
2.	Survey in an area by chain survey (Closed circuit).
3.	Finding the area of the given boundary using compass (Closed Traverse).
4.	Determination of distance between two inaccessible points by using compass.
5.	Plane table survey: finding the area of a given boundary by the method of Radiation.
6.	Plane table survey: finding the area of a given boundary by the method of intersection.
7.	Fly leveling: Height of the instrument method (differential leveling).
8.	Fly leveling: rise and fall method.
9.	Fly leveling: closed circuit/ open circuit.
10.	Fly leveling: Longitudinal Section and Cross sections of a given road profile.



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11.	Two Point Problem by the plane table survey.
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TEXT BOOKS	
1.	Surveying (Vol No.1, 2 &3) by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain – Laxmi Publications (P) ltd, New Delhi.
2.	Advance Surveying by Satish Gopi, R. Sathi Kumar and N. Madhu, Pearson Publications.
REFERENCE BOOKS	
1.	Text book of Surveying by S.K. Duggal (Vol No. 1&2), Tata McGraw Hill Publishing Co. Ltd. New Delhi.
2.	Text book of Surveying by Arora (Vol No. 1&2), Standard Book House, Delhi.
3.	Text book of Surveying by C. Venkataramaiah, University press, India (P) limited.
WEB RESOURCES	
1.	https://lecturenotes.in/notes/2827-note-for-surveying-1-s-1-by-swadhina-priyadarsini
2.	https://nptel.ac.in/courses/105107122/1
3.	https://nptel.ac.in/courses/105107158/

Professional Ethics and Human Values (Common to all branches) Code:19HM3T07
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Course Category	Humanities including Management	Credits	0
Course Type	Theory	Lecture-Tutorial-Practice	2 -0 -0
Prerequisites		Total Marks (Internal Assessment)	100

Course Outcomes	Blooms Taxonomy Level
On successful completion of the course, the student will be able to	



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CO 1	Understand different concepts in Professional Ethics and Human Values.	Understanding
CO 2	Apply ethical principles to resolve the problems that arise in work place.	Applying
CO 3	Make use of Engineers rights to fulfill their responsibilities.	Applying
CO 4	Understand the responsibility of an engineer in designing safety.	Understanding
CO 5	Analyze the social media accounts in order to create and maintain a positive digital footprint.	Analyzing

Contribution of Course Outcomes towards achievement of Program

Outcomes: 1 – Low, 2 - Medium, 3 – High

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	0	0	2	0	0	3	2	3	0	2	0	1
CO2	0	0	2	0	0	2	2	3	0	1	0	2
CO3	0	0	2	0	0	3	2	3	0	2	0	1
CO4	0	0	2	0	0	3	2	3	0	2	0	1
CO5	0	0	2	0	0	2	2	3	0	1	0	1

Course Content:

UNIT - I

Professional Ethics and Human values:

Ethics -History of Ethics-Types of Ethics, Professional Ethics and its forms - Morals, Values – Integrity – Civic Virtue –Respect for others – Living Peacefully – Caring – Sharing – Honesty –Courage – Value time – Co-operation – Loyalty- Collegiality-Commitment – Empathy – Self-confidence – Spirituality- Character.

UNIT - II

Engineering & Organization Ethics:

Engineering Ethics-Meaning & Purpose of Engineering Ethics- Consensus and Controversy –Work Place Ethics and Business Ethics –Ethics in HRM, Finance & Marketing – Ethical Theories-Meaning & Uses of Ethical Theories-Theories of moral Development-Kohlberg’s Theory – Gilligan’s Argument –Heinz’s Dilemma.

UNIT - III

Engineers Responsibilities and Rights:

Key Characteristics of Engineering Professionals – Professional Roles to be played by an Engineer - Ethical egoism-Collective bargaining-Confidentiality- Acceptance of Bribes/Gifts when is a Gift and a Bribe-



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examples of Gifts v/s Bribes-Whistle Blowing and its types-when should it be attempted-preventing whistle blowing.

UNIT - IV

Engineers' Responsibility for Safety and Risk:

Concept of Safety-Types of Safety, Risk-Types of Risks, Voluntary v/s Involuntary Risk- Short term v/s Long term Consequences- Expected Probability- Reversible Effects- Threshold Levels for Risk- Delayed v/s Immediate Risk- Safety and the Engineer – Designing for Safety – Risk-Benefit Analysis-Accidents.

UNIT - V

Ethical issues in Social Media:

Social Media- Various Social Media Platforms: Google, Facebook, YouTube, Instagram -Social Media set-up and Uses-Ethical use of Social media-Effects of Social Media on Public- Social Media (vs) News- Social Media Fame and Reputation-Trolling, Harassing, and Hating on Social Media-Legal Aspects of Social Media.

REFERENCES :

1. "Engineering Ethics includes Human Values" by M.Govindarajan, S.Natarajan and V.S.SenthilKumar- PHI Learning Pvt. Ltd-2009.
2. "Professional Ethics and Morals" by Prof.A.R.Aryasri, Dharanikota Suyodhana- Maruthi Publications.
3. "Professional Ethics and Human Values" by A.Alavudeen, R.Kalil Rahman and M.Jayakumaran- Laxmi Publications
4. "Professional Ethics and Human Values" by Prof.D.R.Kiran-
5. "Indian Culture, Values and Professional Ethics" by PSR Murthy-BS Publication
6. "Ethics in Engineering" by Mike W. Martin and Roland Schinzinger -Tata McGraw- Hill -2003
7. "Engineering Ethics" by Harris, Pritchard and Rabins, CENGAGE Learning, India Edition, 2009.

Web Resources:

1. <https://study.com/academy/lesson/ethical-issues-in-internet-social-media-marketing.html>
2. https://www.tutorialspoint.com/engineering_ethics/engineering_ethics_rights_of_engineers
3. <https://link.springer.com/article/10.1007/s11948-997-0039-x>



II B.Tech. –II Semester

STRENGTH OF MATERIALS – II

Course Category	Professional Core	Course Code	19CE4T06
Course Type	Theory	L-T-P-C	3-0-0-3
Prerequisites	Exposure to Engineering Mechanics & Strength of Materials– I	Internal Assessment Semester End Examination Total Marks	40 60 100

COURSE OBJECTIVES

1	To give concepts of Principal stresses and strains developed in cross section of the beams on the cross section and stresses on any inclined plane.
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2	To give concepts of torsion and governing torsion equation, and there by calculate the power transmitted by shafts and springs.
3	To classify cylinders based on their thickness and to derive equations for measurement of stresses across the cross section when subjected to external pressure
4	To classify columns and calculation of load carrying capacity and to assess stresses due to axial and lateral loads for different edge conditions
5	To calculate combined effect of direct and bending stresses on different engineering structures

COURSE OUTCOMES

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

CO1	Relate to principal stresses, strains under various loading conditions. (K2)
CO2	Understand the concept of torsion in circular shafts. (K2)
CO3	Determine hoops stress and radial stress cylinders and spherical shells. (K3)
CO4	Analyze columns and struts under different loading conditions with different end conditions. (K4)
CO5	Analyze direct and bending stresses in dams, retaining walls and chimneys. (K4)

Contribution of Course Outcomes towards achievement of Program

Outcomes (1 – Low, 2 - Medium, 3 – High)															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	1	--	1	--	--	--	1	--	2	--	2	--
CO2	3	3	2	--	--	1	--	--	--	1	--	2	--	2	--
CO3	3	3	2	1	--	1	--	--	--	1	--	2	--	2	--
CO4	3	3	2	--	--	1	--	--	--	1	--	2	--	2	--
CO5	3	3	2	1	--	1	--	--	--	1	--	2	--	2	2

COURSE CONTENT

UNIT I	PRINCIPAL STRESSES AND STRAINS AND THEORY OF FAILURES: Introduction – Stresses on an inclined section of a bar under axial loading – compound stresses – Normal and tangential stresses on an inclined plane for biaxial stresses – Two perpendicular normal stresses Accompanied by a state of simple shear – Mohr’s circle of stresses – Principal stresses and strains – Analytical and graphical solutions.
UNIT II	TORSION OF CIRCULAR SHAFTS AND SPRINGS: Theory of pure torsion – Derivation of Torsion equations: $T/J = q/r = N\phi/L$ – Assumptions made in the theory of pure torsion – Torsional moment of resistance – Polar section modulus – Power transmitted by shafts – Combined bending and torsion and end thrust – Design of shafts according to theories of failure. SPRINGS: Introduction – Types of springs – deflection of close and open coiled helical springs under axial pull and axial couple – springs in series and parallel – Carriage or leaf springs



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UNIT III	<p>CYLINDERS AND SPHERICAL SHELLS THIN CYLINDERS AND SPHERICAL SHELLS: Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and volumetric strains – changes in diameter, and volume of thin cylinders – Thin spherical shells. THICK CYLINDERS AND SPHERICAL SHELLS: Introduction Lamé’s theory for thick cylinders –Derivation of Lamé’s formulae – distribution of hoop and radial stresses across thickness – design of thick cylinders – compound cylinders – Necessary difference of radii for shrinkage – Thick spherical shells. Introduction to Unsymmetrical Bending</p>
UNIT IV	<p>COLUMNS AND STRUTS: Introduction – Types of columns – Short, medium and long columns – Axially loaded compression members – Crushing load – Euler’s theorem for long columns- assumptions- derivation of Euler’s critical load formulae for various end conditions – Equivalent length of a column – slenderness ratio – Euler’s critical stress – Limitations of Euler’s theory – Rankine – Gordon formula – Long columns subjected to eccentric loading – Secant formula – Empirical formulae – Straight line formula – Prof. Perry’s formula. Laterally loaded struts – subjected to uniformly distributed and concentrated loads – Maximum B.M. and stress due to transverse and lateral loading. Columns with Initial Curvatures</p>
UNIT V	<p>DIRECT AND BENDING STRESSES: Stresses under the combined action of direct loading and B.M. Core of a section – determination of stresses in the case of chimneys, retaining walls and dams – conditions for stability – stresses due to direct loading and B.M. about both axis.</p>

TEXT BOOKS	
1.	Mechanics of Materials- by R. C. Hibbler
2.	Strength of materials by R.K.Bansal
REFERENCE BOOKS	
1.	Fundamentals of Solid Mechanics M.L. Gambhir, PHI Learning Pvt. Ltd., New Delhi
2.	Introduction to text book of Strength of Material by U.C. Jindal, Galgotia publications.
3.	Strength of materials by S.S. Bhavakatti
WEB RESOURCES	
1.	www.nptel.ac.in/courses
2.	https://theconstructor.org/

CONCRETE TECHNOLOGY

Course Category	Professional Core	Course Code	19CE4T07
Course Type	Theory	L-T-P-C	3-0-0-3
Prerequisites	Exposure to Construction Materials	Internal Assessment	40
		Semester End Examination	60
		Total Marks	100

COURSE OBJECTIVES	
1	To understand the properties of ingredients of concrete
2	To know about the procedures in concreting and study the behavior of concrete at its fresh state



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3	To study the behavior of concrete at its hardened stage
4	To study about the concrete design mix
5	To understand special concrete and their use

COURSE OUTCOMES

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

CO1	Know the basic concept of concrete and its ingredients. (K1)
CO2	Perceive the importance of quality of concrete.(K2)
CO3	Know the properties of hardened concrete. (K1)
CO4	Design the concrete mix by BIS method. (K4)
CO5	Understand the Basic concept of special concrete and their production. (K2)

Contribution of Course Outcomes towards achievement of Program

Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO1	3	1	--	2	--	1	1	--	--	--	--	2	3	3	3
CO2	3	1	--	3	--	1	1	--	--	--	--	2	2	2	3
CO3	3	1	1	3	--	1	1	--	--	--	--	2	2	3	2
CO4	3	1	3	3	--	1	1	--	--	--	--	2	3	2	3
CO5	3	--	1	3	--	1	1	--	--	--	--	2	3	2	2

COURSE CONTENT

UNIT I	INGREDIENTS OF CONCRETE
	<p>CEMENTS & ADMIXTURES: Types of Cement – Grades of Cement - Chemical composition - Tests of Cement– Hydration - Structure of hydrated cement – Mineral and Chemical Admixtures – accelerators, retarders, air-entrainers, plasticizers, super plasticizers, fly ash and silica fume.</p> <p>AGGREGATES: Classification of aggregate – Particle shape & texture – Mechanical properties of aggregates – Tests of Aggregates - Alkali aggregate reaction – Thermal properties – Grading curves – Grading of fine & coarse Aggregates – Gap graded and</p>



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	well graded aggregate as per relevant IS code – Quality of mixing water.
UNIT II	FRESH CONCRETE: Manufacture of Concrete – Properties of fresh concrete - Workability –Factors affecting workability – Measurement of workability by different tests, Effect of time and temperature on workability Segregation & bleeding
UNIT III	HARDENED CONCRETE: Water / Cement ratio – Abram’s Law – Gel space ratio – Nature of strength of concrete –Maturity concept – Factors affecting strength - Relation between compressive & tensile strength – Testing of Hardened Concrete – Types of Non-destructive testing. ELASTICITY, CREEP & SHRINKAGE – Modulus of elasticity –Dynamic modulus of elasticity – Poisson’s ratio – Creep of concrete – Factors influencing creep – Shrinkage – types of shrinkage.
UNIT IV	MIX DESIGN: Factors in the choice of mix proportions – Durability of concrete – Quality Control of concrete – Statistical methods – Concepts Proportioning of concrete mixes by various methods – BIS method of mix design.
UNIT V	SPECIAL CONCRETES: Ready mixed concrete, Shotcrete -Light weight aggregate concrete – Cellular concrete – No-fines concrete, High density concrete, Fibre reinforced concrete – Factors affecting properties of F.R.C - Polymer concrete – Properties of polymer concrete, High performance concrete – Self Compaction Concrete - SIFCON - self healing concrete.

TEXT BOOKS

1. Properties of Concrete by A. M. Neville – PEARSON – 4th edition.
2. Concrete Technology by M. L. Gambhir. – Tata Mc. Graw Hill Publishers, New Delhi.
3. Concrete Technology by A.M.Neville.-Pearson Publishers

REFERENCE BOOKS

1. Concrete Technology by A.R. Santha Kumar, Oxford University Press, New Delhi
2. Concrete Technology by M. S. Shetty. – S. Chand & Co.; 2004.

WEB RESOURCES

1. <http://freevideolectures.com/Course/3357/Concrete-Technology>
2. <https://nptel.ac.in/courses/105102012/>

ENGINEERING GEOLOGY

Course Category	Professional Core	Course Code	19CE4T08
Course Type	Theory	L-T-P-C	3-0-0-3
Prerequisites	-----	Internal Assessment	40
		Semester End Examination	60
		Total Marks	100

COURSE OBJECTIVES

1	To introduce the Engineering Geology as a subject in Civil Engineering.
2	To identify and know the varieties of minerals and rocks and their importance.



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3	To know the variance of Geological structures below the earth.
4	To identify the seismic hazards posed at any given site.
5	To know the different Civil Engineering structures and their construction.

COURSE OUTCOMES

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

CO1	Introduce the subject and give a brief explanation to Civil Engineering importance of weathering. (K2)
CO2	Observe and Identify the properties of rocks and minerals and to impart a brief importance in the point of identification. (K2)
CO3	Know a brief knowledge About Recognize of various structures of rock and to identify the differences between the geology and geophysics. (K1)
CO4	Classify and measure the earthquake prone areas to practice the hazard Zone. (K4)
CO5	Locate a suitable site for the construction of Civil engineering structures. (K3)

Contribution of Course Outcomes towards achievement of Program

Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	2	2	2	3	--	--	2	2	--	--	--	--
CO2	2	1	1	3	2	2	1	--	--	2	3	--	--	--	--
CO3	1	1	1	2	3	3	2	--	--	2	3	--	--	--	--
CO4	3	1	1	3	2	3	2	--	--	2	3	--	--	--	--
CO5	1	1	1	2	3	3	2	--	--	2	3	--	--	--	--

COURSE CONTENT

UNIT I	<p>Introduction: Branches of Geology, Importance of Geology in Civil Engineering with case studies.</p> <p>Weathering: Weathering of rocks, Geological agents, weathering process of Rock, Factors affecting weathering types of weathering agents River process and their development. Landforms: produced by rivers. Erosion and Denudation</p>
UNIT II	<p>Mineralogy And Petrology: Definitions of mineral and rock, Different methods of study on minerals and rocks, The study of physical properties of minerals and rocks for Macroscopic study for the Common rock forming minerals and other ore forming minerals. Classification structures, textures and forms of Igneous rocks Sedimentary</p>



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	rocks, Metamorphic rocks and their study.
UNIT III	Structural Geology: a)Strike , Dip and Outcrop study of common geological structures associating with the rocks such as Folds, Faults, Joints and Unconformities- parts types, Mechanism and their importance in Civil Engineering structural Geology Strength Comparisons of Igneous Sedimentary and metamorphic rock structures.
UNIT IV	Ground Water: Water table Cone of depression Geological controls of Ground Water Movement, Ground Water Exploration Techniques. Types of Aquifers- porosity and permeability and water bearing properties of rocks. Earthquakes And Landslides: Terminology, Classification, causes and effects, Shield areas and Seismic belts Richter scale intensity Precautions of building constructions in seismic areas. Seismic Zones in India Classification of Landslides Causes and Effects measures to be taken prevent their occurrence at Landslides.
UNIT V	Dams: Types and purpose of Dams, Geological considerations in the selection of a Dam, Remedial measures to be taken to select the dam site. Reservoirs: Factors responsible in the selection of Reservoir site, Life of Reservoirs. Tunnels: Purpose of Tunneling, Effects, Lining of Tunnels. Influence of Geology for successful Tunneling.

TEXT BOOKS

1. 'Engineering Geology' by Subinoy Gangopadhyay, Oxford University press.
2. 'Engineering Geology' by N. Chenna Kesavulu, Trinity Press (Laxmi Publications), 2nd Edition, 2014.

REFERENCE BOOKS

1. 'Engineering Geology for Civil Engineers' by P.C. Varghese, PHI learning pvt. Ltd.
2. 'Geology for Engineers and Environmental Society' by Alan E Kehew, person publications, 3rd edition.

WEB RESOURCES

1. <https://nptel.ac.in/courses/105105106/1>

HYDRAULICS & HYDRAULIC MACHINERY

Course Category	Professional Core	Course Code	19CE4T09
Course Type	Theory	L-T-P-C	3-0-0-3
Prerequisites	Exposure to Fluid mechanics	Internal Assessment Semester End Examination Total Marks	40 60 100

COURSE OBJECTIVES

1	To get exposure about the applications of Hydraulic Engineering in the field by means of studying the various channels.
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2	To learn applications of dimensional analysis
3	To study the effect of impact of jet of water on vanes.
4	To study the suitability of usage of turbines
5	To learn about usage of various pumps

COURSE OUTCOMES

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

CO1	To study theories those explain the behavior and performance of fluid when the fluid is flowing in an Uniform open channel and non-uniform channels. (K1)
CO2	Student will attain the knowledge on hydraulic similitude of fluids. (K2)
CO3	Student will get acquainted with the concept of impact of jets. (K2)
CO4	To understand the components, function and use of different types of turbines. (K2)
CO5	To understand the components, function and use of different types of pumps. (K2)

Contribution of Course Outcomes towards achievement of Program

Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	1	--	--	--	--	--	--	--	--	2	--	--	2
CO2	3	2	2	1	--	--	--	--	--	--	--	2	--	--	2
CO3	2	3	2	1	1	--	--	--	--	--	--	2	--	--	1
CO4	2	2	2	1	-	1	1	1	--	--	--	2	--	--	1
CO5	2	2	2	3	1	1	1	--	--	--	--	2	--	--	1

COURSE CONTENT

UNIT I	OPEN CHANNEL FLOW: Types of flows - Type of channels – Velocity distribution – Energy and momentum correction factors – Chezy's, Manning's; Kutter's Equations; and Bazin formulae for uniform flow – Most Economical sections. Critical flow: Specific energy-critical depth – computation of critical depth –critical sub-critical and super critical flow .
UNIT II	HYDRAULIC SIMILITUDE: Dimensional analysis-Rayleigh's method and Buckingham's pi theorem-study of Hydraulic models – Geometric, kinematic and dynamic similarities-dimensionless numbers – model and prototype relations
UNIT III	BASICS OF TURBO MACHINERY: Hydrodynamic force of jets on stationary and moving flat inclined and curved vanes, jet striking centrally and at tip, velocity triangles at inlet and outlet, expressions for work done and efficiency-Angular momentum principle. HYDRO ELECTRIC POWER PLANT : Layout of a typical Hydropower installation – Heads and efficiencies - classification of turbines
UNIT IV	HYDRAULIC TURBINES : Pelton wheel - Francis turbine – Kaplan turbine - working, working proportions, velocity diagram, work done and efficiency Draft tube-theory & function efficiency, Governing of turbines-surge tanks-unit and specific turbines-unit speed-unit quantity-unit power-specific speed performance characteristics-geometric similarity-cavitation



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UNIT V

CENTRIFUGAL PUMPS: Pump installation details-classification-work done- Manometric head-minimum starting speed-losses and efficiencies, specific speed, multistage pumps-pumps in parallel- performance of pumps Similarity Considerations. Characteristic curves - NPSH- Cavitations.

RECIPROCATING PUMPS: Introduction, classification of reciprocating pumps, main components of reciprocating pumps, working of a reciprocating pumps, discharge through pumps, indicator diagram, work done by reciprocating pumps, slip of reciprocating pumps

TEXT BOOKS

1. Fluid Mechanics, Thermodynamics of Turbomachinery by S.L. Dixon
2. Hydraulics & Fluid Mechanics by P. N. Modi & S. N. Seth; Standard Book house, New Delhi

REFERENCE BOOKS

1. Hydraulic Machines by Jagadhishlal; Metropolitan Company, Delhi.
2. Fluid Mechanics & Hydraulic Machines by Dr. R. K. Bansal; Laxmi Publications, New Delhi.
3. Fluid Mechanics by A. K. Jain; Khanna Publishers, Delhi

WEB RESOURCES

1. www.nptel.ac.in/courses
2. <https://theconstructor.org/>

HIGHWAY ENGINEERING

Course Category	Professional Core	Course Code	19CE4T10
Course Type	Theory	L-T-P-C	3-0-0-3
Prerequisites	Exposure to Construction Materials	Internal Assessment	40
		Semester End Examination	60
		Total Marks	100

COURSE OBJECTIVES

1. To introduce the students with the principles and practice of transportation engineering which focuses on Highway Engineering.
2. To provide basic knowledge on materials used in pavement construction.



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3	Ability to mathematically develop and interpret design standards for horizontal and vertical geometry and superelevation
4	To enable the students to have a strong analytical and practical knowledge of Planning, Designing of Pavements.
5	To provide basic knowledge in traffic engineering, and transportation planning.

COURSE OUTCOMES	
Upon successful completion of the course, the student will be able to:	
CO1	Plan highway network for a given area. (K3)
CO2	Characterize the pavement materials like aggregates, Bituminous materials & construction. (K2)
CO3	Design the Highway geometrics based on highway alignment. (K3)
CO4	Judge suitability of pavement materials and design flexible and rigid pavements. (K2)
CO5	Design Intersections and prepare traffic management plans. (K4)

Contribution of Course Outcomes towards achievement of Program															
Outcomes (1 – Low, 2 - Medium, 3 – High)															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CO2	1	--	1		--	--	--	--	--	--	--	--	--	--	--
CO3	1	3	2	1	--	--	--	--	--	--	--	--	--	--	--
CO4	1	2	2	1	--	--	--	--	--	--	--	--	--	--	--
CO5	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--

COURSE CONTENT	
UNIT I	Highway Planning and Alignment: Highway development in India; Classification of Roads; Road Network Patterns; Necessity for Highway Planning; Different Road Development Plans – First, second, third road development plans, road development vision 2021, Rural Road Development Plan – Vision 2025; Planning Surveys; Highway Alignment- Factors affecting Alignment- Engineering Surveys – Drawings and Reports.
UNIT II	Highway Materials: Sub-grade soil: classification –Group Index – Subgrade soil strength – California Bearing Ratio – Modulus of Subgrade Reaction. Stone aggregates: Desirable properties – Tests for Road Aggregates – Bituminous Materials: Types – Desirable properties -Tests on Bitumen
UNIT III	Highway Geometric Design: Importance of Geometric Design- Design controls and Criteria- Highway Cross Section Elements- Sight Distance Elements- Stopping sight Distance,



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	Overtaking Sight Distance and Intermediate Sight Distance- Design of Horizontal Alignment- Design of Super elevation and Extra widening- Design of Transition Curves-Design of Vertical alignment-Gradients- Vertical curves.
UNIT IV	<p>Design of Pavements: Types of pavements; Functions and requirements of different components of pavements; Design Factors</p> <p>Flexible Pavements: Design factors – Flexible Pavement Design Methods – CBR method – IRC method – Burmister method – Mechanistic method – IRC Method for Low volume Flexible pavements.</p> <p>Rigid Pavements: Design Considerations – wheel load stresses – Temperature stresses – Frictional stresses – Combination of stresses – Design of slabs – Design of Joints – IRC method – Rigid pavements for low volume roads – Continuously Reinforced Cement Concrete Pavements – Roller Compacted Concrete Pavements.</p>
UNIT V	<p>Traffic Engineering: Basic Parameters of Traffic-Volume, Speed and Density- Traffic Volume Studies; Speed studies –spot speed and speed & delay studies; Parking Studies; Road Accidents-Causes and Preventive measures - Condition Diagram and Collision Diagrams; PCU Factors, Capacity of Highways – Factors Affecting; LOS Concepts; Road Traffic Signs; Road markings; Types of Intersections; At-Grade Intersections – Design of Plain, Flared, Rotary and Channelized Intersections; Design of Traffic Signals –Webster Method –IRC method.</p>

TEXT BOOKS

1. Highway Engineering’ by Paul H. Wright and Karen K Dixon, Wiley Student Edition, Wiley India (P) Ltd., New Delhi.
2. Highway Engineering’ by Khanna S.K., Justo C.E.G and Veeraragavan A, Nem Chand Bros, Roorkee.

REFERENCE BOOK

1. Transportation Engineering and Planning’ by Papacostas C.S. and PD Prevedouros, Prentice Hall of India Pvt. Ltd; New Delhi.
2. ‘Highway Engineering’ by Srinivasa Kumar R, Universities Press, Hyderabad

WEB REFERENCES

1. <https://nptel.ac.in/downloads/105101087/>

STRUCTURAL ANALYSIS-I

Course Category	Professional Core	Course Code	19CE4T11
Course Type	Theory	L-T-P-C	3-0-0-3
Prerequisites	Exposure to Engineering Mechanics & Strength of Materials-I	Internal Assessment Semester End Examination Total Marks	40 60 100

COURSE OBJECTIVES

1	To give preliminary concepts of assessments of bending moment and shear force in propped cantilevers.
2	To impart concepts of shear force and bending moment for Fixed Beams.



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3	To give preliminary concepts of assessments of bending moment and shear force in Continuous beams
4	The procedure for development of slope deflection equations for continuous beams with and without support settlement.
5	To impart basic knowledge on strain energy in the application of beams and frames.

COURSE OUTCOMES

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

CO1	Analyze the bending moment and shear force for propped cantilever beam at different loading and boundary conditions. (K4)
CO2	Determine the bending moment, shear force and deflection for Fixed beams with different loading and boundary conditions. (K4)
CO3	Analyze the continuous beams by using Clapeyron's theorem at different support conditions. (K4)
CO4	Analyze the continuous beams by using Slope Deflection Method. (K4)
CO5	Determinate the deflections by applying the energy theorems. (K4)

Contribution of Course Outcomes towards achievement of Program

Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	2	-	1	-	-	2	-	-	2	1	3	1
CO2	3	2	2	2	-	1	-	-	2	-	-	2	1	3	1
CO3	3	2	2	2	-	1	-	-	2	-	-	2	1	3	1
CO4	3	3	2	2	-	2	-	-	3	-	-	2	2	3	1
CO5	3	3	3	2	-	2	-	-	3	-	-	2	2	3	1

COURSE CONTENT

UNIT I	PROPPED CANTILEVERS: Analysis of propped cantilevers-shear force and bending moment diagrams-Deflection of propped cantilevers.
UNIT II	FIXED BEAMS: Introduction to statically indeterminate beams with udl, central point load, eccentric point load, Number of point loads, uniformly varying load, couple and combination of loads shear force and bending moment diagrams-Deflection of fixed beams effect of sinking of support, effect of rotation of a support.
UNIT III	CONTINUOUS BEAMS: Introduction-Clapeyron's theorem of three moments- Analysis of continuous beams with constant moment of inertia with one or both ends fixed. Continuous beams with overhang, continuous beams with different moment of inertia for different spans-Effects of sinking of supports-shear force and Bending moment diagrams.



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UNIT IV	SLOPE-DEFLECTION METHOD: Introduction, derivation of slope-deflection equation, application to continuous beams with and without settlement of supports.
UNIT V	ENERGY THEOREMS: Introduction to Strain energy, Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear forces - Castiglianos first theorem - Deflections of simple beams and pin jointed trusses.

TEXT BOOKS

1. Structural Analysis by V.D. Prasad Galgotia publications, 2nd Editions.
2. Analysis of Structures by T.S. Thandavamoorthy, Oxford University Press, New Delhi.

REFERENCE BOOKS

1. Theory of Structures by Gupta, Pandit & Gupta; Tata McGraw Hill, New Delhi.
2. Theory of Structures by R.S. Khurmi, S. Chand Publishers.
3. C. S. Reddy, Basic Structural Analysis, Tata McGraw Hill

WEB RESOURCES

1. <https://nptel.ac.in/courses/105105166/>
2. <https://cosmolearning.org/courses/structural-analysis-video-lessons/video-lectures/>
3. <http://www.nptelvideos.in/2012/11/structural-analysis-ii.html>

FLUID MECHANICS & HYDRAULIC MACHINERY LAB

Course Category	Professional Core	Course Code	19CE4L03
Course Type	Laboratory	L-T-P-C	0-0-3-1.5
Prerequisites	-----	Internal Assessment	40
		Semester End Examination	60
		Total Marks	100

COURSE OBJECTIVES

1	To know the knowledge of various flow meters and the concept of fluid mechanics. Students will compare the performance of various machines at different operating points.
2	To understand the flow through different channels in Practical conditions
3	Useful to learn the Bernoulli's Equation Practical Applications.
4	Can understand the different hydraulic turbines in power plants.



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5	This lab helps to gain knowledge on working of centrifugal pumps, positive displacement pumps.
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COURSE OUTCOMES	
Upon successful completion of the course, the student will be able to:	
CO1	Perform experiments to determine the coefficient of discharge of flow measuring devices. (K2)
CO2	Analyze the flow through rectangular and v-notch and pipe flow losses. (K4)
CO3	Verify the Bernoulli's theorem and knowledge on impact of jets. (K2)
CO4	Conduct experiments on hydraulic turbines and pumps to draw characteristics. (K2)
CO5	Examine the centrifugal and reciprocating pumps. (K2)

Contribution of Course Outcomes towards achievement of Program															
Outcomes (1 – Low, 2 - Medium, 3 – High)															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	--	--	1	--	--	--	--	--	--	1	3	1
CO2	3	2	2	--	--	1	--	--	--	--	--	--	1	3	1
CO3	3	2	2	--	--	1	--	--	--	--	--	--	1	3	1
CO4	3	2	2	--	--	1	--	--	--	--	--	--	1	3	1
CO5	3	2	2	--	--	1	--	--	--	--	--	--	1	3	1

S No	List of Experiments
1	Calibration of Venturimeter & Orifice meter
2	Determination of Coefficient of discharge for a small orifice by a constant head method.
3	Determination of Coefficient of discharge for an external mouth piece by variable head method.
4	Calibration of contracted Rectangular Notch and /or Triangular Notch
5	Determination of Coefficient of loss of head in a sudden contraction and friction factor.
6	Verification of Bernoulli's equation.
7	Impact of jet on vanes
8	Study of Hydraulic jump.
9	Performance test on Pelton wheel turbine
10	Performance test on Francis turbine.
11	Efficiency test on centrifugal pump.



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12	Efficiency test on reciprocating pump.
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S No	List of Equipments.
1	Venturimeter setup.
2	Orifice meter setup.
3	Small orifice setup.
4	External mouthpiece setup.
5	Rectangular and Triangular notch setups
6	Friction factor test setup.
7	Bernoulli's theorem setup
8	Impact of jets.
9	Hydraulic jump test setup
10	Pelton wheel and Francis turbines.
11	Centrifugal and Reciprocating pumps

TEXT BOOKS

1.	Fluid Mechanics and Hydraulic Machines by R. K. Bansal; Laxmi Publications; New Delhi.
2.	Hydraulics & Fluid Mechanics by P. N. Modi & S. N. Seth; Standard Book house, New Delhi

REFERENCE BOOKS

1.	Rajput R.K., Fluid Mechanics and Hydraulic Machines, S.Chand and Company Ltd., 2005.
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WEB RESOURCES

1.	http://www.nptelvideos.in/2012/11/fluid-mechanics.html
2.	https://nptel.ac.in/courses/105101001/

Engineering Geology Laboratory

Course Category	Professional Core	Course Code	19CE4L04
Course Type	Laboratory	L-T-P-C	0-0-3-1.5
Prerequisites	----	Internal Assessment	40
		Semester End Examination	60
		Total Marks	100

COURSE OBJECTIVES

1	Sedimentary processes (Weathering, erosion, deposition), Metamorphism and volcanic eruptions.
2	Identification of the minerals types of clay minerals their properties and effects on engineering project
3	Types of rock (Igneous, Sedimentary, and Metamorphic), Civil engineering importance of



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	rock forming minerals
4	Geological structures (Joint, veins, crack, faults, and fold), reasons of formation for each type and their side effects on the engineering projects
5	Origin, Internal and surface structures of the earth

COURSE OUTCOMES

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

CO1	Identify the minerals and their properties.[K3]
CO2	Recognize the rocks and their properties.[K3]
CO3	Determine the behavior of the bedding planes in terms of solving strike and dip.[K5]
CO4	Draw sections for geological maps showing tilted beds and faults.[K6]
CO5	Identify the morphological and geological characteristics on maps.[K3]

Contribution of Course Outcomes towards achievement of Program

Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	--	--	1	--	--	--	--	3	--	--	2	3	--	2
CO2	3	3	1	2	--	--	--	--	2	--	--	2	3	--	2
CO3	3	--	--	2	--	--	--	--	3	--	--	--	2	--	3
CO4	3	3	1	3	3	--	--	--	3	--	--	2	3	--	3
CO5	3	3	3	3	--	--	--	--	--	--	--	2	3	2	3

COURSE CONTENT

S.No	List of Experiments
1.	Physical properties of minerals: Mega-scopic identification of
2.	Rock forming minerals – Quartz group, Feldspar group, Garnet group, Mica group & Talc, Chlorite, Olivine, Kyanite, Asbestos, Tourmelene, Calcite, Gypsum, etc...
3.	Ore forming minerals – Magnetite, Hematite, Pyrite, Pyralusite, Graphite, Chromite.
4.	Megascopic description and identification of rocks.
5.	Igneous rocks – Types of Granite, Pegmatite, Gabbro, Dolerite, Syenite, Granite Poryphery, Basalt, etc
6.	Sedimentary rocks – Sand stone, Ferruginous sand stone, Lime stone, Shale, Laterite, Conglamorate, etc.
7.	Metamorphic rocks – Biotite – Granite Gneiss, Slate, Muscovite & Biotiteschist, Marble, Khondalite, etc
8.	Interpretation and drawing of sections for geological maps showing tilted beds, faults,



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	unconformities etc
9.	Simple Structural Geology problems.
10.	Bore hole data
11.	Strength of the rock using laboratory tests.
12.	Field work – To identify Minerals, Rocks, Geomorphology & Structural Geology.

TEXT BOOKS

1. Engineering Geology' by SubinoyGangopadhyay, Oxford University press
2. Engineering Geology' by N. ChennaKesavulu, Trinity Press (Laxmi Publications), 2nd Edition, 2014.

REFERENCE BOOKS

1. Engineering Geology for Civil Engineers' by P.C. Varghese, PHI learning pvt. Ltd.
2. Fundamentals of Engineering Geology' by P.G. Bell, B.S.P. Publications, 2012.

WEB RESOURCES

1. <https://nptel.ac.in/courses/105105106/>

Essence of Indian Traditional Knowledge

(Common to all branches) Code:19HM4T06

Course Category	Humanities including Management	Credits	0
Course Type	Theory	Lecture-Tutorial-Practice	2 -0 -0
Prerequisites		Total Marks (Internal Assessment)	100

Course Outcomes

Course Outcomes		Blooms Taxonomy Level
On successful completion of the course, the student will be able to		
CO 1	Understand the significance of Indian Traditional Knowledge.	Understanding
CO 2	Classify the Indian Traditional Knowledge	Analysis



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CO 3	Compare Modern Science with Indian Traditional Knowledge system.	Evaluating
CO 4	Analyze the role of Government in protecting the Traditional Knowledge	Analysis
CO 5	Understand the impact of Philosophical tradition on Indian Knowledge System.	Understanding

Contribution of Course Outcomes towards achievement of Program												
Outcomes: 1 – Low, 2 - Medium, 3 – High												
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	0	1	2	0	0	3	0	1	0	2	0	0
CO2	0	0	2	0	0	2	0	2	0	0	0	0
CO3	0	0	2	0	0	3	0	1	1	2	2	1
CO4	0	0	2	0	0	2	0	2	0	0	0	0
CO5	0	0	1	0	0	3	0	1	0	3	0	1

Course Content :

Unit I

Introduction to Traditional Knowledge: Define Traditional Knowledge- Nature and Characteristics- Scope and Importance- kinds of Traditional Knowledge- The historical impact of social change on Traditional Knowledge Systems- Value of Traditional knowledge in global economy.

Unit II

Basic structure of Indian Knowledge System: Astadash Vidya- 4 Ved - 4 Upaved (Ayurved,Dhanurved,GandharvaVed&SthapthyaAdi),6vedanga(Shisha,Kalppa,Nirukha,Vyakaran,Jyot hisha&Chand),4upanga(Dharmashastra,Meemamsa,purana&Tharka Shastra).

Unit III

Modern Science and Indian Knowledge System-Indigenous Knowledge, Characteristics- Yoga and Holistic Health care-cases studies.

Unit IV

Protection of Traditional Knowledge: The need for protecting traditional knowledge -Significance of Traditional knowledge Protection-Role of government to harness Traditional Knowledge.

Unit V



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Impact of Traditions: Philosophical Tradition (Sarvadarshan) Nyaya, Vyshepec, Sankhya, Yog, Meemamsa, Vedantha, Chavanka, Jain & Boudh - Indian Artistic Tradition - Chitra kala, Moorthi kala, Vasthu kala , Sthapthya, Sangeetha, Nruthya Yevam Sahithya

Reference Books :

1. Traditional Knowledge System in India, by Amit Jha, 2009.
2. Traditional Knowledge System and Technology in India by Basanta Kumar Mohanta and Vipin Kumar Singh, Pratibha Prakashan 2012.
3. Sivaramakrishnan (Ed.), Cultural Heritage of India-course material, Bharatiya Vidya
4. Swami Jitatmanand, Holistic Science and Vedant, Bharatiya Vidya Bhavan
5. Yoga Sutra of Patanjali, Ramakrishna Mission, Kolkata.
6. Pramod Chandra, India Arts, Howard Univ. Press, 1983.
7. Krishna Chaitanya, Arts of India, Abhinav Publications, 1987.

Web Resources:

1. https://www.wipo.int/wipo_magazine/en/2017/01/article_0004.html
2. <http://iks.iitgn.ac.in/wp-content/uploads/2016/01/Indian-Knowledge-Systems-Kapil-Kapoor.pdf>
3. https://www.wipo.int/edocs/mdocs/tk/en/wipo_grtkf_ic_21/wipo_grtkf_ic_21_ref_facilitators_text.pdf