DEPARTMENT OF CIVIL ENGINEERING
SCHEME OF COURSE WORK

Course Details:

Course Title	**ENGINEERING PHYSICS**
Course Code	**20BP1103**
L T P C	**3 0 0 3**
Program	**B.Tech.**
Specialization	**CIVIL ENGINEERING**
Semester	**II**
Prerequisites	**Basics of Physics up to +2 level.**
Courses to which it is a Prerequisite	-

COURSE OUTCOMES (COs):

After completion of this course the student would be able to

CO	Course Outcomes	Learning Outcomes
1	Apply laws of mechanics to solve engineering problems	L3
2	Apply the principles of acoustics for noise reduction	L3
3	Develop the relationship between elastic constants	L3
4	Classify various modes of heat transfer and find thermal conductivity of a material	L4
5	Identify the sensors for various engineering applications and explain the preparation and uses of nanomaterials	L3

PROGRAMME OUTCOMES

1. Graduates will be able to apply the knowledge of mathematics, science, engineering fundamentals to solve complex civil engineering problems.
2. Graduates will attain the capability to identify, formulate and analyse problems related to civil engineering and substantiate the conclusions
3. Graduates will be in a position to design solutions for civil engineering problems and design system components and processes that meet the specified needs with appropriate consideration to public health and safety.
4. Graduates will be able to perform analysis and interpretation of data by using research methods such as design of experiments to synthesize the information and to provide valid conclusions.
5. Graduates will be able to select and apply appropriate techniques from the available resources and modern civil engineering and software tools, and will be able to predict and

model complex engineering activities with an understanding of the practical limitations.

6. Graduates will be able to carry out their professional practice in civil engineering by appropriately considering and weighing the issues related to society and culture and the consequent responsibilities.
7. Graduates will be able to understand the impact of the professional engineering solutions on environmental safety and legal issues.
8. Graduates will transform into responsible citizens by resorting to professional ethics and norms of the engineering practice.
9. Graduates will be able to function effectively in individual capacity as well as a member in diverse teams and in multidisciplinary streams.
10. Graduates will be able to communicate fluently on complex engineering activities with the engineering community and society, and will be able to prepare reports and make presentations effectively.
11. Graduates will be able to demonstrate knowledge and understanding of the engineering and management principles and apply the same while managing projects in multidisciplinary environments.
12. Graduates will engage themselves in independent and life-long learning in the broadest context of technological change while continuing professional practice in their specialized areas of civil engineering.

PROGRAMME SPECIFIC OUTCOMES(PSOs):

1. Collect, process and analyse the data from topographic surveys, remote sensing, hydrogeological investigations, geotechnical explorations, and integrate the data for planning of civil engineering infrastructure.

2. Analyse and design of substructures and superstructure for buildings, bridges, irrigation structures and pavements.

3. Estimate, cost evaluation, execution and management of civil engineering projects.

Course Outcome Vs Program Outcomes:

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

Course Outcome Vs Programme Specific Outcomes:

CO	PSO1	PSO2	PSO3
CO1	-	-	-
CO2	-	-	-
CO3	-	-	-
CO4	-	-	-
CO5	-	-	-

Mapping Levels:
1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), put -: No Correlation

Assessment Methods:	Assignment / Quiz / Seminar / Case Study / Mid-Test / End Exam

Teaching-Learning and Evaluation:

Week	Topic / CONTENTS	Course Outcomes	Sample questions	Teaching-Learning Strategy	Assessment Method & Schedule
1	Basic laws of vectors and scalars, Conservative forces- F=-gradV, Torque and angular momentum	**CO1**	1) State laws of vector addition and multiplication. 2) Define conservative force. 3) Recall Torque and angular momentum	Lecture / Discussion & Problem solving	Assignment I (Week 6 - 7) / Quiz-I (Week -7)/ Cycle-Test I (Week 8)
2	Newton's laws in inertial and linear accelerating non-inertial frames of reference, rotating frame of reference with constant angular velocity-concept of pseudo forces	**CO1**	1) Recall Newton's laws of motion. 2) What are inertial and non-inertial frames of reference? 3) What are pseudo forces?	Lecture / Discussion & Problem solving	Assignment I (Week 6 - 7) / Quiz-I (Week -7)/ Cycle-Test I (Week 8)
3	Qualitative explanation of Focault's pendulum-rigid body-angular velocity vector-moment of inertia tensor, gravitation and Kepler's laws	**CO1**	1) What does a Focault's pendulum experiment explain? 2) What is a moment of inertia tensor? 3) Define Kepler's laws.	Lecture / Discussion & Problem solving	Assignment I (Week 6 - 7) / Quiz-I (Week -7)/ Cycle-Test I (Week 8)
4	Classification of sound, Weber-Fechner law, Decibel, Reverberation and reverberation time. Derivation using growth and decay.	**CO2**	1) Define Weber-Fechner law. 2) What is decibel. 3) Define reverberation and reverberation time. 4) Derive Sabines formula.	Lecture / Discussion & Problem solving/PPT	Assignment I (Week 6 - 7) / Quiz-I (Week -7)/ Cycle-Test I (Week 8)
5	Absorption coefficient-definition and determination, factors affecting acoustics and their remedies, introduction of ultrasonics.	**CO2**	1) Define and determine absorption coefficient of a material. 2) Write some factors affecting acoustics and their remedies.	Lecture / Discussion & Problem solving/PPT	Assignment I (Week 6 - 7) / Quiz-I (Week -7)/ Cycle-Test I (Week 8)
6	Production of ultrasonics by magnetostriction and piezoelectric	**CO2**	1) Explain the phenomenon of magnetostriction. How will	Lecture / Discussion	Assignment I (Week 6 - 7)

	method, Acousic grating, Non-destuctive testing, sonogram		you produce high frequency sound waves with its help? 2) Explain piezo electric method of production of ultrasonics. 3) What is acoustic grating. 4) Write some applications of ultrasonics.	& Problem solving/PPT	/ Quiz-I (Week -7)/ Cycle-Test I (Week 8)
7	Stress, Strain, Hooke's Law, Stress-Strain diagram, Generalized Hooke's law, different types of moduli and their relations,	**CO3**	1. Explain behavior of a wire under increasing load using stress strain diagram 2. Obtain the expression for generalized Hooke's law. 3. Obtain the relation between various elastic constants.	Lecture / Discussion & Problem solving/PPT	Assignment I (Week 6 - 7) / Quiz-I (Week -7)/ Cycle-Test I (Week 8)
8	Bending of beams, Bending Moment of a Beam; Depression of cantilever, Young's modulus by uniform bending.	**CO3**	1) Derive the expression for bending moment of a beam. 2) Derive the expression for depression in a cantilever. 3) Derive the expression for Young's modulus by uniform bending.	Lecture / Discussion & Problem solving/PPT	Cycle-Test I (Week 8)
9	Transfer of heat- - Thermal conduction, convection and radiation and their Fundamental Laws (Newton's Law of Cooling, Stefan's-Boltzmann law and Wien's law)-Thermal expansion of solids and liquids	**CO4**	1) Define co-efficient of thermal conductivity and give it's unit. 2) Explain different modes of heat transfer. 3) Derive Newton's law of cooling from Stefan's Law	Lecture / Discussion & Problem solving/PPT	Assignment II (Week-14-15) Quiz -II (Week -15) Cycle-Test II (Week 16) /
10	Heat Conduction in solids- Thermal Conductivity- Lee's method (bad conductor)-Heat conduction through compound media	**CO4**	1) Discuss the principle of lee's disc method. 2) Discuss the heat flow through a compound wall. 3) Explain the determination of thermal conductivity of poor conductor by Lee's disc method.	Lecture / Discussion & Problem solving	Assignment II (Week-14-15) Quiz -II (Week -15) Cycle-Test II (Week 16) /
11	Doubt clarification and Numerical solving. Sensors:(qualitative description only): Classification of sensors, Strain and Pressure sensors, Piezoelectric, magnetostrictive sensors,	**CO5**	1) What is a sensor? 2) List out the types of sensor? 3) Describe the working of Strain and Pressure sensors? 4) What is	Lecture / Discussion & Problem solving	Assignment II (Week-14-15) Quiz -II (Week -15)

			piezoelectricity?		Cycle-Test II (Week 16) /
12	Fibre optic methods of pressure sensing, Temperature sensor- Thermocouple, bimetallic strip, pyroelectric detectors	**CO5**	1) Discuss the working of Thermal sensors? 2) What is the working of a pyroelectric sensor?	Lecture / Discussion & Problem solving	Assignment II (Week-14-15) Quiz -II (Week -15) Cycle-Test II (Week 16)
13	Hall-effect sensor, Smoke and fire detectors. Basics of Nano Materials, Top and Bottom approaches, Preparation (Sol-Gel and Ball Milling)	**CO5**	3) What is Hall effect and what information do we get from Hall effect sensor? 4) What are nanomaterials? 5) Why do they exhibit different properties 6) Discuss top and bottom approaches	Lecture / Discussion & Problem solving	Assignment II (Week-14-15) Quiz -II (Week -15) Cycle-Test II (Week 16)
14	Carbon Nano tubes, Applications of nanoMaterials (better insulating materials, elimination of pollutants, high energy density battery, nanomachines and nano devices	**CO5**	1) What are CNTs? How are they produced? 2) Discuss some applications of Nano- Materials	Lecture / Discussion & Problem solving	Assignment II (Week-14-15) Quiz -II (Week -15) Cycle-Test II (Week 16)
15	Revision and discussion		-	Discussion/ problem solving/PPT	Assignment II (Week-14-15) Quiz -II (Week -15) Cycle-Test II (Week 16)
16	Revision Cycle Test-II				Cycle-Test II (Week 16)
End Examination					