SCHEME OF COURSE WORK

Course Details:

Course Title	**: Transportation Engineering**		
Course Code	**: 20CE1108**	**L T P C**	**: 3 0 0 3**
Program:	**: B. Tech.**		
Specialization:	**: Civil Engineering**		
Semester	**: III**		
Prerequisites	**: None**		
Courses to which it is a prerequisite		**: None**	

At the end of the course, the student will be able to:

	Course Outcomes (COs)	**Learning Outcomes**
1	Impart knowledge on highway development and materials.	1. Illustrate importance of highway development 2. Classify highways based in field conditions and alignment 3. Design Engineering surveys for highway alignment
2	Teach about the tests on highway Materials.	1. Illustrate different types of material used in construction 2. Standard test procedures used to test materials 3. Determining optimum Binder content in mix
3	Teach concepts of Geometric design and alignment.	1. Illustrate different aspects govern highway design 2. Design highway features like alignment and superelevation 3. Design vertical and horizontal alignment of highways
4	Throw light on traffic volume studies and regulation.	1. Identify need and basic parameters of traffic channeling 2. Illustrate traffic volume and regulation. 3. Visualize causes for road accidents 4. Design safety features traffic using different methodologies
5	Impart knowledge on design of intersection and pavements	1. Study causes for conflicts at intersections 2. Plan types and positioning of traffic intersections on highway. 3. Distinguish flexible and rigid pavements 4. Design of pavements using different methods

Program Outcomes (POs):
Graduates will be able to:

1	Apply the knowledge of mathematics, science, engineering fundamentals to solve complex civil engineering problems.
2	Attain the capability to identify, formulate and analyse problems related to civil engineering and substantiate the conclusions.
3	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	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	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	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	Understand the impact of the professional engineering solutions on environmental safety and legal issues.
8	Transform into responsible citizens by resorting to professional ethics and norms of the engineering practice.
9	Function effectively in individual capacity as well as a member in diverse teams and in multidisciplinary streams.
10	Communicate fluently on complex engineering activities with the engineering community and society, and will be able to prepare reports and make presentations effectively.
11	To demonstrate knowledge and understanding of the engineering and management principles and apply the same while managing projects in multidisciplinary environments.
12	Engage them in independent and life-long learning in the broadest context of technological change while continuing professional practice in their specialized areas of civil engineering.

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 superstructures for buildings, bridges, irrigation structures and pavements.
 3. Estimate, cost evaluation, execution and management of civil engineering projects.

Course Outcome versus Program Outcomes & Program specific outcomes:

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

3 - Strongly correlated, 2 - Moderately correlated, 1 - Low correlation, Blank - No correlation

Assessment Methods:	Assignment / Seminar / Mid-Test / End Exam

Teaching-Learning and Evaluation

Week No.	TOPIC / CONTENTS	CO	Sample questions	Teaching-Learning strategy	Assessment Method & Schedule
1	Highway development in India; necessity for highway Planning; different road development plans and classification of roads.	1	Discuss about road development plans in India.	Lecture Demonstration	
2	Road network patterns; highway alignment; factors affecting alignment;	1	Enlist the factors that affecting the road alignment.	Lecture / Discussion	

3	Engineering surveys; drawings and reports. Highway materials– soil, aggregates and bitumen;	1	Describe various engineering surveys of road that are adopted.	Lecture Discussion	
4	Test on aggregate – aggregate properties and their importance.	2	Discuss different tests that are conducted for aggregates?	Lecture / Discussion	
5	Tests on bitumen – bituminous concrete – requirements of design mix– Marshall method of design mix design.	2	Requirements of Bituminous design mix.	Lecture / Discussion	Assignment Quiz-1 Mid-Test 1 (Week 9)
6	Importance of geometric design –design controls and criteria	3	Explain the Importance of geometric design.	Lecture / Discussion	
7	Highway cross section elements; sight distance elements; stopping sight distance, Over taking sight distance and intermediate sight distance	3	Problems on SSD, OSD and ISD.	Lecture Problem solving	
8	Design of horizontal alignment – design of super elevation and extra widening; design of transition curves; design of vertical alignment, gradients and vertical curves.	3	Problems on transition curves and gradients.	Lecture Problem solving	
9	**MID TEST – I**				
10	Basic parameters of traffic – volume, speed and density – traffic volume studies – speed studies – data collection andpresentation.	4	List and define the basic parameters of traffic volume.	Lecture Discussion	Assignment Quiz-2
11	Parking studies and parking characteristics - road accidents – causes and preventive measures – accident data recording – condition diagram and collision diagrams.	4	Explain the causes and preventive measures for accidents.	Lecture / Discussion	
12	Road traffic signs - types and specifications – road markings – need for road markings – typesof road markings.	4	Explain the types and specifications of traffic regulations.	Lecture / Discussion	
13	Design of traffic signals –Webster method – IRC method	4	Describe the IRC method of traffic signal.	Lecture / Discussion	
14	Types of interactions conflicts at intersections – types of At – Grade	5	Explain the types of intersections and their	Lecture / Discussion	

	intersections – channelization		conflicts.		
15	Objectives – traffic islands and design criteria – rotary – types.	5	Explain the components of traffic rotary.	Lecture / Discussion	
16	Types of grade separated intersections – rotary intersections-flyovers, ROV, cloverleaf (partial, full)- Criteria for selection, advantage, disadvantages of grade separated intersections.	5	What are the types of grade separated intersections and define cloverleaf? Explain the advantages and disadvantages of grade separated intersections.	Lecture / Discussion	
17	Flexible and rigid pavements – Components and Functions – design of Flexible pavement (G.I method and CBR Method as per IRC 37-2002) –Design of Rigid pavements – Westergaard's stress equations.	5	Explain the IRC method of flexible pavements.	Lecture / Discussion	Mid-Test 2 (Week 18)
18	**MID TEST – II**				
19/20	**END EXAM**				