



INSTITUTE OF AERONAUTICAL ENGINEERING

Dundigal, Hyderabad - 500 043
(AUTONOMOUS)

CIVIL ENGINEERING

COURSE DESCRIPTION FORM

Course Title	TRANSPORTATION ENGINEERING – I			
Course Code	A60132			
Regulation	R15 – JNTUH			
Course Structure	Lectures	Tutorials	Practicals	Credits
	4	-	-	4
Course Coordinator	Mr. D. M. V. Praneeth, Assistant Professor			
Team of Instructors	Mr. D. M. V. Praneeth, Assistant Professor Mr SV Konda Reddy, Assistant Professor			

I. COURSE OVERVIEW:

The course gives an overview about the Transportation engineering with respect to, planning, design, construction and maintenance of highways as per IRC standards, specifications and methods. To impart knowledge of Traffic engineering, traffic regulation, management and traffic safety with integrated approach in traffic planning as well.

II. PREREQUISITE(S):

Level	Credits	Periods/ Week	Prerequisites
-	-	-	-

III. MARKS DISTRIBUTION:

Sessional Marks	University End Exam marks	Total marks
<p>Midterm Test</p> <p>There shall be two midterm examinations. Each midterm examination consists of essay paper, objective paper and assignment.</p> <p>The essay paper is for 10 marks of 60 minutes duration and shall contain 4 questions. The student has to answer 2 questions, each carrying 5 marks.</p> <p>The objective paper is for 10 marks of 20 minutes duration. It consists of 10 multiple choice and 10 fill-in-the blank questions, the student has to answer all the questions and each carries half mark.</p> <p>First midterm examination shall be conducted for the first two and half units of syllabus and second midterm examination shall be conducted for the remaining portion.</p> <p>Five marks are earmarked for assignments. There shall be two assignments in every theory course. Assignments are usually issued at the time of commencement of the semester. These are of problem solving in nature with critical thinking.</p> <p>Marks shall be awarded considering the average of two midterm tests in each course.</p>	75	100

IV. EVALUATION SCHEME:

S. No	Component	Duration	Marks
1.	I Mid Examination	80 minutes	20
2.	I Assignment	-	5
3.	II Mid Examination	80 minutes	20
4.	II Assignment	-	5
5.	External Examination	3 hours	75

V. COURSE OBJECTIVES:

The objective of the teacher is to impart knowledge and abilities to the students:

- I. Understand the basic concepts and importance of highway development, road classification of roads in India.
- II. Impart knowledge regarding highway cross section elements.
- III. Design various geometric elements like sight distance, super elevation, horizontal curves, gradients etc
- IV. Interpret the various traffic parameters, regulations and methods of traffic data collection.
- V. Analyze traffic signal designs, the importance of intersection designs, grade intersections and rotaries
- VI. Explain about highway construction, maintenance and their importance

VI. COURSE OUTCOMES:

After completing this course the student must demonstrate the knowledge and ability to:

1. Understand the importance of highway development of India and classification of roads and road patterns.
2. Illustrate the factors affecting highway alignment and its design
3. Capable of performing various engineering surveys and can prepare highway report
4. Design various geometric elements like curves, gradients, super elevation, etc.
5. Demonstrate the accident patterns in a road network and take up preventive measures
6. Formulate methods of performing various traffic surveys.
7. Compute traffic flow characteristics like speed, density and volume
8. Analyze traffic signals intersections and road markings and their designs.
9. Understand the factors affecting rotary design and intersections
10. Assess the Characteristics and properties of highway materials.
11. Explain about highway construction, maintenance and their importance.
12. Participate and succeed in competitive exams like GATE, PSU'S and IES etc

VII. HOW PROGRAM OUTCOMES ARE ASSESSED:

Program Outcomes		Level	Proficiency assessed by
PO1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	H	Assignments, Exams
PO2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	H	Assignments, Exams
PO3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.	H	Assignments
PO4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	S	Assignments
PO5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.		-
PO6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.	H	Exams
PO7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.	S	Exams, Assignments
PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.		Quizzes, Discussions
PO9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	S	Lectures, Discussions
PO10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.		Lectures, Discussions
PO11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.		Possible Projects

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

S – Supportive

H - Highly Related

VIII. HOW PROGRAM SPECIFIC OUTCOMES ARE ASSESSED:

Program Specific Outcomes		Level	Proficiency assessed by
PSO1	UNDERSTANDING: Graduates will have an ability to understand, analyze and solve problems using basic mathematics and apply the techniques related to irrigation, structural design, etc.	H	Lectures, Assignments, Exams
PSO2	ANALYTICAL SKILLS: Graduates will have an ability to design civil structures, using construction components in transport systems and to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety manufacturability and reliability and learn to work with multidisciplinary teams.	S	Lectures, Assignments, Exams
PSO3	BROADNESS: Graduates will have an exposure to various fields of engineering necessary to understand the impact of other disciplines on civil engineering blueprints in a global, economic, and societal context and to have necessary focus for postgraduate education and research opportunities at global level.		Guest Lectures, Possible Group Projects, Industrial Internship

S – Supportive

H - Highly Related

IX. SYLLABUS:

UNIT - I:

HIGHWAY DEVELOPMENT AND PLANNING-Highway development in india- Necessity for highway planning-Different road development plans; classification of roads- Road network patterns –Highway Alignment-Factors affecting alignment-Engineering surveys-Drawing and reports-Highway project.

UNIT – II:

HIGHWAY GEOMETRIC DESIGN: Importance of Geometric Design – factors affecting highway geometric design. Design controls and Criteria- Highway Cross Section Elements- Sight Distance Elements- Stopping sight Distance, 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 – III:

TRAFFIC ENGINEERING AND REGULATIONS: Basic Parameters of Traffic – Volume, Speed and density-Traffic volume studies-Data collection and presentation-Speed studies – Data collection and presentation- Origin and Destinations studies,- Parking Studies–On street and off-street parking - Road

Accidents - Causes and Preventive measures- Accident Data Recording–Condition Diagram and Collision Diagrams-Traffic Types and Specifications – Road markings-Need for Road Markings-Types of Road Markings- Design of Traffic Signals- Webster method.

UNIT – IV:

INTERSECTION DESIGN : Types of Intersections – Conflicts at Intersections- Requirements of At –Grade intersection- Types of at-Grade Intersections- Channelization -

Traffic Islands - Types of Grade Separated Intersections- Rotary Intersection –concept of Rotary-Design factors of rotary-Advantages and limitations of rotary intersections.

UNIT – V:

HIGHWAY MATERIAL, CONSTRUCTION AND MAINTENANCE: Highway material characterization; Sub grade soil, Stone aggregate, Bitumen materials, Construction of gravel roads-Construction of water bound macadam roads-Construction of bituminous pavements: Surface dressing, Bitumen bound macadam, Bituminous concrete-Construction of cement concrete pavements-Construction of joints in cement concrete pavements-Joint filter and seal-Pavement failures –Maintenance of highways-Highway Drainage.

TEXT BOOKS:

1. Highway Engineering – S.K.Khanna & C.E.G.Justo, Nemchand & Bros., 7th edition (2000).
2. Traffic Engineering & Transportation Planning – Dr.L.R.Kadyali, Khanna publications – 6th Edition – 1997.

REFERENCES:

1. Principles of Traffic and Highway Engineering – Garber & Hoel, Cengage Learning.
2. Principles of Practices of Highway Engineering–Dr.L.R.Kadyali, and Dr.N.B Lal-Khanna publication

X. COURSE PLAN:

At the end of the course, the students are able to achieve the following course learning outcomes:

Lecture Number	Topics Planned to cover	Learning Objectives	References
1	Introduction of Highway development in India	To Know the highway development in India	T1:24.6 T1:24.7 T1:24.8
2	Necessity for Highway Planning	To know the necessity of highway	T1:12.14
3-5	Different road development plans	To know the types of road plans.	T1:3.10
6-7	classification of roads-Road network patterns	To Know the classification of roads and its patterns.	T4:3.11
8-9	Highway Alignment and its factors	To understand the concept of highway alignment.	T1:16.2
10	Importance of Geometric Design	To understand the geometric design of roads	T1:16.5
11	Highway elements	Able to know the highway elements	T1:16.6.2
12	Design controls and Criteria	Able to know the measurement of cross sectional elements.	T1:16.6.2

13	Highway Cross Section Elements- Sight Distance Elements	Able to know the measurement of Sight distances	T2:26.9
14	Stopping sight distance	Able to know the measurement of Sight distances	T2:26.11
15-16	overtaking sight distance	Able to know the measurement of Sight distances	T1:16.7
17-18	Design of Horizontal Alignment	Able to know the design Horizontal curve	T2:26
19-21	Design of Super elevation and Extra widening	Able to know the design Super elevation and extra widening	T2:20.4
23-24	Design of Transition Curves	Able to know the design Transition curves	T2:23.4
25-26	Design of vertical Alignment	Able to know the design Horizontal curve	T2:20.9 T2:20.10
27-28	Gradients	To know about gradient	T4:5.13
29	Vertical curves	To able to design vertical curves.	T2:21.1- 21.2
30-31	Basic Parameters of Traffic –Volume	To know about traffic volume.	T2:21.3-
32	Speed and density	To understand the parameters of speed Speed and density	T2:21.5- 21.6
33-36	Traffic volume studies-Data collection and presentation	Able to understand the traffic volume studies,	T2:7.1-7.3
37-38	Speed studies-Data collection and presentation	Able to understand the speed studies,	T2:27.2
39	Origin and Destinations studies	To know about the concept of solving the problems on speed studies	T2:27.9
40-42	Parking Studies –On street and off street parking	To know about the parking studies	T2:27.9
43-44	Accident studies	To understand the concept of accident studies	T3:27.10
45-46	Traffic Signs – Types and Specifications	To know about the specifications of traffic markings and specifications	T2:27.11
47-48	Road markings-Need for Road Markings- Types of Road Markings	To know about the road markings	T2:27.12
49-50	Design of Traffic Signals- Webster method.	To design traffic signal	T2:10.7
50-51	Types of Intersections, Conflicts at Intersections	To understand about the intersection	T2:10.8
52-54	Requirements of At –Grade intersection- Types of at-Grade Intersections- Channelization	To know about the types of intersections	T3:10.10
55	Traffic Islands	To get the knowledge of Traffic islands	T3:13.8

56-58	Rotary Intersection –concept of Rotary- Design factors of rotary- Advantages and limitations of rotary	To understand the concept of rotary intersection	T4:13.9
59	Highway material characterization	To understand the characteristics of highway materials	T4:9.8
60-64	Construction of gravel roads- Construction of water bound macadam roads-Construction of bituminous pavements: Surface dressing, Bitumen bound macadam,	To know the construction of the highway using different materials	T4:9.10
65-66	Joint filter and seal -Highway Drainage.	Able to know the maintenance of highway drainage	T4:27.12
66	Pavement failures	To understand pavement failures	T4:27.12
67	Maintenance of highways	To understand maintenance of highways	T4:27.12
68	Highway drainage	To know importance of highway	T4:27.12

XI. MAPPING COURSE OBJECTIVES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Objectives	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
I	H			S				H					H		
II			H						S						S
III	H			S		S									
IV				H					S						S
V	H	S		H			H						H		
VI	H		S			S		S					H	S	

S – Supportive

H - Highly Related

XII. MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	H			H		H	H						H		
2		S												S	
3	H		H	H	H			S					H		
4	S		H			H	H							S	

5	H		H	S					S				H		
6	H				S		H						H		S
7	H			H		H	H						H		
8		S							S					S	H
9	H		H	H	H			S					H		
10	S		H			H	H							S	
11	H		H	S					S				H		
12	H				S		H						H	S	S

S – Supportive

H - Highly Related

Prepared by: D.M.V Praneeth, Assistant Professor, CE

Date : 21 November, 2017

HOD, CIVIL ENGINEERING