GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

COURSE CURRICULUM
COURSE TITLE: BASIC TRANSPORTATION ENGINEERING
(Code: 3340603)

Diploma Programme in which this course is offered	Semester in which offered
Civil Engineering	4th Semester

1. RATIONALE

As we know that the economy of any country is widely dependent either direct or indirect way on the transportation of various commodities which in turn dependent upon the "How efficiently the transportation system of the country is functioning."
Therefore, knowledge and understanding of various design, construction and maintanance aspects of roads, railways and bridges are very important for engineers working at site in order to make transportation system safe and efficient. At diploma level, students are expected to study about these aspects of raods, railways and bridges so as to develop their understanding in order to apply their knowledge in improving civil infrastructure for transportation.

2. COMPETENCY:

The course content should be taught and curriculum should be implemented with the aim to develop different types of skills so that students are able to acquire following competency:

- **Supervise construction and maintenance of roads, railways and bridges.**

3. COURSE OUTCOMES

The theory should be taught and practical should be carried out in such a manner that students are able to acquire different learning out comes in cognitive, psychomotor and affective domain to demonstrate following course outcomes.

i. Explain the importance of transportation system and its geometrical aspects
ii. Comprehend the concept of construction and maintenance of roads, railways and bridges.
iii. Perform the tests on the various materials used in the construction work of roads, railways and bridges.

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	ESE	PA	ESE	PA	
3	0	2	5	70	30	20	30	150

Legends: L - Lecture; **T -** Tutorial/Teacher Guided Student Activity; **P -** Practical; **C -** Credit; **ESE** - End Semester Examination; **PA** - Progressive Assessment.

5. COURSE DETAILS

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit – I **Introduction and Road Geometric**	1a. Discuss various Modes of transportation 1b. Explain the various components of a road section. 1c. Demonstrate the basic requirement of road alignment. 1d. Dsecribe various terms used in road geometry.	. 1.1 Importance & Classification of roads 1.2 Modes of transportation. 1.3 Requirements of good roads 1.4 and its advantage. 1.5 Road alignment and their types 1.6 Importance of road alignment. 1.7 Factors affecting the alignment. 1.8 Cross section of road showing its component as per IRC. 1.9 Function of each component. Terms used in road geometry Camber, sight distance, Super elevation, Widening of Road. 1.10 Transition curve and Road Gradient.
Unit – II **Road materials and its construction aspects**	2a. Describe various types of road construction methods. 2b. Explain various types of failures and maintenanceof road. 2c. Explain various types of tests on road materials.	2.1 Types of Pavement. 2.2 Necessity of Soil Stabilization and its methods. 2.3 Types of materials used in road Construction 2.4 Various tests on Aggregate and bitumen. 2.5 Construction of Flexible and Rigid Pavement. 2.6 Types of Failures in roads 2.7 Maintenance of roads and its components
Unit – III **Drainage system.**	3a. Explain importance of drainage and its maintenance	3.1 Importance of drainage. 3.2 Purpose of drainage. 3.3 Methods of Surface and Sub-surface drainage. 3.4 Maintenance of drainage system.

Unit – IV **Introduction to Permanent way.**	4a. Describe the basic parts of railway track and its functions. 4b. Explain the Joints and Gauge. 4c. Explain basic knowledge of points and Crossing.	4.1. Typical cross section of various permanent way as per IRS. 4.2. Function of Various Components. 4.3. Method of fixing the rails with slipper. 4.4. Function of Rail joints. 4.5. Railway gauge , Types of Rail gauge and uniformity of gauge. 4.6. Function of point and crossing. 4.7. Factors affecting point and crossing. 4.8. Components of Turn outs and types of crossing.
Unit – V **Yards and Maintenance of railway track**	5a. Discuss the function of various yards. 5b. Explain requirement of track Maintenance	5.1 Classification of Yards. 5.2 Function of Various Yards. 5.3 Requirement of Track Maintenance. 5.4 Daily and periodical Maintenance. 5.5 Maintenance of Alignment, Drainage, Track Material and its components, Point and crossing and level crossing.

Unit – VI Introduction, Investigation and Maintenance of BridgeS.	6a. Discuss the function of various parts of bridge. 6b. Explain terms related to bridge. 6c. Explain reqauirment of an ideal bridge 6d. Carry out the maintenance report	6.1. Importance and term used in Bridge. 6.2. Component of Bridge and its function 6.3. Requirement of an ideal bridge 6.4. Classification and types of bridge. 6.5. Bridge Site Characteristics 6.6. Factor affecting the selection of Bridge Site. 6.7. Explain following terms: Scour, Afflux, Runoff, Economic Span, Clearance, Freeboard. 6.8. Classification of Cause Way and its limitations. 6.9. Routine and in depth inspection. 6.10. Requirements of Inspection Report. 6.11. Maintenance of Steel Bridge, Masonry Bridge, Cause Way, Piers, Pilebents, Abutment, Wing Wall, Road Surface, Drainage, Parapet Wall and Bearing.

6. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (THEORY)

Unit	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Introduction and Road Geometric	8	2	3	5	10
II	Road materials and its construction aspects	9	4	4	7	15
III	Drainage system	4	2	3	5	10
IV	Introduction to Permanent way.	8	2	3	5	10
V	Yards and Maintenance of railway track	5	2	3	5	10
VI	Introduction, Investigation and Maintenance of Bridge.	8	2	5	8	15
Total		42	14	21	35	70

Legends: R = Remember; U = Understand; A = Apply and above levels (Bloom's revised taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

7. SUGGESTED LIST OF EXERCISES/PRACTICAL

The practical/exercises should be properly designed and implemented with an attempt to develop different types of skills **(outcomes in psychomotor and affective domain)** so that students are able to acquire the competencies/programme outcomes. Following is the list of practical exercises for guidance.

***Note**: Here only outcomes in psychomotor domain are listed as practical/exercises. However, if these practical/exercises are completed appropriately, they would also lead to development of certain outcomes in affective domain which would in turn lead to development of **Course Outcomes** related to affective domain. Thus over all development of **Programme Outcomes (**as given in a common list at the beginning of curriculum document for this programme) would be assured.*
Faculty should refer to that common list and should ensure that students also acquire outcomes in affective domain which are required for overall achievement of Programme Outcomes/Course Outcomes.

S. No.	Unit No.	Practical/Exercise/Project (outcomes in psychomotor domain)	Hrs.
1	**I**	Draw the dimensional sketches of cross section of road (with function of each part of road) , road junction, road curve and widening	**6**
2	**II**	Carry out the following tests. - On Aggregate 1. Impact test. 2. Crushing test. 3. C B R test. - On Bitumen 1. Flash &Fire test. 2.Softening point 3. Penetration test	**10**
3	**IV**	Draw the dimensional sketches of cross section of permanent way & points & crossing (with function of each part of road).	**6**
4	**V**	Prepare a brief report after visit to Railway track & yards.	**3**
5	**VI**	Draw the sketches of various bridges after visiting the bridges in nearby locations.	**3**
		Total	**28**

8. SUGGESTED LIST OF STUDENT ACTIVITIES

Following is the list of proposed student activities like: Course/topic based seminars, internet based assignments, teacher guided self learning activities, course/library/internet/lab based mini-projects etc. These could be individual or group-based.

S. No.	Unit No.	Student Activities
1	I	Comparison of different types of Roads
2	IV	Comparison and uniformity of various Guages
3	VI	Comparison of different types of Bridges

9. SPECIAL INSTRUCTIONAL STRETEGIES (If any)

i. Lecture cum demonstration of various types of equipments used in construction of Road , Bridges and Railways (show video clips)
ii. Field demonstration about the maintenance of Roads , Railways and Bridges
iii. Show video films/ clips about different features of road, rail and bridge constructions.

10. SUGGESTED LEARNING RESOURCES

List of Books:

S. No.	Title of Books	Author	Publication
1	Highway Engineering	S K Khanna & Justo	Khanna publication, Delhi
2	Highway Engineering	S P Bindra	
3	Highway Engineering	L R Kadiyali	
4	Highway Engineering	S C Rangwala	
5	Transport engineering	Vazirani & Chandola	
6	Road Railway Bridges & Tunnel Engineering	T D Ahuja & Birdie	
7	Road Railway Bridges & Tunnel Engineering	B L Gupta & A K Gupta	

(B) List of Major Equipment/Materials

---No equipments or Materials required------

(C) List of Software/Learning Websites

i. www.waterbouw.tudelft.nl/
ii. www.learnrstv.com
iii. www.shiksha.com , IIT, Roorkee
iv. www.blackwellpublishing.com
v. www.hrpwa.org
vi. www.creativeworld9.com
vii. nptel.iitm.ac.in
viii. www. Indian rail. com

11. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Faculty Members from Polytechnics

- **Prof. N. J. Patel** Lecturer in Civil Engineering, Shri K J Polytechnic Bharuch
- **Prof .D. P. Rao** Lecturer in Civil Engineering, Dr. S & S S Gandhi Engg. College Surat

Coordinator and Faculty Members from NITTTR Bhopal

- **Dr. Subrat Roy**, Professor, Department of Civil and Environmental Engineering
- **Prof M. C. Paliwal,** Associate Professor, Department of Civil and Environmental Engineering