COURSE NAME : DIPLOMA IN CIVIL ENGINEERING

COURSE CODE : CE/CS/CR/CV

SEMISTER : VI

SUBJECT TITLE : HIGHWAY ENGINEERING

SUBJECT CODE :

Teaching and Examination Scheme :

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS.	TH.	PR	OR	TW	TOTAL
04	--	02	1	100	--	--	25@	125

External @ Internal * on line Examination

NOTE :

- Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head sessional work. (SW)

RATIONALE :-

Today's civil Engineering. Diploma Technician has to work on various civil Engineering. Projects like multistoried buildings, Industrial buildings, Roads, Water Supply, Sanitary Schemes & also on Various Irrigation Structures like Dams, Percolation tanks, Bridges etc. Infrastructural facility like Roads plays a major role in the development of the country.

Road is the important largest and basic mode of Transportation in India. Road Transportation is the most effective and economical means of Transportation. A large scope in Design, Construction and maintenance of Road is present in our country.

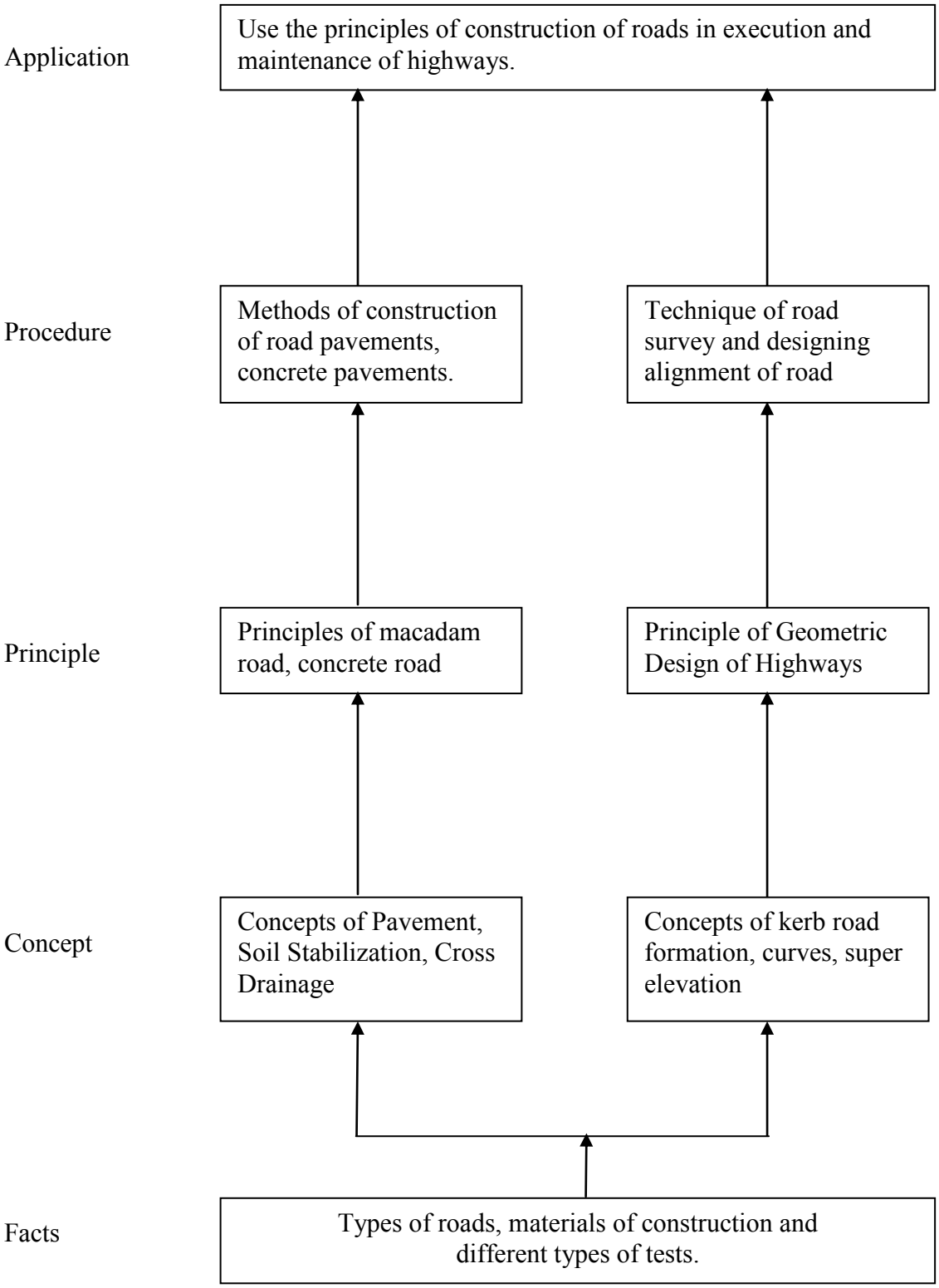
Diploma Engineering students have large scope in jobs as well as different Construction activities in Road Construction. This project gives the knowledge and skills required to carry out the survey, investigation, planning, design, construction and maintenance works related to Road Constructions.

General Objective :

Student should be able to:

1) Know the importance and classification of Road.
2) Understand the types of Surveys and Investigation for location of new Roads.
3) Understand the different methods of Road Construction.
4) Apply the Equipments used in Road Constructions.

Learning Structure :



	Name of Topic	Hrs.	Mks.
	Topic 01 : Importance and Classification of Roads. **Specific Objectives :** ➢ State the importance of Transportation. ➢ List classification of Roads. **Contents :** • Importance of Transportation. • Different Modes of Transportation. • Classification of Roads. • Characteristics of Road Transport.	02	04
	Topic 02 : Investigation of Road Project **Specific Objectives :** ➢ Describe types of surveys ➢ Draw L section & C/S of roads. **Contents :** • Reconnaissance survey preliminary survey and location survey for road project. • Fixing the alignment of road, factors affecting road alignment. • 'L' section & cross section of roads. • Drawing required for road project. • Keymap, Index map, Preliminary survey plan, Detailed location survey plan, 'L' section & C/s of C.D. works, Land acquisition plan.	02	06
	Topic 03 : Geometric design of Roads. **Specific Objectives :** ➢ State the maximum and minimum I.R.C. specification for Camber, Kerbs, Gradient, Slight distance, Super elevation. ➢ Sketch standard cross section of Highway in cutting and embankment.	14	18

	Name of Topic	Hrs.	Mks.
	Contents : • Camber- definition, types, IRC specification. • Kerbs, road margin, road formation, right of way. • Design speed- IRC specifications. • Gradient- Definition, types of IRC specifications. • Slight distance- Definition, types, IRC specifications. • Super elevation- Definition, minimum & maximum values of super elevation methods of providing super elevation. • Sketching of standards cross-sections of national highway in embankment & cutting.		
	Topic 04 : Construction of Roads **Specific Objectives :** ➢ List the different materials used in road construction. ➢ Describe the construction of earthen roads, soil stabilized roads, water bound macadam roads, bituminous roads & concrete roads. **Contents :** • Types pf road materials – soil, aggregates, bitumen, cement concrete. • Pavement- objective, structures and functions of pavement components, types of pavements rigid and flexible • Construction of earthen roads, general terms used, borrow pits, spoil bank lead & lift, balancing of earth work, construction procedure. • Soil stabilized roads- necessity, methods of soil stabilization. • Water bound macadam roads- materials used, size	14	18

	Name of Topic	Hrs.	Mks.
	& grading of materials used, construction procedure including precautions rolling. • Construction- bitumen asphalt, emulsion, cutback tar, common grades, adopted for construction. • Types of bituminous surface, prime coat, tack coat, seal coat, surface dressing, procedure of construction , full grout , semi grout • Cement concrete pavements- Method of Construction ,Construction joints, joint filling, joint sealer.		
	Topic 05: Traffic Engineering **Specific Objectives :** ➢ Define the traffic density, traffic capacity and traffic volume. ➢ State the traffic control devices. **Contents :** • Traffic Engg.- Definition, Traffic characteristics. • PUC, Traffice density, traffic capacity. • Traffic volume study- objects and uses , counting of Traffic volumes ,PCU. • Traffic control devices – road • signs, marking, signals, traffic island and its types – Divisional , Channelizing , Pedestrian , Rotary.	04	08
	Topic 06 : Hill Roads **Specific Objectives :** ➢ describe the procedure for the alignment and geometric of hill roads. ➢ Sketch the drainage structures in hill roads. **Contents :**	02	08

	Name of Topic	Hrs.	Mks.
	• Alignment survey for hill roads. • Geometric of hill road – width , formation ,camber construction of hill roads. • Drainage structures in hill roads, side drains, catch water. • Land Sides- causes and prevention.		
	Topic 07 : Drainage and maintenance of roads. **Specific Objectives :** ➢ State the purpose of road drainage. ➢ State the importance and repairs of roads. **Contents :** • Purpose of high drainage. • Surface drainage system in urban roads, cross drainage. • Sub-Surface drainage- Longitudinal drains and cross drains. • Necessity of maintenance of roads. • Classification of maintenance operation – routine and periodic maintenance, special repairs and resurfacing. • Maintenance of W.B.M., bituminous and cement concrete roads.	04	08
	Topic 08 : Hoisting and Conveying Equipments **Specific Objectives :** ➢ List the types of Hoisting Equipments. ➢ State the types of Cranes. **Contents :** • Types and uses of Cranes : Tower Cranes, Crawler Cranes, Truck Mounted Cranes, Gantry Cranes,	04	06

	Name of Topic	Hrs.	Mks.
	Demick • Capacities of Dumpers, Tractors and Trucks.		
	Topic 09 : Earth Moving Equipments. **Specific Objectives :** ➢ List the different types of Excavating Equipments ➢ State the use and Working of Compacting Equipments. **Contents :** • Excavating Equipments : Bulldozers, Scrappers, Graders, Power Showels, JCB. • Use and Working of Excavating Equipments. • Compacting Equipments : Rollers, Plain Rollers, Sheep Tooted Roller, Vibratory Roller, Pneumatic Rollers • Use of Compacting Equipments.	08	10
	Topic 10: Concreting Equipments : **Specific Objectives :** ➢ State working of Concrete Mixers. **Contents :** • Types of Concrete Mixers, Drum Type, Pan Types, Paving Mixer, Transit Mixer. • Concrete pumps - its working • Concept of Weigh Batches and its Working. • Concrete Compacting Equipments : Needle Vibrator, Fork Work Vibrator, Take Vibrator, Platform Vibrator, Surface Vibrator.	04	06
	Topic 11: Miscellaneous Equipments and Equipment Management **Specific Objectives :**	06	08

	Name of Topic	Hrs.	Mks.
	. ➢ Describe the Selection of Equipment, Owning and Operating Cost of Equipment. ➢ State the Economic Life of Construction Equipment. **Contents :** • Hot Mix Bitumen Plant : Bitumen Road Paver. • Standard Equipment, Selection of Equipment • Owning and Operating Cost of Equipment. • Economic Life of Construction Equipment.		
		64	**100**

List of Assignments :

1. Road project for a road of minimum 1.0 km. length having at least one shall cross drainage work.
   - 1.1 Site selection.
   - 1.2 Reconnaissance survey.
   - 1.3 Fixing the alignment.
   - 1.4 Detailed profile survey along the alignment and cross section of road and CD Work.
   - 1.5 Prepare computer/ pencial finished drawing of longitudinal section and typical cross sections of the road in cutting and filling.
   - 1.6 Prepare computer / pencil finished drawing of proposed typical CD work /culvert.

2. Visit to a road under construction / constructed to study the construction of (a)WBM road (b) flexible pavement (c) Rigid pavement roads for observing the type of construction and construction equipments.

3. Preparing drawing of detailed cross sections of
   (a) Major district road, (b) State highway (c) National highway, (d) Express highway in cutting and banking showing details and dimensions with proper scale (Any two)

4. Traffic volume study and its preparation of an important road interaction in your city.

5. Visit to a W.B.M./ Bituminous/Concrete road for observing the different types of defects in roads. Prepare a visit report. Which should consist of (a) List of various defects observed (b) Suggestions regarding the possible remedial measure.

6. Test on Bitumen: -Penetration, Ductility, Softening point, Flash and Fire point
7. Test on Soil : CBR Test
8. Visits to Road Construction site for studying different equipments like JCB , Power shovel , Excavators , Dozers , Rollers .

Learning Resources :
Books :

Sr.No.	Author	Title	Publisher Address
01	Khanna & Justo	Highway Engineering	Khanna Publication
02	L.R.Kadiyali	Traffic Engineering	----
03	N.L.Arora, S.P. Luthara	Transportation Engineering	I.P.H. New Delhi
04	Vazarani & Chandola	Transportation Engineering	Khanna Publication
05	Biridi & Ahuja.	Road, Highway, Bridges	S.B.H. New Delhi
06	Kamala.	Transportation Engineering	T.M.H. New Delhi
07	---	DATA Book of P.W.D.	----

1. **IS / International Codes :** IRC 36-1970, IRC 16-1965, IRC 20 - 1966.
2. **CDS and PPTS :** search for google.
   Mahindra heavy earthmoving equipments
   BEML heavy earthmoving equipments
   COSMOS Construction equipments
   UNIVERSAL Construction equipments
3. Web sites : www.constructionmanagementprocess.com