GOVERNMENT OF TAMILNADU

DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI

STATE PROJECT COORDINATION UNIT

(Established Under Canada India Institutional Cooperation Project)

CURRICULUM

Course Name	**DESIGN OF ROADS USING MXROAD SOFTWARE**
Course Code	CE / 2020 / 015
Course Duration	70 Hours
Minimum Eligibility Criteria and Pre-requisites (if any)	+2/Diploma/Graduates
Course Objectives	Training Module has been designed for the Participants to • Design 2D and 3D drainage design • Build horizontal and vertical alignments • Design storm drainage, water and sewer system • Understand Pavement and subgrade design • Understand Road and junction design
Course Outcomes	At the end of training the participants will be able to • Build horizontal and vertical alignments • Understand concepts ofGIS, business tools such as PDFs, i-models, and hypermodels.
Expected Job Roles	• Road Design Engineer • Highway Design Engineer

TEACHING AND SCHEME OF EXAMINATION						
Course Code	**Course Name**	**Hours**		**Assessment Marks**		**Duration of Examination**
				Min	**Max**	
CE / 2020 / 015	**DESIGN OF ROADS USING MXROAD SOFTWARE**	**Theory**	30	10	20	**3 Hours**
		Practical	40	40	80	
		Total	**70**	**50**	**100**	

CE / 2020 / 015 – DESIGN OF ROADS USING MX ROAD SOFTWARE

DETAILED SYLLABUS

Unit No	Modules	No of Hours	
		Theory	Practical
1.	**INTRODUCTION TO MX ROAD**	05	---
	Introduction - General - Scope of study - MX ROAD		
2.	**OVERVIEW OF MX ROAD**	05	08
	Overview - Template and string Modelling - MX ROAD overview		
3.	**ROAD GEOMETRIC DESIGN**	05	08
	Geometric Design standards - Cross Section Elements - Horizontal and vertical alignment		
4.	**DESIGN STEPS**	05	08
	Introduction - Steps for road designing in MX ROADS		
5.	**ELEMENTS OF ROAD DESIGN**	05	08
	Horizontal design - Vertical alignment - Road design - Pavement and sub grade design - Earthwork Quantities - Draw plan - vertical profile - cross sections.		
6.	**DATA ANALYSIS AND DESIGN REPORTS**	05	08
	Horizontal alignment - Vertical alignment - Cross sectional analysis using MX Road - Earthwork calculations using MX Road.		
TOTAL THEORY AND PRACTICAL HOURS		**30**	**40**
TOTAL HOURS		**70**	

PRACTICAL EXERCISES (40 HOURS)	
SL.NO.	**List of Experiments**
1.	Design a Carriage Way using MX ROAD software
2.	Design a Vertical Profile Using MX ROAD Software
3.	Design a Pavement using MX ROAD software
4.	Design a Subgrade Layer using MX ROAD software
5.	Design a Horizontal Alignment using MX ROAD software
6.	Design a Earthwork Road By MX ROAD
7.	How to import Data from the multi sources of elements in MX ROAD

HARDWARE REQUIREMENT

SL. NO.	LIST OF TOOLS / EQUIPMENTS
1.	CPU – 64bit Intel® or AMD® multi-core processor
2.	RAM - 4 GB of RAM minimum (8 GB or more recommended)
3.	DISK SPACE - 6 GB of free disk space for installation
4.	VGA Monitor
5.	USB Key Board
6.	USB Optical Mouse

SOFTWARE REQUIREMENT

SL. NO.	NAME OF THE SOFTWARE
1.	Bentley MX ROAD - 2018 Version 8i

REFERENCE BOOKS

SL.NO	NAME OF THE BOOK	AUTHOR	PUBLISHER
1.	Highway Engineering	SK KHANNA	NEM CHAND
2.	MX Road Manual	Creak. Bentley	Bentley Company

ASSESSMENT AND CERTIFICATION

S.No	Criteria for Assessment
1.	A trainee will be assessed based on the performance in End Examination for Theory and Practical conducted internally in the CIICP Project Polytechnic College for a duration of 3 hours
2.	A trainee must have 75% of attendance to appear for End examination in Theory and Practical.
3.	The assessment for theory part will be based on the marks scored in the end examination on the knowledge bank of questions (1 Word/ Objective type questions).
4.	The assessment for practical part will be based on the marks scored in the end examination conducted by the CIICP Project Polytechnic and assessed by the Examiners approved by Strategic Plan Implementation Committee (SPIC) of the project polytechnic.
5.	The passing criteria for successful completion of training is every trainee should score 50% of marks in the End Theory and Practical examination.
6.	On successful completion of training, Certificate will be issued to the participants by the Directorate of Technical Education through the Project Polytechnics.

END EXAMINATION

ALLOCATION OF MARKS

S. No.	Description	Maximum Marks
1.	THEORY EXAM	20
2.	PRACTICAL EXAM	
	a. DATA IMPORTING / CONVERSION	10
	b. DESIGN OF ROAD ELEMENTS	40
	c. RESULT / OUTPUT	10
	d. RECORD	20
	TOTAL	**100**

THEORY MODEL QUESTION PAPER - I

CE / 2020 / 015 – DESIGN OF ROADS USING MXROAD SOFTWARE
(Maximum Marks: 20)

(N.B: Answer any **Twenty** Questions) **20 x 1 = 20 Marks**

1. What is the first step in highway construction after paper work?

a) Evaluation b) Bill of quantities
c) Surveying d) Estimation.

2. Which of the following types of roads are most preferred for highways?

a) Unpaved surfaces b) Bituminous roads
c) Cement concrete roads d) Gravel roads

3. Design of road intersections is a part of ……

a) Harbour engineering b) Highway engineering
c) Railway engineering d) Traffic engineering

4. A road running parallel to highway for some selected areas with grade separator are called ……..

a) Parallel highway b) Frontage road
c) Footage road d) Urban roadDefine Points.

5.The normal width recommended in rural areas by IRC for a national highway is

a) 60 m b) 89 m c) 25 m d) 45m

6.The design speed on a highway is 60kmph; calculate the super elevation if radius of curve is 150m and coefficient of friction is 0.15.

a) 0.15 b) 0.04 c) 0.038 d) 0.07

7.The most preferred type of transition curve by IRC for highway is ……..

a) Parabola b) Lemniscate
c) Cubic parabola d) Spiral

8.Which of the pavement is better for highway lighting?

a) Gravel roads b) WBM
c) Black top surface d) Cement concrete

9.The removal of earth for highway formation is …….

a) Filling b) Excavation
c) Embankment d) Sub grade

10. The design of the highway should satisfy ……

a) Economical b) Structural requirement
c) Drainage system d) All of the above

11. The skid number for highways should not be less than …….

a) 25 b) 35 c) 45 d) 55

12. What is the speed limit on the national highway on hill road in Kmph?

a) 40 b) 30 c) 60 d) 50

13. The design thickness of the CC slab of important highway with heavy traffic is?

a) 300 mm b) 275 mm

c) 125 mm d) 250 mm

14. What is the speed limit on the national highway on hill road in Kmph?

a) 40 b) 30 c) 60 d) 50

15. The degree if curve is central angle subtended by an arc of length is?

a) 20m b) 25m c) 30m d) 35m

16. The ratio between centrifugal force and weight of the vehicle is called ……

a) Impact factor b) Impact ratio

c) Centrifugal factor d) Centrifugal impulse

17. The ruling minimum radius in the curve is given by ……..

a) R=V2/127(e+f) b) R=V'2/127 (e+f)

c) R=127(e+f) d) R=127/(e+f)

18. The ruling gradient required for plain or rolling terrain is ……

a) 1 in 15 b) 1 in 20

c) 1 in 30 d) 1 in 40

19.The angle which is measured at the change of direction of two gradients is called ……

a) Standard angle b) Subtended angle

c) Deviation angle d) Setback angle

20. The length of the summit curve is based on …….

a) Comfort b) Sight distance

c) Convexity d) Deviation angle

21. The minimum length of vertical curve recommended by IRC for a design speed of100kmph is?

a) 30m b) 40m c) 50m d) 60m

22. The changes in gradient and vertical curve are covered under which type of alignment?

a) Horizontal alignment b) Vertical alignment

c) Geometric design d) Highway specifications

23. The coefficient of lateral friction as recommended by IRC is ……..

a) 0.15 b) 0.40 c) 0.35 d) 0.30

24. Which of the following is equal to super elevation?

a) Sinθ b) Cosθ c) Tanθ d) Secθ

25. What is the SSD value for speed of 20 Kmph?

a) 20 m b) 40 m c) 25 m d) 50 m

THEORY MODEL QUESTION PAPER - II

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(Maximum Marks: 20)

(N.B: Answer any **Twenty** Questions) **20 x 1 = 20 Marks**

1. Define Traverse.
2. Define Ground.
3. Define Points.
4. Define Text.
5. Define Triangles.
6. Define Contours.
7. What is meant by GUI?
8. What is the default parameter (K) for summit curve?.
9. What is the default parameter (K) for valley curve?
10. What is the minimum gradient for drain water in concrete drains?
11. What are types of gradient?
12. What are the types of pavement?
13. What is meant by string?
14. Write any two string types?
15. What is the width of carriage way for single lane road?
16. What is the minimum roadway width for single lane bridge?
17. What is meant by PIEV?
18. Name the Code used for define the elements of earthwork.
19. Write any two types of earth work analysis.
20. What is meant by zones in pavement layer design?
21. What is Meant by MC10 ?
22. What is the use of Zoom tool bar?
23. What is the use of Style tool bar?
24. What is meant by IRC?
25. What is the formula for superelevation?
