Code: 20A01602 **R20**

B.Tech III Year II Semester (R20) Regular Examinations August 2023

HIGHWAY ENGINEERING

(Civil Engineering)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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1		Answer the following: (10 X 02 = 20 Marks)	
	(a)	Mention the basic requirements of an ideal alignment.	2M
	(b)	List out the drawings those are generally prepared in highway project.	2M
	(c)	What is meant by super elevation?	2M
	(d)	List out the different types of gradients available on highways.	2M
	(e)	Mention any two uses of traffic volume studies.	2M
	(f)	What is a cautionary sign?	2M
	(g)	Define at grade intersection.	2M
	(h)	What are the design speeds of rotary intersections in rural and urban areas?	2M
	(i)	With a neat diagram show the flexible pavement components.	2M
	(j)	Define expansion joint.	2M

PART – B

(Answer all the questions: 05 X 10 = 50 Marks)

2	(a)	Explain the factors affecting the alignment of a highway.	5M
	(b)	With neat sketches explain different road network patterns.	5M
		OR	
3	(a)	Explain about major steps in planned highway development in India.	5M
	(b)	What are the salient features of Nagpur road development plan?	5M
4	(a)	Derive an equation for computing stopping sight distance.	5M
	(b)	Design the length of transition curve for a horizontal highway curve of radius 500 m with a design speed 100 kmph. The super elevation is provided by rotating the pavement w.r.t centre line. The rate of introduction of super elevation is 1 in 120. The road is a two-lane road. The longest wheelbase is 6.2 m. Assume other data required suitably.	5M
		OR	
5	(a)	Analysing various forces acting on a vehicle moving on a horizontal curve, derive an equation for rate of super elevation, ‘e’.	5M
	(b)	A vertical summit curve is formed at the intersection of two gradients, +3.0 and -5.0 percent. Design the length of summit curve to provide a stopping distance for a design speed of 80 kmph. Assume other data suitably.	5M
6	(a)	Explain the factors which affect the capacitor and level of service.	5M
	(b)	What are the causative factors of road accidents?	5M
		OR	
7		Defining the three basic parameters of traffic, explain their interrelationship with the help of neat diagrams.	10M

Contd. in page 2

8	(a)	Write the advantages and disadvantages of rotary intersections.	5M
	(b)	With a neat sketch, explain the full clover leaf type of interchange.	5M
		OR	
9	(a)	Explain the advantages of channelization at intersections.	5M
	(b)	Explain the design criteria of rotary intersection.	5M
10	(a)	What are the differences between flexible and rigid pavements?	5M
	(b)	Define the following two parameters relation to CC pavements and give the equation for their computation: (i) Radius of relative stiffness. (ii) Radius of resisting section.	5M
		OR	
11	(a)	Explain the functions of components of flexible pavement.	5M
	(b)	What are the three critical stress positions in a CC pavement as per Westergaard's analysis? What are the assumptions made by Westergaard?	5M

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Code: 20A01602 **R20**

B.Tech III Year II Semester (R20) Supplementary Examinations January 2024

HIGHWAY ENGINEERING

(Civil Engineering)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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1 Answer the following: (10 X 02 = 20 Marks)

(a) Mention the list of engineering surveys carried out for highway alignment. 2M
(b) Write any two recommendations of Jayakar committee. 2M
(c) When is a vertical curve called a valley curve? 2M
(d) Write the reasons of widening of pavements on horizontal curves. 2M
(e) What is meant by density of a traffic stream? 2M
(f) Define parking accumulation. 2M
(g) What is an at – grade intersection? 2M
(h) Define channelization. 2M
(i) What are the different stresses in rigid pavements? 2M
(j) What are the functions of sub base course? 2M

PART – B

(Answer all the questions: 05 X 10 = 50 Marks)

2 (a) Discuss how the roads help in the growth of economic prosperity and the overall development of a country. 5M
(b) What are the main differences between Nagpur plan and Bombay plan? Discuss. 5M

OR

3 (a) Explain in detail the road classification as per Nagpur Road plan. 5M
(b) Define highway alignment and explain about the obligatory points. 5M

4 Define overtaking sight distance. Derive an expression for computing the OSD for a two – lane two way road with the help of a neat diagram indicating overtaking process. 10M

OR

5 (a) Explain about the situations when summit curves and valley curves are formed. 5M
(b) Calculate the length of transition curve using the following data. Design speed = 65 kmph, radius of circular curve = 220 m, allowable rate of introduction of super elevation (pavement rotated about the centre line) = 1 in 150, pavement width including extra widening = 7.5 m. Assume any other Data required suitably. 5M

6 (a) With the help of a neat diagram, explain the relationship between speed and flow of traffic. 5M
(b) Describe the methodology adopted in parking usage survey by patrolling method. 5M

OR

7 (a) Explain different types of road signs. 5M
(b) Explain with suitable figures and examples, how road markings can be effectively used for regulation of traffic. 5M

8 (a) Explain the objectives of channelization. 5M
(b) Write the advantages and disadvantages of rotary intersections. 5M

OR

9 (a) Explain different types of at grade intersections. 5M
(b) With a neat sketch, explain the traffic movements on a diamond type of interchange. 5M

10 (a) How the stress distribution occurs in a flexible pavement? Explain with the help of a neat diagram. 5M
(b) Explain the critical loading locations as regards wheel load stresses in cement concrete pavement. Discuss Westergaard's concept and assumptions? 5M

OR

11 (a) Explain the various steps involved in the design of flexible pavement as per IRC method. 5M
(b) Discuss about various joints to be provided in rigid pavements. 5M

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