A **Reg. No. :** | | | | | | | | | | |

Question Paper Code : 53104

B.E./B.Tech. DEGREE EXAMINATION, NOV 2022

Civil Engineering

15UCE304 -HIGHWAY AND RAILWAY ENGINEERING

(Regulation 2015)

(Use of IRC 37 is permitted)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. ISD is – times SSD CO1- R

   (a) 1 (b) 2 (c) b3 (d) 4

2. Where topography of place compels adopting steeper gradient than ruling gradient, _____gradient is used CO1- R

   (a) Limiting (b)Exceptional (c)Minimum (d)Zero

3. ____ bars are used across the longitudinal joints of cement concrete pavements CO2- R

   (a) Tie (b) Dowel

   (c) Stress reinforcement (d) Temperature reinforcement

4. The aggregate crushing value of good aggregate acceptable for wearing surface should be CO2- R

   (a) less than 30% (b) More than 30% (c) More than 40% (d) Zero

5. When the crack pattern on a bituminous surface course is almost of the same pattern and location as the cracks of lower pavement layer the cracks are known as_____ crack CO3- R

   (a) Reflection (b) Alligator (c) Longitudinal (d) Depression

6. Diversion or removal of excess soil-water from the subgrade is termed as CO3- R

   (a) Surface drainage (b)Sub surface drainage

   (c) Special drainage (d) Capillary cut off

7. Longitudinal movement of rail with respect to sleeper in track is known as CO4- R

(a) Kink (b) Creep (c) Coning (d) Buckling

8. _____ are used in rail joints to maintain the continuity of rails. CO4- R

(a) Bearing plate (b) Spikes (c) Fish plate (d) Bolt

9. Name the device which is used to ensure a mechanical relationship between setting of points and taking OFF of the corresponding signal CO5- R

(a) Stretcher bar (b) Tappet (c) Detector (d) Point lock

10. First stop signal at a station is known as CO5- R

(a) Home signal (b) Outer signal (c) . Departure signal (d) Starter signal

PART – B (5 x 2= 10Marks)

11. Enumerate the classifications of roads. CO1- R

12. Narrate any four the desirable properties of bitumen? CO2- R

13. List out the various types of failures in flexible pavement. CO3- R

14. Under what condition extra winding is adopted? CO4- R

15. List out different types of yards CO5- R

PART – C (5 x 16= 80Marks)

16. (a) (i) Briefly outline the main features of various road patterns commonly used. CO1- U (8)

(ii) Explain the various factors controlling the alignment of highway. CO1- U (8)

Or

(b) Calculate the length of transition curve on a national highway located in rolling terrain with design speed of 80 kmph curve radius of curve 250m. The pavement is rotated about centre lane; rate of attainment of super elevation is 1 in 150. Width of pavement including extra widening is 7.5m. Assume any other data if required. CO1- App (16)

17.	(a)	Narrate the step by step procedure involved in bituminous mix design.	CO2- App	(16)
		Or		
	(b)	Design the flexible pavement for construction of new highway with the following data. Number of commercial vehicles as per last count = 1500 Period of construction = 3 years Annual traffic growth rate = 7.5% Category of road = NH, two lane single carriageway Design life = 10 years. Assume suitable data if required	CO2- App	(16)
18.	(a)	Describe the purpose and use of Benkelman Beam with neat sketches.	CO3- U	(16)
		Or		
	(b)	Explain the construction procedure of concrete roads with neat sketches.	CO3- U	(16)
19.	(a)	Draw a typical cross section of permanent way and explain the functions of any two components of permanent way.	CO4- U	(16)
		Or		
	(b)	Calculate the equilibrium cant on B.G. curved track of 7 degree for an average train speed of 50 kmph ? Also calculate the maximum permissible speed after allowing the maximum cant deficiency of 7.6 cm.	CO4- App	(16)
20.	(a)	Design all the elements required for a turnout of .1 in 8.5 taking off from a straight B.G. track with its curve starting from the toe of switch. i.e. tangential to the gauge face of the outer main rail and passes through theoretical nose of crossing, ie TNC .Given heel divergence = 11.4 cm. Assume suitable data if required	CO5- App	(16)
		Or		
	(b)	Compare the different methods of plate laying during the construction of railway tracks.	CO5- App	(16)

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