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

Question Paper Code: 94105

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

Fourth Semester

Civil Engineering

19UCE405 - HIGHWAY ENGINEERING

(Regulations 2019)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Formula for estimating the length of NH and SH is recommended by CO1- U

   (a) First 20 year plan (b) Mumbai plan (c) Five year plan (d) Lucknow plan

2. The Width of the three lane road is CO1-App

   (a) 10.5m (b) 15 m (c) 11.5m (d) 9m

3. The ruling design speed on a NH as per IRC is CO2-App

   (a) 80 Kmph (b) 100 Kmph (c) 120 Kmph (d) 140 Kmph

4. The degree of the circular curve is 20 Degree. Estimate the radius of the curve CO2-U

   (a) 86 m (b) 96 m (c) 106m (d) 116 m

5. The role of Surface course in pavement is CO3-U

   (a) Wear and tear and protecting base course (b) Good look

   (c) Good wearing surface (d) Protecting the vehicles

6. Dowel bars are used in CO3-U

   (a) Transverse joints (b) Longitudinal joints (c) both joints (d) construction joints

7. Camber provided in water bound macadam road is CO4-U

   (a) 1 in 33 (b) 1 in 40 (c) 1 in 25 (d) 1 in 13

8. Impact test values are used for ……course CO4-U

(a) Base course (b) Surface course (c) sub base (d) wearing course

9. Mud pumping is one of the_____ CO5- R

(a) popular failure occur in rigid pavement

(b) providing mud to the base course

(c) pumping procedure

(d) strengthening measure used in rigid pavement

10. Benkelman beam is used to measure CO5- R

(a) Structural cracks (b) Diagonal cracks (c) undulations (d) potholes

PART – B (5 x 2= 10 Marks)

11. Highlight the salient features of "second 20-year road development plan" What are the changes it made in road development. CO1- App

12. Construct the procedure for calculating the length of valley curve. CO2- App

13. Name factors influencing the design of flexible pavements. CO3- App

14. What is the purpose of conducting softening point test on bitumen? CO4- App

15. Classify the various types of General failures in flexible pavement? Explain the causes? CO5- App

PART – C (5 x 16= 80 Marks)

16. (a) Analyse the role of any four Institutions formed based on the recommendations of the Jayakar committee in Road development initiatives of the government. CO1- App (16)

Or

(b) Justify the need for considering various factors which influencing the ideal alignment of a highway, with a case study of Madurai- Melur Highway. CO1- App (16)

17. (a) Derive the formula for calculating super elevation on horizontal curves and calculate the super elevation to be provided on the curve of 220m radius with design speed of 60kmph. CO2- App (16)

Or

(b) Express the objectives of widening of road pavements at horizontal curves? Derive an expression for the extra widening. CO2- App (16)

18.	(a)	Determine the stresses at interior, edge and corner regions of a rigid pavement using Westergaard's method. Take P=4100KG; E=3X105 kg/cm2, h=20cm, μ=0.15, k=4.0kg/cm2 and a=15cm.	CO3-App	(16)
		Or		
	(b)	Write down the functions of providing dowel bars and tie bars in Cement concrete pavement joints. Highlight their roles and advantages.	CO3-U	(16)
19.	(a)	Describe the step by step procedure in construction of bituminous concrete road.	CO4- U	(16)
		Or		
	(b)	Describe the step by step procedure in construction of water bound macadam road	CO4- U	(16)
20.	(a)	Elaborate the common failures that occur in concrete pavements, suggest suitable remedial measures.	CO5- U	(16)
		Or		
	(b)	How cracks and potholes affect the performance of a bituminous road. Justify with suitable suggestions to over this issue	CO5- U	(16)

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