Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V (NEW) EXAMINATION – WINTER 2023

Subject Code:3150613 Date:13-12-2023

Subject Name:Pavement Design and Highway construction

Time:10:30 AM TO 01:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	Explain modulus of resilient of subgrade.	**03**
	(b)	Discuss advantages of modified bitumen in brief.	**04**
	(c)	Explain various pavement layers with neat sketch.	**07**
Q.2	**(a)**	Write a short note on penetration macadam.	**03**
	(b)	Compare alternate bay and continuous bay methods of construction of cement concrete road.	**04**
	(c)	Write the construction procedure for WBM	**07**
		OR	
	(c)	Explain Dry lean concrete. Write the advantages of dry lean concrete	**07**
Q.3	**(a)**	The standard single axle load is 8.2 Tonnes. The axle load spectrum from a survey data is presented in the following table. Find the value of VDF using fourth power damage law.	**03**

Axle Load range (tonne)	17-15	15-13	13-11	11-09	09-07	07-05
Percentage frequency	5	20	25	37	10	3

	(b)	State the procedure of Marshall stability test.	**04**
	(c)	Explain Burmister three layers theory with neat sketch.	**07**
		OR	
Q.3	**(a)**	Write a short note on ESWL .	**03**
	(b)	Compute the design traffic (in msa) for bituminous pavement by considering the following data • Four lane divided carriageway • Initial directional traffic in the year of completion of construction = 2500 cvpd • Traffic growth rate per annum = 6.0 per cent • Design life period = 20 years • Vehicle damage factor = 5.2	**04**
	(c)	Write the steps to be followed for analysing flexible pavements using IITPAVE.	**07**
Q.4	**(a)**	Discuss the importance of drainage in pavement design.	**03**
	(b)	Explain factors affecting pavement design.	**04**
	(c)	Calculate the stresses at interior, edge and corner region of cement concrete pavement using Westergaard's stress equations. Take wheel load = 5000 kg,	**07**

Ec = 3.1 x 10^5 kg/cm^2 , Pavement thickness = 20 cm, μ = 0.15, Modulus of subgrade reaction K = 7 kg/cm^3, Radius of contact area = 15cm

OR

Q.4	**(a)**	Define: (1) Modulus of subgrade reaction (2) Poison's ratio (3) warping stress	**03**
	(b)	Differentiate between dowel bar and tie bar.	**04**
	(c)	Discuss the critical combination of stresses due to wheel load and temperature effects in rigid pavement.	**07**
Q.5	**(a)**	Enlist and explain type of pavement maintenance.	**03**
	(b)	Explain the advantages of concrete block pavement. Enlist various types of concrete blocks.	**04**
	(c)	Classify pavement distress in flexible pavement and mention the causes and preventive measures of any three type of distress as per IRC 82:2015	**07**

OR

Q.5	**(a)**	Enlist functions of Pavement Maintenance Management System.	**03**
	(b)	What are the benefits of white topping as per IRC SP:076-2015	**04**
	(c)	Enlist various aspects of recycling and explain hot in place recycling in detail.	**07**

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