Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME- SEMESTER II– EXAMINATION – SUMMER 2015

Subject Code: 2721302 **Date: 28/05/2015**

Subject Name: Pavement Design, Construction and Evaluation

Time: 2:30 PM – 5:00 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	Give detailed comparison between: (i) Flexible and Rigid pavements, (ii) Highway and Runway pavements.	**07**
	(b)	What are the functions of different layers of pavements? Explain various factors affecting pavement design.	**07**
Q.2	**(a)**	Briefly explain: Tyre pressure, contact pressure, rigidity factor, ESWL, EWLF	**07**
	(b)	The loaded wt. on the rear dual wheels of a truck is 5500 kg. The c/c spacing and clear space in the dual wheels are 30 cm and 10 cm respectively. Calculate the ESWL for pavement thickness of (i) 20 cm, (ii) 35 cm.	**07**
		OR	
	(b)	Compute the radius of relative stiffness and equivalent radius of resisting section of 20 cm thick cement concrete slab from the following data: E of Cement concrete = 2.1 x 10^5 kg/cm^2, Poissonôs ratio for concrete = 0.15, Modulus of subgrade reaction = 7 kg/cm^3, radius of contact area of wheel load = 15 cm.	**07**
Q.3	**(a)**	Explain the CBR method of flexible pavement design. What are the considerations in design of bituminous pavements as per IRC 37: 2012?	**07**
	(b)	Design a suitable bituminous pavement section for a two-lane road with a Single carriageway. The traffic expected is 500 commercial vehicles per day in both directions with average vehicle damage factor of 2.0. Design subgrade CBR is 5 % and the assumed design life of the pavement is 10 years. Take lane distribution factor 0.75. Use Guidelines of IRC 37-2001.(See Fig.1 and Plate 1)	**07**
		OR	
Q.3	**(a)**	Explain with sketch Marshallôs stability test procedure for bituminous mix design.	**07**
	(b)	Design the Tie bars for the CC pavement having following data: Slab thickness = 35 cm, Lane width = 3.5m, Coefficient of friction = 1.5, Density of concrete = 2400 kg/m^3, Allowable tensile stress in plain bars = 1250 kg/cm^2, Allowable bond stress = 17.5 kg/cm^2, Diameter of tie bar = 12mm. Use Guidelines of IRC 58-2002.	**07**
Q.4	**(a)**	Explain with sketches: Stresses in cement concrete pavements.	**07**
	(b)	Calculate the stresses at interior, edge and corner region of cement concrete pavement using Westergaardôs stress equations. Take wheel load = 5100 kg, Ec = 3 x 10^5 kg/cm^2 , Pavement thickness = 15 cm, μ = 0.15, Modulus of subgrade reaction K = 5 kg/cm^3, Radius of contact area = 15 cm.	**07**
		OR	
Q.4	**(a)**	Explain Benkelman Beam test with sketch.	**07**

(b) Benkelman beam deflection studies were carried out on 10 selected points on a stretch of flexible pavement during summer season using a dual wheel load of 4085 kg, 5.6 kg/cm2 pressure. The deflection values obtained in mm after making the necessary leg corrections are given below. If the present traffic consists of 850 CV per day, determine the thickness of bituminous overlay required, if the pavement temperature during the test was 30^0 C and correction factor for subsequent increase in subgrade moisture content is 1.3. Assume traffic growth rate increase as 8 % and duration between last count and construction of overlay as 2 year. Assume allowable deflection = 1.0mm and equivalency factor = 2 for the bituminous concrete overlay. **07**

1.40, 1.35, 1.48, 1.60, 1.55, 1.45, 1.36, 1.46, 1.52, and 1.45 mm.

Q.5 **(a)** Explain special points to be considered while road construction in black cotton soil. **07**

(b) Describe with sketches failures in flexible pavements. Write the remedial measures for them. **07**

OR

Q.5 **(a)** Discuss the importance and methods of surface and sub surface drainage in pavement construction. **07**

(b) Write short note on óPavement Evaluationô. What is óPavement Serviceabilityô concept? **07**

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