Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – II • EXAMINATION – SUMMER • 2014

Subject code: 1721906 Date: 23-06-2014

Subject Name: Pavement Design and Analysis

Time: 02:30 pm - 05:00 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)** Explain curling stresses for infinite rigid pavement slab assuming that slab bends in both direction due to temperature difference. **07**

(b) What is mechanistic-empirical design? Differentiate between functional failure and structural failure in the case of pavement? **07**

Q.2 **(a)** Design a rigid overlay for a badly crushed concrete pavement of 20 cm thickness, having coefficient as 0.35. The design thickness of equivalent single slab placed directly on the sub-grade with a working stress equal to that of overlay slab is 30 cm. As per US corps of engineers, for leveling course values of X=2, Y=2 and Z=0.5 are given. **07**

(b) State the prioritization of maintenance operation to satisfy the maintenance objectives. **07**

OR

(b) State the guidelines for periodic renewable treatment for NH for single & double lane width. **07**

Q.3 **(a)** State the assumptions of made by Burmister to the state of stress or strain for Elastic layered systems **07**

(b) Determine the thickness of a concrete pavement using Westergaardôs corner load formula to support a maximum wheel load of 4100 kg. Allow 10 percent for impact. The tyre pressure may be taken as 5.5 kg/cm². The modulus of subgrade reaction is 5.5 kg/cm³. The flexural strength of concrete may be taken as 40 kg/cm². Use a factor of two. Assume slab thickness of 20 cm, poisonôs ratio of concrete as 0.15 and modulus of elasticity of concrete as 3×10^6 kg/cm^2 **07**

OR

Q.3 **(a)** State the limitations of layered theory. **07**

(b) Design the reinforcement for a 12 cm thick simply supported RCC pavement. The contraction joints are spaced at 12 m intervals. The pavement width is 7.5 m, comprising of two lanes. Allowable stress for steel as 3000 kg/cm^2. Take of coefficient of friction as 1.5. Assume weight of slab as 288 kg/m². **07**

Q.4 **(a)** State the concept of present serviceability index for pavement. **07**

(b) State the relationship between contact pressure and tyre pressure. **07**

OR

Q.4 **(a)** The tyre inflation pressure is 7.5 kg/cm² and the wheel load is 5000 kg. Calculate the radius of contact area. Calculate radius of equivalent distribution of pressure area, if the slab thickness is 30 cm. **07**

(b) What is vehicle damage factor? How to determine it? **07**

Q.5 **(a)** State the symptoms, causes and remedies of streaking defect and hungry surface in flexible pavement. **07**

(b) What do you mean by full depth reclamation? State the merits and demerits of it. **07**

OR

Q.5 **(a)** State the symptoms, causes and remedies of blowup and punchout defects in rigid pavement. **07**

(b) Write a short note on plate bearing tests. **07**

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