

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 Westergaard's 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/cm^2 . The modulus of subgrade reaction is 5.5 kg/cm^3 . The flexural strength of concrete may be taken as 40 kg/cm^2 . Use a factor of two. Assume slab thickness of 20 cm, poisson's ratio of concrete as 0.15 and modulus of elasticity of concrete as $3 \times 10^6 \text{ kg/cm}^2$ **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/m^2 . **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/cm^2 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**
