Seat No.: _____   Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY
M. E. - SEMESTER – II • EXAMINATION – WINTER • 2013

Subject code: 1721302   **Date: 27-12-2013**
Subject Name: Pavement Design and Evaluation
Time: 10.30 am – 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. **Use of IRC and relevant codes permitted.**

Q.1 **(a)** What are the various factors affecting the design of highway pavement? **07**
 (b) Estimate the stresses developed at interior, edge and corner regions of a **07**
cement concrete pavement using Westergaard's stress theory with
following data.
 i) Wheel load P = 4800 kg/m^2
 ii) Young's Modulus of concrete E = 3 x 10^5 kg/m^2
 iii) Pavement thickness h = 20 cm
 iv) Poisson's ratio μ =0.15
 v) Modulus of subgrade reaction K = 8 kg/cm^3
 vi) Radius of contact area a = 15 cm.

Q.2 **(a)** Enlist the theories of stress distribution and Explain the Boussinesq's **07**
theory of stress distribution.
 (b) Determine the deflection at the surface of a pavement due to wheel load **07**
of 40 kN and a tyre pressure of 0.6 MN/m^2. The young's modulus of the
pavement and subgrade material may be assumed to be uniform equal to
25 MN/m^2.

OR

 (b) Estimate twenty year EWL and TI values using the following AADT **07**
data. Assume 50% increase in traffic in next 20 year period.

No of axle	AADT (Two dimension)	EWL (Constants)
2	300	450
3	450	1100
4	400	2500
5	150	5000

Q.3 **(a)** Compare the highway pavement and runway pavement. **07**
 (b) Draw the sketch showing the various layers in pavement and also state **07**
the functions of each layer.

OR

Q.3 **(a)** Explain possible types of failures in rigid pavements. **07**
 (b) Write a short note on highway maintenance. **07**

Q.4 **(a)** Explain the IRC method of flexible pavement design in detail. **07**
 (b) What is the temperature stress developed at the edge in the concrete if **07**
Modulus of elasticity of concrete = 3 x 10^5 kg/cm^2
Coefficient of thermal expansion = 10 x 10^{-6} per ˚C

Bradbury coefficient = 0.812
Temperature difference = 18 ˚C

OR

Q.4 **(a)** Explain the concept of ESWL with sketch. **07**

(b) Explain various types of overlays in pavement. **07**

Q.5 **(a)** Enlist the various methods of pavement evaluation and explain **07** Benkelman beam method in detail.

(b) Explain the various types of joints in rigid pavement with sketch. **07**

OR

Q.5 **(a)** A plate load test was carried out on sub grade soil using 300mm radius **07** rigid plate. A load of 8 tonnes resulted in a deflection of 16 mm. Calculate the elastic modulus of soil if the poisson's ratio is 0.5.

(b) Explain the method of finding the road unevennesss. **07**

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