

GUJARAT TECHNOLOGICAL UNIVERSITY**M.E –IIst SEMESTER–EXAMINATION – JULY- 2012****Subject code: 1721302****Date: 09/07/2012****Subject Name: Pavement Design and Evaluation****Time: 10:30 am – 13:00 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 possible types of failures in rigid pavements. **07**
 (b) Estimate the stresses developed at interior, edge and corner regions of a cement concrete pavement using Westergaard's stress theory with following data. **07**
- i) Wheel load $P = 5100 \text{ kg/m}^2$
 - ii) Young's Modulus of concrete $E = 3 \times 10^5 \text{ kg/m}^2$
 - iii) Pavement thickness $h = 18 \text{ cm}$
 - iv) Poisson's ratio $\mu = 0.15$
 - v) Modulus of subgrade reaction $K = 6 \text{ kg/cm}^3$
 - vi) Radius of contact area $a = 15 \text{ cm}$.

- Q.2** (a) Explain the Boussinesq's theory of stress distribution and show how it can be used for design of highway pavements. **07**
 (b) Determine the deflection at the surface of a pavement due to wheel load of 50 kN and a tyre pressure of 0.5 MN/m^2 . The young's modulus of the pavement and subgrade material may be assumed to be uniform equal to 20 MN/m^2 . **07**

OR

- (b) Explain the types of failures in rigid and flexible pavements. **07**

- Q.3** (a) What are the various functions and desirable characteristics of pavements / **07**
 (b) Draw the sketch showing the various layers in pavement and also state the functions of each layer. **07**

OR

- Q.3** (a) What are the various factors affecting the design of highway pavement? **07**
 (b) Explain various types of joints used in concrete pavements. **07**
- Q.4** (a) Enlist all the factors affecting the design of rigid pavement and describe any one of them. **07**
 (b) What is the temperature stress developed at the edge in the concrete if **07**

Modulus of elasticity of concrete = $3 \times 10^5 \text{ kg/cm}^2$
 Coefficient of thermal expansion = $10 \times 10^{-6} \text{ per } ^\circ\text{C}$
 Bradbury coefficient = 0.812 ; Temperature difference = $15 \text{ }^\circ\text{C}$

OR

- Q.4** (a) Explain C B R method of pavement design. How is this method useful in determining the thickness of pavement layers. **07**
 (b) Explain possible types of failure in rigid pavement with sketches. **07**
- Q.5** (a) Enlist the various methods of pavement evaluation and explain **Bankalman beam deflection method** in detail. **07**
 (b) Estimate fifteen year EWL and TI values using the following AADT data. Assume 60% increase in traffic in next 20 year period. **07**

No of axle	AA DT (Two dimension)	EWL (Constants)
2	400	450
3	350	1100
4	200	2500
5	80	5000

OR

- Q.5** (a) Describe why highway maintenance is needed? **07**
 (b) A plate load test was carried out on sub grade soil using 300mm radius rigid plate. A load of 6 tonnes resulted in a deflection of 14mm. Calculate the elastic modulus of soil if the poisson's ratio is 0.5. **07**
