

GUJARAT TECHNOLOGICAL UNIVERSITY**M.E Sem-II Examination July 2010****Subject code: 721302****Subject Name: Pavement Design and Evaluation****Date: 06 /07 /2010****Time: 11.00am – 1.30pm****Total Marks: 60****Instructions:**

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

- Q.1** (a) Describe the structural difference between the concrete and bituminous pavements. **06**
- (b) Explain the various types of joints used in concrete pavements. **06**

- Q.2** (a) How is the combined effect of temperature stress and load stress considered in concrete pavements? **06**
- (b) A plate load test is carried out on sub grade soil using a 300mm radius rigid plate. A load of 5 tonnes resulted in a deflection of 1.2 mm . Determine the elastic modulus of the soil, if the Poisson's ratio is 0.5. **06**

OR

- (b) Compute the radius of relative stiffness of 19 cm thick cement concrete slab from the following data. **06**
- Modulus of elasticity of concrete = 210000 Kg/cm²
- Poisson's ratio for concrete = 0.15
- Modulus of subgrade reaction = 3.0 Kg/cm²

- Q.3** (a) Calculate the equivalent C- value of a three layered pavement section having individual C- values as given below. **06**

Material	Thickness cm	C-value
Bituminous	12	65
Cement treated base	25	275
Gravel sub-base	15	20

- (b) Determine the spacing between contraction joints for 3.5 meter slab width having thickness of 20 cm and $f = 1.5$ for the following cases: **06**
- i) For plain C C, allowable $S_c = 0.8 \text{ kg/cm}^2$
- ii) For reinforcement cement concrete, 1.0 cm dia. Bars at 0.30 m spacing

OR

- Q.3** (a) What is VDF. The std. single axle load 8.2 Tonnes spectrum from a survey data is presented in the following table . Find the values of VDF. **06**

Axle load range (tonnes)	Percentage frequency
17-15	04
15-13	19
13-11	24
11-09	37
09-07	12
07-05	04

- (b) What is the temperature stress developed at the edge in concrete, if. **06**
 Modulus of elasticity of concrete = $3.0 \times 10^5 \text{ Kg/cm}^2$
 Coefficient of thermal expansion = $10 \times 10^{-6} \text{ per } ^\circ\text{C}$
 Bradbury coefficient = 0.812
 Temperature difference = $12.98 ^\circ\text{C}$

- Q.4** (a) Explain ESWL and the concept in the determination of the equivalent wheel load. **06**
 (b) Explain types of failures in flexible pavements. **06**

OR

- Q.4** (a) Explain the CBR method of pavement design. How is this method useful to determine thickness of components layers. **06**
 (b) Explain possible types of failures in rigid pavements. **06**

- Q.5** (a) Describe Benkelman Beam test. **06**
 (b) Calculate fifteen year **EWL** and **TI** values using the following AADT data. Assume 50% increase in traffic in 15 years period. **06**

Number of axle	AADT (Two dimensions)	EWL CONSTANTS
2	4000	450
3	325	1100
4	200	2500
5	70	5000

OR

- Q.5** (a) Explain the step by step procedure of Dowel bar design as per IRC 58 -2002. **06**
 (b) Discuss briefly importance of Highway Maintenance and its need. **06**
