

GUJARAT TECHNOLOGICAL UNIVERSITY
ME - SEMESTER– II(Old course) • EXAMINATION (Remedial) – WINTER- 2015

Subject Code: 1721302**Date: 10/12/2015****Subject Name: Pavement Design and Evaluation****Time: 2:30 pm to 5:00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Support your answers with suitable examples, sketches & flow diagrams.

- Q.1** (a) Explain ESWL and the concept in the determination of the equivalent load? **07**
 (b) Discuss the effect of repeated applications of load on pavements. Explain equivalent load factors for load repetitions. **07**
- Q.2** (a) Calculate design repetitions for 20 years period for various wheel load equivalent to 4082kg wheel load using the following traffic survey data on a four lane road. **07**

Wheel load in kg	Average daily traffic (Both directions)	Percentage of total traffic volume
2268kg	Total volume consideration traffic growth (215)	13.17
2722 kg		15.30
3175kg		11.76
3629kg		14.11
4082kg		6.21
4536kg		5.84

- (b) Design the Pavement section by Tri axial test method using the following data: **07**
 Wheel load: 4100 kg
 Radius of contact area = 15cm, Traffic coefficient = 1.5
 Rainfall coefficient = 0.9, Design deflection = 0.25 cm
 $E \text{ of Value of sub grade soil} = 100 \text{ kg/sqcm}$
 $E \text{ of Value of base course material} = 400 \text{ kg/sqcm}$
 $E \text{ of Value of 7.5 cm thick bituminous concrete surface course} = 1000 \text{ kg/sqcm}.$

OR

- (b) Explain Burmister's method of Pavement Design. **07**
- Q.3** (a) Design a flexible pavement by stabilometer and cohesion meter value method using the following data. **10**
 Traffic index = 1
 $\text{Equivalent C value} = 90 \text{ gm/cm}^2$
 Test result on sub grade soil

Moisture content	R-value	Expansion (Kg/cm ²)	Exudation (Kg/cm ²)
15	65	0.10	48
18.5	40	0.085	35
23	18	0.04	20

- (b) Explain the terms: Contact Pressure, Tyre Pressure, Inflation Pressure **04**

OR

- Q.3** (a) Explain the Tri axial test method of Pavement Design. **07**
 (b) Write a note on Design of aircraft runway Pavement. **07**

Q.4 (a) How could the Performance of Pavement be evaluated? Suggest method to evaluate the Performance of Pavement? **07**

(b) Benkelman Beam deflection studies were carried out on 15 selected locations on a stretch of flexible pavement during summer season using a dual wheel load of 4085 kg, 5.6kg/cm² pressure. The deflection values obtained in mm after making the necessary lag corrections are given below. If the Present traffic consists of 750commercial vehicles per day, determine the thickness of Bituminous overlay required, if the Pavement temperature during the test was 30 degree Celsius and the correction factor for subsequent increase in sub grade moisture content is 1.3.Assume annual growth rate of Traffic = 7.5%. and construction period = 2 years. **07**

1.4mm	1.32mm	1.25mm	1.35mm	1.48mm
1.60mm	1.65mm	1.55mm	1.45mm	1.40mm
1.36mm	1.46mm	1.50mm	1.52mm	1.45mm

Q.5 (a) Determine the thickness of concrete pavement using Westergaard's corner load formula to support maximum wheel load of 4200 Kg. Allow 10% for impact, other data are as under: **06**

$$K = 6\text{Kg/cm}^3$$

$$E = 3 \times 10^3 \text{ Kg/cm}^2$$

$$\mu = 0.15$$

$$\text{Flexural strength of concrete} = 50 \text{ Kg/cm}^2$$

$$\text{Use factor of safety} = 2.0$$

$$\text{Assume tyre pressure} = 6\text{Kg/cm}^2$$

(b) Calculate the spacing of expansion joint from the following data **04**

$$\text{Maximum joint width} = 2 \text{ cm}$$

$$\text{Temperature of laying concrete} = 20^\circ \text{C}$$

$$\text{Maximum slab temperature expected} = 50^\circ \text{C}$$

$$\text{Coefficient of Thermal expansion} = 10 \times 10^{-6} \text{ per } ^\circ \text{C}$$

(c) Compare different method of obtaining wheel load stress at critical section for a rigid pavement. **04**