

AQ-2948

**Faculty of Engineering & Technology****M.E. (Civil Engg.) (Full Time) (Geotech. Engg.) (C.G.S.) (New) Semester-II Examination  
PAVEMENT ANALYSIS & DESIGN (Elective-II)****Paper—2 SFGE 5**

Time—Three Hours]

[Maximum Marks—80

**INSTRUCTIONS TO CANDIDATES**

- (1) All questions carry marks as indicated.
- (2) Due credit will be given to neatness and adequate dimensions.
- (3) Assume suitable data wherever necessary.
- (4) Illustrate your answers wherever necessary with the help of neat sketches.
- (5) Solve any TWO sub questions from each question out of FIVE.
- (6) Use pen of Blue/Black ink/refill only for writing the answer book.

## 1. Solve any TWO :

- (a) Differentiate between flexible pavement and rigid pavement. 8
- (b) Explain repetition of load. Also calculate design repetition for a 20 year period for various wheel loads equivalent to a 2268 kg wheel load using the following traffic survey data on a four lane road. 8

| Wheel load (kg) | Average daily traffic (both direction) | % of Total traffic volume | Equivalent load factor |
|-----------------|--|---------------------------|------------------------|
| 2268            | Total Volume<br>215                    | 13.17                     | 1                      |
| 2722            |  | 15.30                     | 2                      |
| 3175            |  | 11.76                     | 4                      |
| 3629            |  | 14.11                     | 8                      |
| 4082            |  | 6.21                      | 16                     |
| 4536            |  | 5.84                      | 32                     |

- (c) Explain the design factors affecting highway and airfield pavement. 8

## 2. Solve any TWO :

- (a) Explain Marshal method of bituminous mix design. 8
- (b) Explain with neat sketch, the field method to determine modulus of subgrade reaction 'K'. Its correction required and its importance. 8
- (c) The load penetration values of CBR test conducted on a sample is given below. Determine the CBR value of the soil if 100 divisions of load dial represents 190 kg load in calibration chart of proving ring. 8

| Penetration of plunger (mm) | Load dial reading (divisions) |
|-----------------------------|-------------------------------|
| 0.0                         | 0                             |
| 0.5                         | 0.5                           |
| 1.0                         | 1.5                           |
| 1.5                         | 2.5                           |
| 2.0                         | 6                             |
| 2.5                         | 13                            |
| 3.0                         | 20                            |
| 4.0                         | 30                            |
| 5.0                         | 38                            |
| 7.5                         | 50                            |
| 10.0                        | 58                            |
| 12.5                        | 63                            |

## 3. Solve any TWO :

- (a) Explain in detail the various methods of determining stresses and strains in flexible pavement. 8
- (b) Explain in detail along with diagram and different types of joints provided in concrete pavement. 8

- (c) Calculate the stresses at interior, edge and corner regions of a cement concrete pavement using Westergard's stress equation. Use the following data :

Wheel load = 5100 kg

Modulus of elasticity of cement concrete =  $3 \times 10^5$  kg/cm<sup>2</sup>

Pavement thickness = 18 cm

Poissons ratio of concrete = 0.15

Modulus of subgrade reaction = 6.0 kg/cm<sup>3</sup>

Radius of contact area = 15 cm.

8

4. Solve any TWO :

(a) Enlist various design methods of flexible airfield pavement and explain any one in detail. 8

(b) Explain IRC-58 recommendations for design of concrete pavement. 8

(c) Enlist the various design methods of flexible highway pavement design and explain group index method in detail. 8

5. Solve any TWO :

(a) Explain LCN system of Rigid Airfield pavement design. 8

(b) Enlist different field tests involved in pavement testing and explain field CBR test. 8

(c) State methods of pavement evaluation and explain Benkleman Beam method for pavement evaluation. 8

