2015

Total Pages—5

(Set-1)

M.Tech –2nd(TE)
Analysis and Design of Pavements

Full Marks : 70

Time : 3 hours

Q. No. 1 is compulsory and answer any
five from the rest

The figures in the right-hand margin indicate marks

1. Answer *all* questions : 2 × 10

   (*i*) What is the actual shape of a tyre imprint ?

   (*ii*) What is the legal single axle load as per IRC
   guidelines ?

   (*iii*) What are the major modes of structural
   failure in flexible pavements ?

   (*iv*) What do you mean by group index (GI) ?

   (*v*) What is the value of coefficient of thermal
   expansion for concrete ?

(*Turn Over*)

(vi) Calculate the Modulus of rupture for M40 grade concrete.

(vii) Which Critical pavement response is correlated with fatigue life of pavements ?

(viii) What is the critical combination of stresses in a concrete pavement and when it occurs ?

(ix) What are the different types of joints used in Concrete pavements ?

(x) Briefly mention the distance from the load within which the dowel bars are effective in load transfer ?

2. (a) Explain different layers of a conventional flexible pavement with sketch. 5

(b) Briefly discuss different types of rigid pavements. 5

3. (a) Briefly discuss the Burmister's analysis for three layer pavements. 5

(b) A plate load test is carried out on subgrade soil using a 150 mm radius rigid plate. A load of 50 kN resulted in a deflection of 1·0 mm. Determine the elastic modulus of soil if Poisson's ratio is 0·35. What will be the elastic modulus if Poisson's ratio is 0·5 ?   5

4. Write short notes on the following :   10

(i) Equivalent single wheel load

(ii) Modulus of subgrade reaction

(iii) Resilient Modulus

(iv) Present Serviceability Index.

5. (a) Discuss the factors to be considered in pavement design.   5

(b) What do you mean by fourth power damaging effect ? Find the vehicle damage factor for the axle load spectrum from a survey data as presented in the following table :   5

Axle load Range (Tonnes)	Percentage Frequency
17-15	04
15-13	29
13-11	14
11-09	27
09-07	22
07-05	04

6. (a) Calculate the design traffic as per IRC : 37 : 2001, for a two lane single carriageway road with the following data : 5

Traffic volume in the year 2014 = 800 CV/day
Traffic Growth rate = 7·5 %
Year of completion of construction = 2016
Design life = 15 years
Vehicle damage factor = 3·5
Lane distribution factor = 0·75
Assume suitable data.

(b) Explain the principle of dowel bar design in concrete pavements. 5

7. (a) What do you mean by soil stabilization ? Briefly explain the different methods of soil stabilization. 5

(b) Briefly mention the requirement and specification for cemented bases and subbases in flexible pavements. 5

8. (a) Enumerate various approaches of flexible pavement design. Briefly indicate the basis of design in each case. 5

(b) What are the requirements of a good high-way drainage system ? 5

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