

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)

(2)

- (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

M.Tech -2nd(TE)/Analysis and Design of Pavements(Set-1) (Continued)

(3)

- (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

M.Tech -2nd(TE)/Analysis and Design of Pavements(Set-1) (Turn Over)

(4)

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

(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 highway drainage system ? 5