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Reg. No. : .....

Name : .....

Eighth Semester B.Tech. Degree Examination, May 2018
(2013 Scheme)
13.805.7 : DESIGN AND CONSTRUCTION OF PAVEMENTS (C)

Time : 3 Hours Max. Marks : 100

***Instruction** : Relevant charts and tables are **permitted** in the exam hall.*

PART – A

Answer **all** questions : **(5×4=20 Marks)**

1. Write a short note on the Resilient modulus of pavement materials.
2. What is an Equivalent single wheel load ? How can it be determined ?
3. How do the corner, edge and interior stresses vary (i) due to temperature and (ii) due to load ? Where and when is the most critical situation found ?
4. Indicate how the filler material is designed for use in subsurface drainage system ?
5. What is the principle of falling weight deflectometer method ? Explain.

PART – B

Answer **any one full** question from **each** Module.

Module – I

6. i) Plate bearing tests were conducted with a 75 cm plate diameter on soil subgrade and over 15 cm thick gravel base course. The pressure yielded at 2.5 mm deflection are 0.09 MN/m^2 and 0.14 MN/m^2 for the subgrade and base respectively. Design the pavement section for 40 kN wheel load with a tyre pressure of 0.5 MN/m^2 for an allowable deflection of 5 mm using Burmister's two layer approach. **10**

   ii) The axle load spectrum from a survey data for 3 days is presented in the following table. Determine the Equivalent single axle load repetitions per year in million standard axles (msa). **10**

Axle load range (t)	80 – 90	90 – 100	100 – 110	110 – 120	120 – 130	130 – 140
No. of Passes	189	178	110	99	87	95

OR

P.T.O.

7. Traffic studies were conducted on a stretch of four lane divided highway with flexible pavement indicated that there are 3600 CV/day in one direction. The average growth rate is 5.5% per year and the mean VDF value is 2.5. The estimated period of completing construction is 3 years after the traffic studies. Design the pavement for a design life of 12 years using IRC method. Design CBR of subgrade soil is 8%. Assume data is necessary as per IRC. **20**

Module – II

8. i) Which are the different types of joints provided in a rigid pavement ? Explain with the help of sketches. **10**

   ii) Determine the thickness of a concrete pavement using Westergaard's corner load formula to support a maximum wheel load of 4100 kg. Allow 10% for impact. The tyre pressure may be taken as 5.5 kg/cm^2. The modulus of subgrade reaction is 5.5 kg/cm^3. The flexural strength of concrete may be taken as 40 kg/cm^2. Use a factor of safety of 2. Also determine the distance from the corner at which the maximum stress occurs. **10**

OR

9. i) A cement concrete pavement has a thickness of 32 cm and has two lanes of 7.0 metres width with a longitudinal joint. Design the tie bar along the longitudinal joint using the data : Unit weight of concrete = 2400 kg/cm^3, allowable tensile stress in deformed bars = 2000 kg/cm^2 allowable bond stress in deformed bars = 24.6 kg/cm^2. Diameter of tie bar = 12 mm. **10**

   ii) What are the steps involved for the design of dowel bars across an expansion joint ? **10**

Module – III

10. i) List the specification of materials, method of preparation of mix and construction steps for laying Bituminous Macadam base course. **12**

    ii) With sketches explain the effective surface drainage system for roads. **8**

OR

11. i) Discuss how the problem of road construction in water logged areas may be solved. **10**

    ii) Mention the specification of materials, construction steps and quality control test for laying Premix carpet with seal coat. **10**

Module – IV

12. Write short notes on :

    i) Rutting and Ravelling.

    ii) Mud pumping.

    iii) MERLIN and Bump Integrator.

    iv) Present serviceability index. **20**

OR

13. Traffic studies were conducted on a stretch of six-lane divided highway with flexible pavement indicated that there are 3960 CV/day in one direction. The average growth rate is 4.9% per year and the mean VDF value is 7.2. The estimated period of completing overlay construction is 3 years after the traffic studies. Design the overlay using DBM binder course and BC wearing course for a design life of 10 years. Charts for moisture correction factor and overlay thickness design can be used. BBD study results are given below.

    Mean deflection value = 1.42 mm; Standard deviation of deflection values = 0.27 mm; temperature of bituminous pavement during the study = 46°C; Clayey soil with PI = 11%; moisture content of subgrade during the deflection study = 9%; annual rainfall in the region = 1690 mm. **20**