15CV833

Eighth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Pavement Design

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. What are the desirable characteristics of pavement? **(08 Marks)**

b. List out the difference between highway pavement and airfield pavement. **(08 Marks)**

OR

2 a. List out the assumptions of Burmister's theory. **(08 Marks)**

b. A dual wheel load assembly with 70kN load on each wheel and contact pressure of 0.7kN/mm^2 is applied on a homogeneous mass with modulus of elasticity 12N/mm^2. If the centre to centre distance between the two wheel is 600mm, determine the deflection value at a depth of 0.5m at four points, at the centre of dual wheels and at radial distance of 300, 600 and 900mm from this centre along the line joining centers of the two wheel loads. Use deflection factor chart Fig.Q.2(b). **(08 Marks)**

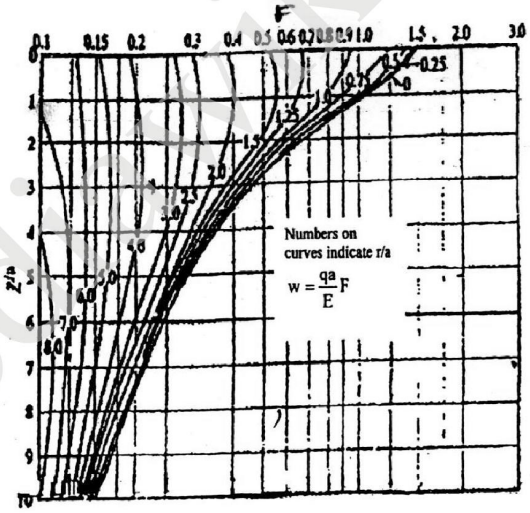

Fig.Q.2(b)

Module-2

3 a. What are the design factors considered in the design of pavement? Explain any three in detail. **(08 Marks)**

b. Calculate the design repetition for 20 years period for various wheel loads equivalent to 22.68kN. Wheel load using the following data on a four lane road. **(08 Marks)**

Load kN	22.68	27.22	31.75	40.82	45.36	49.90	54.43
Volume per day	30	25	20	15	10	5	1

OR

4 a. Explain the significance of ESWL in pavement design. **(08 Marks)**

b. It is proposed to widen an existing 4 lane NH section to 3 lane dual carriage way road. Design the pavement for new carriage way with following data:
Initial traffic in both directions = 4932 CVPD
Construction period = 20 months
Design life = 15 years
Design CBR of soil = 7%
Traffic growth rate = 8%
VDF = 4.5.
Land distribution factor = 75% (0.75)

Pavement Design Catalogue

Plate 2- Recommended Designs for Traffic Range 10-150 msa

CBR 7%				
Cumulative traffic (msa)	Total pavement thickness (mm)	Pavement Composition		
		Bituminous Surfacing		Granular base and sub-base (mm)
		BC (mm)	DBM (mm)	
10	580	40	60	
20	610	40	90	
30	630	40	110	Base = 250
50	650	40	130	
100	575	50	145	Sub-base = 230
150	695	50	165	

(08 Marks)

Module-3

5 a. Explain different types of flexible pavement failure. **(08 Marks)**

b. Explain the various design factors for runway pavement. **(08 Marks)**

OR

6 a. What are the causes of formation of waves and corrugations in flexible pavement? Suggest remedial measures. **(08 Marks)**

b. Explain step by step procedure of conducting Benkleman beam-deflection studies for-evaluation of flexible pavement surface condition. **(08 Marks)**

Module-4

7 a. Write Westergaard's load stress equations at critical regions and discuss critical combination of stresses. **(08 Marks)**

b. Explain IRC recommendation's is the design of dowel bar, tiebar and RCC in pavements. **(08 Marks)**

OR

8 a. Calculate wheel load stresses at interior, edge and corners using Westergaard's equations for wheel load = 51kN, tyre pressure = 0.75N/mm^2, E = 30kN/mm^2, K = 0.08N/mm^2 slab thickness 250mm. **(08 Marks)**

b. A cement concrete pavement has a thickness of 20cm on a 2 lane road of 7.5m with a longitudinal joint along the centre. Design the dimensions and spacing of tie bars for the following data. Working stress in tension S_s = 1400 kg/cm^2 density of concrete W = 2500kg/m^3, friction coefficient 1.5. Allowable bond stress in concrete, Sb = 24.6kg/cm^2. **(08 Marks)**

Module-5

9 a. What are the various types of joints in C.C. pavements? Explain their functions with neat sketches. **(08 Marks)**

b. Explain briefly the pavement evaluation. **(08 Marks)**

OR

10 a. Explain various types of rigid pavement failures, with neat sketch. **(08 Marks)**

b. Explain the following:

i) Fatigue behavior of concrete

ii) Maintenance of Joints. **(08 Marks)**