

15.05.2025

BE - CIVIL - Sem VIII - R-19 - C-Scheme

Time: (3 Hours)

[Total Marks : 80]

N.B:

1. Question No **ONE** is **Compulsory**.
2. Attempt any **Three** from remaining five questions
3. Assume suitable data wherever required.
4. Figures to the right indicate full marks.



1. Attempt any **four** of the following [20]
 - a) Determine Cumulative Standard Axles in msa for 2 lane undivided carriageway using the following data. CBR = 5 %, Initial traffic on completion of construction 300cvpd. Growth rate = 6%, design life = 10 years, VDF = 2.5. 05
 - b) What factors influence the design thickness in the AASHTO method? 05
 - c) The spacing between the contraction joint of concrete pavement is 4.2 m. Determine the tensile stresses developed in the concrete pavement due to contraction if the coefficient of friction between the bottom of the pavement and supporting layer is 1.1 05
 - d) Explain why aircraft wheel loads are more critical in pavement design than highway vehicle loads. 05
 - e) Explain how the two-layer theory improves the stress estimation in flexible pavement systems. 05
2. a) An existing airport rigid pavement has a 10 cm thick concrete slab in good condition. Due to an increase in aircraft loading, the required pavement thickness is now determined to be 20 cm. 10
 Using the U.S. Army Corps of Engineers method, calculate the rigid overlay thickness required under the assumption of a fully bonded overlay condition.
 In addition to the calculation,
 - a) briefly explain the types of rigid overlays and how bond condition affects overlay thickness, and
 - b) describe the steps necessary to ensure proper bonding between the existing pavement and the overlay
- b) Define and explain the significance of traffic growth rate, design life, Lane distribution factor. 10
3. a) An airport is being planned to accommodate the traffic mix shown in the table below. 10
 Convert the given traffic into equivalent DC-8-61 departures. Assume any necessary data for the conversion.
 If traffic grows at a 6% annual rate, how will the equivalent departures change in 10 years?

Aircraft (Wheel Configuration)	Departure, R	Load per Wheel, W
CV-880 (Dual Tandem)	3100	21800
DC-9-32 (Dual)	1100	25200
DC-8-61 (Dual Tandem)	3000	39400

- b) Explain the Benkleman Beam with neat sketch and procedure to determine the characteristic deflection w.r.t IRC-81-1997 10

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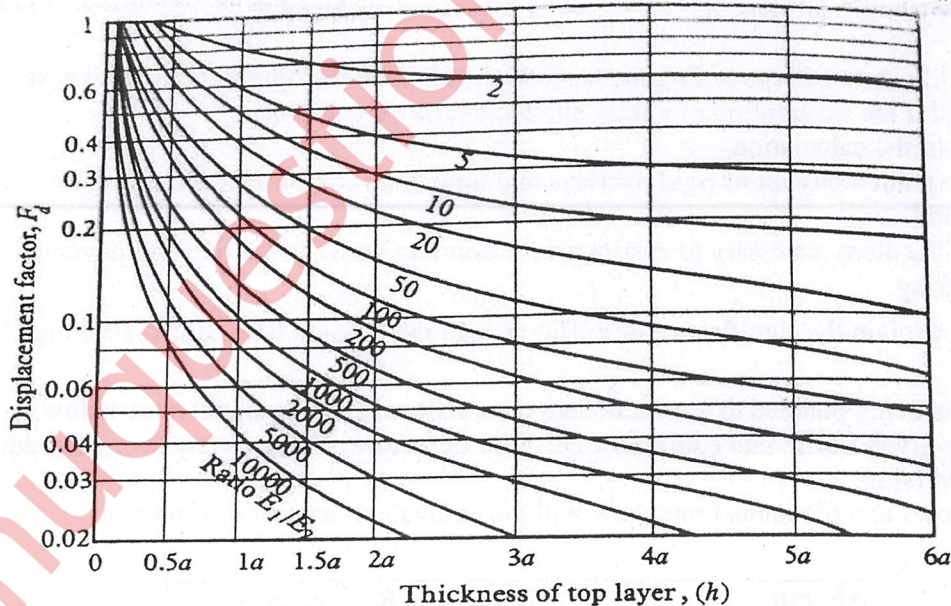
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4. a) The following data is obtained from the axle load survey conducted for 3 days. Determine the equivalent number of standard axle loads of 80 kN repetitions per year 10



Axle load (kN)	No. of axles
30-40	54
40-50	65
50-60	64
60-70	78
70-80	103
80-90	98
90-100	110

- b) What is PMS? What is the purpose of the network level and project level activities? 10
5. a) Write in detail about the different kinds of stresses in rigid pavements 10
- b) Determine the required thickness of an airfield flexible pavement based on Burmister's theory using the following plate load test (PLT) data and other input parameters: 10
- Diameter of plate used = 75 cm
 Pressure observed at 1.25 mm deflection when the plate load test is conducted on the sub-grade 0.82 kg/cm^2 Pressure observed at 1.25 mm deflection when the plate load test is conducted on a base course of 16 cm thickness 2.1 kg/cm^2 Design wheel Load = 23000 kg, Tire Pressure = 15 kg/cm^2
- a) If allowable deflection = 0.125 cm
 b) If allowable deflection = 0.5 cm



6. a) What is a contraction joint in concrete pavement? Why is it necessary? How does an expansion joint function in rigid pavement? 10
- b) Compare the Asphalt Institute method with AASHTO in terms of failure criteria and reliability approach. 10