BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE, PILANI
DEPARTMENT OF CIVIL ENGINEERING
FIRST SEMESTER 2022-23
CE G616: BRIDGE ENGINEERING
MID-SEM EXAMINATION
PART-A (CLOSE BOOK)

Duration: 40 Minutes **Max. Marks: 20**

Q1. Treating the axel loads of the IRC Class 70R Wheeled vehicle as concentrated loads, determine the absolute maximum moment produced in a simply supported slab bridge having an effective span of 8 m.

[10]

Q2. A 15 m span three-lane simply supported T-beam bridge consists four longitudinal girders and five transverse girders. The C/C spacing between the longitudinal girders is 2.6 m. The overhang length on each side is 1.3 m and the width of kerb on each side is 300 mm. Treating loads of IRC Class A loading as concentrated loads and assuming the distance of the nearest concentrated load from the kerb 0.3 m, determine the maximum load transferred to all the longitudinal girders using Courbon's method. For simplicity, assume width of each wheel (W) (for driving vehicle as well as for trailers) as 300 mm.

[10]

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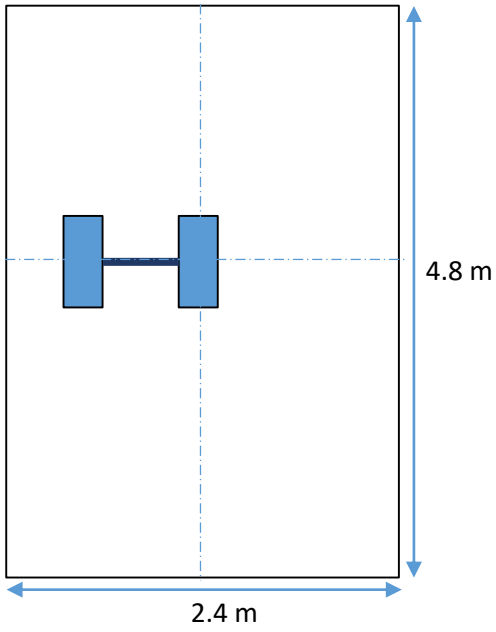
PART-B (OPEN BOOK)

Duration: 50 Minutes **Max. Marks: 25**

Q1. A 16 m span two-lane simply supported T-beam bridge has three longitudinal girders and the C/C spacing between them is 3.0 m. There are five numbers of transverse girders. The moment of inertia of longitudinal and transverse girders are 0.435 m^4 and 0.123 m^4 respectively. If IRC Class 70R tracked vehicle is located at mid-span and in the transverse direction it is placed such that one of the wheels is over the middle girder. Treating the bridge infinitely rigid in the transverse direction, determine the maximum bending moment in the middle longitudinal girder using the Hendry-Jager method.

[5]

Q2. In a T-beam bridge the thickness of deck slab is 200 mm. If the spacing between the longitudinal girders is 2.4 m and the spacing between the transverse girders is 4.8 m c/c, determine the maximum positive and negative moments in the interior slab panel due to an axel carrying a load of 200 kN placed as shown in the Figure. The c/c spacing of wheels on axel is 1.0 m and the dimensions of each wheel are: width (measured along the bridge span) = 650 mm, length (measured along the bridge width) = 250 mm. The thickness of wearing coat is 75 mm. Consider the dispersion of load by 45° through the wearing coat only.



[10]

Q3. For the T-beam bridge described in Q2, if width of longitudinal as well as transverse girders is 200 mm, determine the maximum shear force produced in the slab panel due to the axel loads. Along the span direction slab consider a 45° dispersion of load through the wearing coat and concrete slab.

[10]