Code: 9A01702



## B.Tech IV Year I Semester (R09) Supplementary Examinations, May 2013 BRIDGE ENGINEERING

(Civil Engineering)

Time: 3 hours

Max Marks: 70

## Answer any FIVE questions All questions carry equal marks

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- 1. (a) Explain in detail about various types of loads considered in design of bridges.
  - (b) Define the term "impact factor" and specify the importance of site investigation in bridge design.
- 2. A reinforced concrete box culvert of prismatic form with a clear vent way 3.85m by 3.85 is required for a road crossing. The box culvert has to support a superimposed dead load at 8.5 kN/m<sup>2</sup> and a live load of 50 kN/m<sup>2</sup>. Density of soil is 18 kN/m<sup>3</sup> and the angle of repose of the soil is 30<sup>0</sup>. Adopting M-20 grade concrete and Fe 415 grade tor steel design the box culvert and sketch the details of reinforcement.
- 3. A road bridge deck consists of a reinforced concrete slab continuous over tee beams spaced at 2m centers and cross girders spaced at 5m centers. Thickness of wearing coat = 100 mm. Type of loading is IRC class AA or A whichever gives the worst effect. Using M20 grade concrete and Fe 415 grade HYSD bars. Draw the cross section of the deck slab over two spans showing reinforcement details.
- 4. Design a R.C.C. Tee beam and slab deck to suit the following data. Effective span of girders = 16 m, width of kerbs = 600 mm, clear width of roadway = 7.5 m, thickness of wearing coat = 80 mm, No.of main girders = 4, spacing of main girders = 2.5 m, Spacing of cross girders = 4m, Type of loading = IRC class 70 R tracked vehicle – materials, M20 grade concrete and Fe415 grade HYSD bars. Design the deck slab and draw the details of reinforcement.
- 5. A plat girder bridge deck is to be designed for a B.G. track to suit the following data. Effective span of the girder = 15 m Dead load of sleepers, rails, fittings = 10 kN/m. E.U.L.L for B.M. calculations/track = 1637 kN, E.U.L.L. for S.F. calculations/track = 1806 kN Design the plate girder to conform to the IRS loadings and IRC specifications. Sketch the typical c/s of the bridge deck.
- 6. A single span composite steel girder and an R.C.C. deck slab bridge is proposed for a state highway across a stream. The span of the bridge is 16m and width of the road is 7 m. Slab is supported by 4 numbers of rolled steel joists placed longitudinally symmetrically. Design the R.C.C. deck slab for an equivalent live load of 1250 Kg/m<sup>2</sup> and an impact factor of 0.5. Adopt M15 grade concrete and Fe415 steel HYSD bars.
- 7. Design an elastomeric pad bearing to support a tee beam girder of a major bridge using the fallowing data: Maximum dead load reaction/bearing = 340 kN. Maximum load reaction/ bearing = 550 kN. Longitudinal force due to friction for each bearing = 35 kN. Effective span of the girder = 23 m. Estimated rotation at bearing of the girder due to dead and live loads = 0.003 radians. M-20 grade concrete is used. Total estimated shear strain due to creep, shrinkage and temperature = 5x10<sup>-4</sup> units. Draw the details of the bearing.
- 8. (a) What are the materials used for piers and abatements mention them.
  - (b) Explain briefly about types of piers.
    - (c) List out various types of forced acting on piers.

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