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10CV766

Seventh Semester B.E. Degree Examination, Dec.2015/Jan.2016

Design and Drawings of Bridges

Time: 4 hrs. Max. Marks: 100

Note: 1. ***Answer any TWO full questions from Part-A and ONE from Part-B.***
2. ***Use of IRC 21-2000 and Pigeard's curves are permitted.***
3. ***Assume any missing data suitably.***

PART – A

1 a. With a neat sketch explain the component of bridges. **(06 Marks)**
b. Explain the terms Afflux and scour **(04 Marks)**
c. List the forces to be considered for the design of pier and abutments. **(10 Marks)**

2 a. Design a pipe culvert through a road embankment of height 5.0m, the width of the road is 7.5m and formation width 10m, the side slope of the embankment is 1.5:1, the maximum discharge is 4m^3/sec. the safe velocity is 3m/sec. I.R.C class AA tracked vehicle is to be considered as live load, Assume bell mounted entry. Take Influence coefficient = 0.010, Impact factor = 1.25, unit wt. of soil = 20kN/m^3, Use NP$_3$ 1000/1230, 3EBS = 72kN/m. **(15 Marks)**
b. Draw to a suitable scale the cross section of pipe showing reinforcement details. **(05 Marks)**

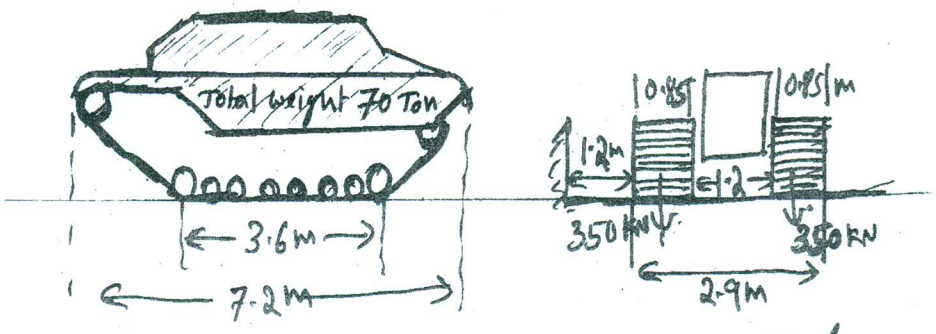
3 Design deck slab for the following data. Width of roadway= 7.5m, Clear span = 5m,
Width of bearing = 400mm, Kerb =0.6 m, Wide
height of vent = 3.0m,
Depth of foundation = 1.4m, Wearing course = 100mm
Consider I.R.C class A.A (Tracked) vehicle
impact factor = 23.5% and constant K or α = 2.72 Material M25 and Fe 415 steel.
Design slab for the flexure only and show the detail of reinforcement. **(20 Marks)**

PART – B

4 a. An RCC T beam bridge girder of effective span 14.5m, across a stream of average bed width of 12m, bed level of stream 101.00m, H.F.L of stream = 106.00m, Ground level 107.00m, Road formation level 108.5m, Hard rock level = 98.00m, Embankment side slope = 1.5:1, width of carriage way = 7.5m, Kerb on either side = 500 × 200mm(depth). Thickness of wearing course = 80mm. Assume 3T beam spaced at 2.5m intervals and 5 cross beams at 3.625m intervals. Use M40, grade concrete and steel Fe415. Consider I.R.C class A.A tracked vehicles. Design the following.
i) An intermediate panel of deck slab by Pigeard's method for flexure. Take Dead load moment coefficient M_1 = 0.047, and M_2 = 0.0175, live load moment coefficient M_1 = 0.0775 and M_2 = 0.02675, Impact factor = 25%, Poisson ratio = 0.15, Density of concrete 24kN/m^3, Density of wearing coat = 22kN/m^3.
ii) An intermediate longitudinal girder using Courban's method, for an impact factor of 10%.
iii) Design the substructure empirically. **(30 Marks)**

Draw the following views to a suitable scale.
iv) Half longitudinal section and half longitudinal elevation. **(15 Marks)**
v) Half plan at top and bottom at foundation level. **(15 Marks)**

5 Design a composite bridge deck consisting of an R.C.C slab on steel girders for two lane national Highway. The span of the bridge is 15.0m. No of steel girder = 4, kerb on either side = 600mm, spacing of girders = 2.5m c/c, material M40 grade concrete and Fe415 steel. Impact factor = 0.25, Bed level R.L = 99.0m, Bed width = 20m, stream bond top = 101.5m, road top level = 104.5m, Hard rock level = 97.5m, wing wall = Return type.
Consider, I.R.C class A.A tracked vehicle. **(30 Marks)**
Draw the following to suitable scale
i) Half longitudinal section and half longitudinal elevation. **(15 Marks)**
ii) Half plan at top and bottom. **(15 Marks)**



Loading of IRE-class A-A-Tracked vehicle

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