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RM-7671

B. E. - IV (Sem. VIII) (Civil) Examination

May / June – 2010

Design of Bridge Structures

(Elective - II)

Time : 4 Hours] [Total Marks : **100**

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **B. E. - 4 (Sem. 8) (Civil)**

Name of the Subject :

☛ **Design of Bridge Structures**

☛ Subject Code No. : **7 6 7 1** ☛ Section No. (1, 2,.....) : **1&2**

Seat No. :

Student's Signature

(2) Assume suitable data if required and mention it clearly on the top of your answer.

(3) Relevant I.S. code is permitted.

(4) Pigeaud's curves are permitted.

(5) Neatly drawn pencil sketches will earn special credits.

(6) Use of IS 456, IS 1343 permitted.

SECTION - I

1 Design a reinforced concrete slab culvert for a National Highway to suit the following data : **26**

Carriage way - two lane (7.5 m wide)

Foot paths - 1 m on either side

Clear span = 6 m

Wearing coat = 80 mm

Width of bearing = 0.4 m

Materials M_{30} grade concrete and Fe 415 grade HYSD bars.

Loading I.R.C. class AA tracked vehicle.

Design the R.C. deck slab and sketch the details of reinforcements in the longitudinal and cross section of slab.

OR

1 Design a R.C.C. Tee beam girder bridge to suit the following data: **26**

Clear width of roadway = 7.5 m

Span (Centre to centre of bearings) = 16 m

Live load : I.R.C. class AA tracked vehicle

Average thickness of wearing coat = 100 mm

Concrete mix : M_{30} grade

Steel : Fe 415 grade HYSD bars.

Using Courbon's method, compute the design moments and shears and design the deck slab, main girder and sketch the typical details of reinforcements.

2 Write short notes : (any **three**) **24**

(i) Economical span length of a bridge

(ii) IRC class AA loading with tracked vehicle and wheeled vehicle figures

(iii) Courbon's method

(iv) Typical class section of post tensioned prestressed concrete bridge decks with advantages.

SECTION - II

1 Design a post tensioned prestressed concrete bridge for following data : **30**

(i) Effective span - 20 m

(ii) Width of road - 7.5 m

(iii) No. of main girder - 4

(iv) Live load - IRC – 70 R tracked vehicle

(v) Kerbs - 600 mm on each side

(vi) For beam f_{ck} (cube) = 50 MPa

(vii) Cube strength of transfer fci = 35 MPa

(viii) Permissible compressive stress at transfer f_{ct} = 17.5 μPa.

(ix) Permissible compressure stress at working load f_{cw} = 16.5 μPa.

(x) E_C = 34 kN/mm^2

(xi) Loss ratio = 0.85

(xii) Use 8 mm dia. wire, characteristic tensile strength f_p = 1500 N/mm^2.

2 Write short notes on : (anay **four**) **20**

(i) Pigeaud's curve

(ii) Guidelines to control cracking as per IRC

(iii) Advantages of prestressed concrete bridges

(iv) Secondary stresses in truss bridges

(v) Hendry-Jaegar method

(vi) Articulation of Bridge
