



**SF-7671**

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

**May / June - 2011**

**Design of Bridge Structures**

*(Elective Group - II)*

Time : 4 Hours]

[Total Marks : 100

**Instructions :**

(1)

नीचे दशांवेव निशानीवाणी विगतो उत्तरवडी पर अवश्य लपवी. Fillup strictly the details of signs on your answer book.	Seat No. :
Name of the Examination :	<input type="text"/>
<b>B. E. - 4 (Sem. 8) (Civil)</b>	<input type="text"/>
Name of the Subject :	<input type="text"/>
<b>Design of Bridge Structures</b>	<input type="text"/>
Subject Code No. : <input type="text" value="7"/> <input type="text" value="6"/> <input type="text" value="7"/> <input type="text" value="1"/>	Section No. (1, 2,.....): <input type="text" value="Nil"/>
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' curves are permitted.
- (5) Neatly drawn pencil sketches will earn special credits.

### SECTION - I

- 1 Design a reinforced concrete slab culvert for a National highway to suit the following data : **30**

Carriage way - two lane (7.5 m wide)

Foot paths - 1 m on either side

Clear span = 7 m

Wearing coat = 80 mm

Width of bearing = 0.3 m

Materials  $M_{35}$  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 : 30
- 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 Caarbon's method, compute the design moments and shears and design the deck slab, main girders and cross girders and sketch the typical details of reinforcements.
- 2 Write short notes : (any **four**) 20
- (a) Pigeaud's curve
- (b) Parameters influencing 'Impact Factors'
- (c) Hendry-Jaegur method
- (d) Typical cross section of post-tensioned pre-stressed concrete bridge deck with advantages
- (e) Secondary stresses in the truss bridges.
- 3 Design a post tensioned prstressed concrete bridge for following data : 20
- (1) Effective span = 20 m
- (2) Width of road = 7.5 m
- (3) Kerbs = 600 mm on each side
- (4) LL = IRC 70 R tracked vehicle
- (5) Use  $f_{ck} = 20$  MPa for deck slab and  $f_{ck} = 50$  MPa for beam
- (6)  $f_{ci} = 35$  MPa,  $f_{ct} = 17.5$  MPa,  $f_{cw} = 16.5$  MPa and  $E_c = 34000$  MPa
- (7) Loss ratio = 0.85, use 8 mm diameter wire, having  $f_p = 1500$  MPa
- (8) Spacing between main girder 2.5 m and no. of main girder = 3
- Assume 250 mm thickness of deck slab and 80 mm thick wearing coat.

OR

- 3** Design a double cantilever bridge as per following data : **30**
- (1) Total length of bridge = 120 m and road width 10 m
  - (2) Foot path 1.5 m on each side
  - (3) Spacing between girders 2.5 m
  - (4) LL = IRC class AA tracked vehicle
  - (5) Use M35 grade of concrete
- 4** Write short notes : (any **four**) **20**
- (a) Guidelines to control cracking as per IRC 21
  - (b) Courbon's method
  - (c) Advantages of prestressed concrete bridges
  - (d) Economical span length of bridge
  - (e) Support arrangement in balanced cantilever bridges.
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