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**Seventh Semester B.E. Degree Examination, Dec.2016/Jan.2017**  
**Design and Drawing of Bridges**

Time: 4 hrs.

Max. Marks:100

**Note: Answer TWO questions from Part-A and ONE from Part-B.**

**PART – A**

- 1 a. Explain bridge classification. (06 Marks)  
b. Write a note on forces considered in design of bridges. (06 Marks)  
c. Explain linear water way, economic span, afflux and scour. (08 Marks)

- 2 Design a suitable pipe culvert for to following data:

- i) Discharge through pipe =  $1.57 \text{ m}^3/\text{sec}$   
ii) Velocity of flow through pipe =  $2 \text{ m/sec}$   
iii) Width of road =  $7.5\text{m}$   
iv) The side slope of embankment  $1.5:1$   
v) Bed level of stream =  $100.00\text{m}$   
vi) Top of embankment =  $103.00\text{m}$

Loading IRC class AA wheeled vehicle with a maximum wheel load  $62.5 \text{ kN}$ . Design the pipe for culvert and draw the C/S of pipe showing details of reinforcement. Take  $C_s = 0.032$ . (20 Marks)

- 3 Design a concrete slab for a slab culvert for the following data:

- Carriage way – two lane  $7.5\text{m}$  wide  
Foot path –  $1\text{m}$  on either side  
Clear span –  $6\text{m}$   
Wearing coat –  $80\text{mm}$   
Width of bearing –  $0.4\text{m}$   
M25 conc FE 415 steel  
IRC class AA tracked vehicle.

Design slab only for flexure and draw cross section of deck slab and longitudinal section of slab. Take  $K = 2.84$ . (20 Marks)

**PART – B**

- 4 Design RCC T beam and slab deck for the following data:

- Effective span of girder =  $16\text{m}$   
Clear width of road way =  $7.5\text{m}$   
Width of kerbs =  $600\text{mm}$   
Thickness of wearing coat =  $80\text{mm}$   
Number of main girder =  $4$   
Spacing of main girder  $2.5\text{m}$   
Spacing of cross girder  $4\text{m}$ .

Assume three edge bearing strength as  $111 \text{ kN/m}$ .

Type of loading IRC class 70R tracked vehicle M20 concrete Fe415 steel. (30 Marks)

Design the deck slab and exterior girder for flexure only and to a suitable scale, draw the following:

- a. Cross section of bridge deck. (10 Marks)
- b. Plan of bridge deck. (10 Marks)
- c. Cross section of exterior T beam showing the details of reinforcement in T beam slab kerb and parapet. (10 Marks)
- Take Pigeaudi curve values for  $K = 0.6$ ,  $m_1 = 0.081$ ,  $m_2 = 0.022$ . For slab,  $m_1 = 0.049$  and  $m_2 = 0.015$  for  $l/K = 1.6$ .

- 5 Design a composite bridge deck with RC slab and steel plate girder to cover a span of 18m.  
Clear width of road ways 7.5m  
Foot path 1m on either side  
Spacing of main girder 2m  
M20 conc Fe 415 steel (30 Marks)
- Design RC deck slab, steel plate girder and draw to a suitable scale.
- a. Cross section of deck slab. (15 Marks)
- b. Longitudinal elevation of composite beam. (15 Marks)
- Take Pigeaudi curve value for  
 $k = 0.5$ ,  $m_1 = 0.085$ ,  $m_2 = 0.017$ ,  $l/k = 2.25$ ,  $m_1 = 0.047$ ,  $m_2 = 0.006$ . Adopt IRC class AA tracked vehicle.

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