

Printed Pages: 02

Subject Code: NCE031

Paper Id: **100703**

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**BTECH
(SEM VII) THEORY EXAMINATION 2018-19
BRIDGE ENGINEERING**

Time: 3 Hours

Total Marks:100

Notes: Assume any Missing Data.

SECTION A

- 1. Attempt any four parts: (5x4=20)**
- a) Write the importance of each and every part of bridge?
 - b) Describe the various types fixed of bearing.
 - c) What is class A and B loading according to IRC?
 - d) Why it is necessary to calculate afflux while designing the waterway in bridge construction.
 - e) Write a short note on Forces on Abutments. What are the factors affecting the span of bridge?
 - f) What specifications should be followed while designing a bridge?

SECTION B

- 2. Attempt both parts: (20x2=20)**
- a) Calculate the reinforcement in R.C.C slab culvert due to total design load of 145.0 kNm. Width of the bridge =12m, No footpath provided, Materials: M25 Concrete, steel deformed bars to IS:1786 (Grade Fe415), Clear span is 5m.
 - b) The reinforced concrete slab panel of a reinforced concrete Tee Beam and slab deck is 2.0 m wide between Tee beams and 4.0 m long between cross girders. Calculate the moment in shorter span and longer span for the R.C slab panel for IRC Class A loading using M-30 Grade concrete and HYSD bars. Assume the thickness of the wearing course as 80 mm & thickness of slab 200mm.

SECTION C

- 3. Attempt any one part: (20x1=20)**
- a) Draw a typical view of box culvert. Also discuss why the box culverts are economical. Explain in detail the steps of designing of the following for a box culvert.
 - (i) Loads and Reactions of box culvert.
 - (ii) Structural design of box culvert.
 - (iii) Hydraulic design of box culvert.
 - b) Sketch the elements of plates girder bridge. Write the design principles of plate girder used in plate girder bridge.

4: Attempt the following: (20X1=20)

Design a R.C.C. Tee beam and slab deck to suit the following data:

Effective span of girders =16m, Clear width of roadway=7.5m, width of kerbs=600mm, thickness of wearing coat=80mm, number of main girders=4, spacing of cross girders=4m, spacing of main girders=2.5m, type of loading: -IRC class 70 R tracked vehicle. Material: - M-20 Grade, Steel-Fe₄₁₅ grade HYSD bars.

5: Attempt any one part: (20X1=20)

a) Design an elastomeric unreinforced neoprene pad bearing to suit the following data.

Vertical load(sustained)=20 KN

Vertical load(dynamic)=40 KN

Horizontal force=600KN.

K=1N/mm²

$\mu = 0.3$

b) What are the loads and forces to be considered in the design of the bridge pier? What are the different type of expansion bearings for girder bridges, state the circumstances under which each would be appropriate.

NITIN AGARWAL
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