

Roll No.

23525

**M. Tech 3rd Semester Civil Engg.
(Specialization in Structural
Design) (Elective-III)**

Examination-May, 2015

Design of Bridges

Paper-MTSD-308

Time : 3 hours

Max. Marks : 100

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard will be entertained after the examination.

Note : Attempt any **five** questions. All questions carry equal marks. .

1. Explain in detail all the steps involved in the planning of a bridge. Also write down the forces that acts on a bridge structure. [20]

2. Design a slab culvert for the following data :

[20]

Culvert to be on state highway, width of the bridge 11m; no footpath provided; condition of expose moderate; clear span 6.5m; height of vent 3m; depth of foundation 1.75m; wearing course 50mm thick asphaltic concrete; concrete M30; steel used is Fe 500. Live load is considered due to class AA tracked vehicle.

3. Design a double cantilever bridge to suit the following data :

[20]

Total length of the bridge = 85 m

Road width = 7.5 m (Two lane)

Footpaths = 1.0 m on either side

Spacing of beams = 1.5 m

Loading :IRC class 70R tracked vehicle

Material: M-30 grade of concrete and Fe 500 grade of steel

Design the salient structural elements of the bridge and sketch the details of reinforcement.

4. What are the different types of Box Girder Bridges ? Explain and draw neat and clean sketches for all. [20]

5. Design a prestressed concrete slab for the following data : [20]

Span (clear) : 5.0 m

Live Load: IRC class AA

Road: National Highway

Foot Path: 1 m on either side

Material: M 35 concrete and Fe 500 grade of steel.

The compressive stress permissible in concrete during transfer: 20 Mpa.

6. Explain the following in detail : [20]

(a) Short term deflections.

(b) What are the checks for stresses at various sections ?

(c) Long-term deflections.

7. Verify the stability of the abutment of a bridge with the following details : [20]

Top width = 1.5 m.

Height = 4 m.

Back batter: 1 in 6

Front face of the abutment is vertical

Material: Stone masonry

Unit Weight of soil: 18 kN/m³

Angle of repose: 35°

Superstructure: T-beam bridge of span 15 m.

Loading : IRC Class 70R

Assume suitable dimensions for the components of the superstore.

8. What are the different types of bearings ? Explain sliding plate, Steel Rocker & R.C. hinge (rocker) bearings in detail with neat and clean sketches. [20]