

23525

M. Tech. 3rd Semester (Civil Engg.) Examination,  
May – 2017

SPECIALIZATION IN STRUCTURAL DESIGN

Paper–MTSD-308

Design of Bridges Elective-III

*Time allowed : 3 hours ] . [Maximum marks : 100*

*Note : Attempt any five questions.*

1. What are the forces that acts on a typical bridge explain?  
Also explain in detail class 70R vehicle loading with  
diagram. 20
2. Design a slab culvert for the following data : 20  
Culvert to be on state highway, width of the bridge 12m;  
no footpath provided; condition of expose moderate;  
clear span 4m; height of vent 3m; depth of foundation  
1.4 wearing course 100mm thick asphaltic concrete;  
concrete M30; steel used is Fe 415. 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 = 48m  
Road width = 7.5 m (Two lane)  
Footpaths = 1.0 m on either side

( 2 )

23525

Spacing of beams = 2m

Loading : IRC class 70R vehicle

Material : M-40 grade of concrete and Fe 415 grade of steel

Also sketch the details of reinforcement.

4. What do you understand by the 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) : 4.5m

Live Load : IRC class 70R

Road : National Highway

Foot Path : 1m on either side

Material : M 40 concrete and Fe500 grade of steel.

The compressive stress permissible in concrete during transfer : 16 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 = 2.0 m

Height = 4.5 m.

23525

( 3 )

23525

Back batter. v1 in 6

Front face of the abutment is vertical

Material : Stone masonry

Unit Weight of soil : 19kN/m<sup>3</sup>

Angle of repose ; 30

Superstructure : T-beam bridge of span 15m.

Loading : IRC Class AA

Assume suitable dimensions for the components of the superstructure.

8. A reaction of 3000 kN is expected at the supports of a 20m span T-beam bridge. Design a rocker and roller bearing. The other details are :

Allowable pressure on roller = 5N / mm dia / mm length.

Allowable pressure on bearing plates = 2500N / mm<sup>2</sup>.

Bearing pressure on rocker pin = 25N/mm<sup>2</sup>.

Allowable pressure on concrete bed block = 3.8N/mm<sup>2</sup>.

23525