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

Spacing of beams = 2

Loading : IRC class 1 hicle

Material : M –40 gra oncrete and Fe 415 grade of steel

Also sketch the deta einforcement.

4. What do you unders y the Box Girder Bridges ? Explain and draw ne clean sketches for all. 20

5. Design a prestresse rete slab for the following data : 20

Span (clear) : 4.5m

Live Load : IRC clas

Road : National High

Foot Path : 1m on ei le

Material : M 40 con nd Fe500 grade of steel.

The compressive str missible in concrete during transfer : 16 Mpa.

6. Explain the followin tail : 20

(a) Short term def s

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

(c) Long term defl s.

7. Verify the stability o utment of a bridge with the following details : 20

Top width = 2.0 m

Height = 4. 5 m.

Back batter. v1in 6

Front face of the abutment is vertical

Material : Stone masonry

Unit Weight of soil : 19kN/m^3

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^2.

Bearing pressure on rocker pin = 25N/mm^2.

Allowable pressure on concrete bed block = 3.8N/mm^2.