Reg. No. : | | | | | | | | | | | |

K 6428

M.E. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2007.

Elective

Structural Engineering

ST 1624 — DESIGN OF BRIDGES

(Regulation 2005)

Time : Three hours Maximum : 100 marks

(Use relevant BIS, IRC Codes and Pigeaud's Curves are permitted
Assume any required data suitably)

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Write short note on IRC Class 70 R Loading?

2. Write short note on Indian Railway Standards (IRS)?

3. What is impact effect for IRC Class A loading bridges?

4. List out the guide lines for control of cracking prescribed in IRC : 21-1987?

5. What is effective width of dispersion?

6. List out the methods available for distribution of live loads among longitudinal girders.

7. What is economical depth of plate girder?

8. List out the benefits of using prestressed concrete bridges.

9. Write short note on elastomeric bearings.

10. Sketch the Hammer- head type pier and explain its features.

PART B — (5 × 16 = 80 marks)

11. (a) Discuss the codal provisions given for various types loading as per IRC. Explain the loading types with neat sketches.

Or

(b) Explain :

(i) Longitudinal forces in road bridges.

(ii) Centrifugal forces in road bridges.

(iii) Secondary stresses in members of bridge structures.

(iv) Temperature and shrinkage effects of concrete bridge structures.

12. (a) Design a slab bridge for the following data:

Clear span	:	5m
Carriage way	:	Two lane
Live load	:	Class AA loading
Concrete	:	M 25
Steel	:	Fe 415
Average thick of wearing coat	:	80 mm

Or

(b) Design the cantilever slab of a T Beam and slab bridge deck using the following data :

Width of Road way	:	7.5 m
Width of Kerb	:	600 mm
Depth of Kerb	:	300 mm
Number of longitudinal girders	:	3
Width of girder	:	300 mm
Spacing of girders	:	2.5 m
Thickness of wearing coat	:	80 mm
Type of loading	:	IRC Class A Wheel loads

Use M 20 grade concrete and Fe 415 steel.

13. (a) Explain the design principles of balanced cantilever bridges.

Or

(b) Write down the step by step procedure of design of box girder bridges.

14. (a) Design a plate girder to carry a super imposed load of 120 kN per *m* on an effective span of 18 m.

Or

Design a post tensioned prestressed concrete slab bridge deck to suit the following data :

Clear span	:	8 m
Width of bearing	:	400 mm
Clear width of roadway	:	7.5 m
Foot path	:	1 m on either side
Kerbs	:	600 mm wide
Thickness of wearing coat	:	80 mm
Loading	:	IRC Class AA tracked vehicle
Compressive strength at transfer	:	35 N/mm^2.

Materials : M 40 grade concrete and 7mm diameter high tensile wires with an ultimate tensile strength of 1500 N/mm^2. For supplementary reinforcement adopt Fe 415 grade bars.

(a) Design a roller bearing for the road bridge. It carries a total vertical load of 1300 kN

Or

(b) List out the different types of foundation to be adopted for bridges. Explain any two in detail with neat sketches.
