[4959] - 1004

B.E. (Civil)

STRUCTURAL DESIGN OF BRIDGES

(Elective - I) (2012 Course) (Semester - I)

Time : 2½ Hours]   *[Max. Marks :70*

Instructions to the candidates:

1) *Attempt Q.1 or Q. 2; Q. 3 or Q. 4; Q. 5 or Q. 6; Q. 7 or Q. 8; and Q.9 or Q.10.*
2) *Figures in bold to the right indicate full marks.*
3) *IRC: 6, IRC: 112, IS 456, IS 800, IS 1343 and Steel table are allowed in the examination.*
4) *Neat diagrams should be drawn wherever necessary.*
5) *If necessary, assume suitable data and indicate clearly.*
6) *Use of electronic pocket calculator is allowed.*

Q1) Explain the loadings considered on highway RC bridges.   **[10]**

OR

Q2) Write a note on different loadings adopted for railway steel bridges.   **[10]**

Q3) Explain Pigeaud's curves with an example?   **[10]**

OR

Q4) Explain the procedure to obtain maximum bending moment and shear force on an intermediate longitudinal girder.   **[10]**

Q5) Design the members L_0-L_1, L_0-U_1 for the broad gauge railway steel truss bridge shown in Fig. 1. The details are as follows. **[18]**

a) Weight of stock rail = 0.55 kN/m,

b) Weight of check rail = 0.5 kN/m

c) Sleepers of size = $(0.25 \times 0.25 \times 2.5)$ m @ 0.40 m c/c

d) Unit weight of sleepers = 7.8 kN/m³

e) Spacing of truss = 4.50 m c/c

f) Equivalent uniformly distributed load for BM and SF are 2874 kN and 3161 kN respectively
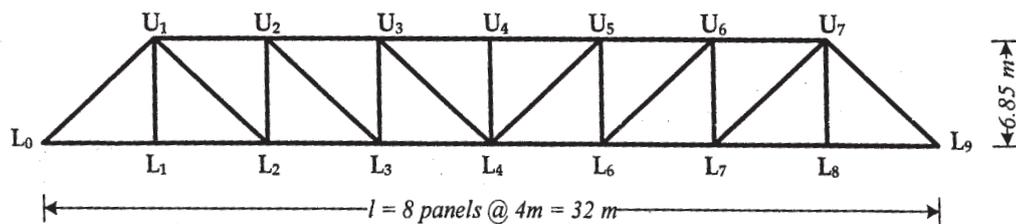
g) CDA = 0.361

Fig. 1

OR

Q6) For the Problem given in Q.5 design the members U_1-L_2 and U_1-L_1. **[18]**

Q7) Design a rocker bearing for the given data and also sketch the details. **[16]**

a) Maximum normal load = 2250 kN

b) Minimum normal load = 750 kN

c) Lateral load = 48 kN

d) Longitudinal load = 110 kN

OR

Q8) a) Explain the classification of various types of bearings with neat sketches. **[8]**

b) Explain the design procedure for elastomeric bearing. **[8]**

Q9) Explain the steps involved in design of abutment. **[16]**

OR

Q10) Design a RC abutment for a RC T-beam deck slab bridge with the following data. **[16]**

a) Span = 10m

b) Width of carriageway = 7.5 m

c) Live load on the deck slab = IRC Class AA

d) Dead weight of span = 3500 kN

e) Longitudinal force = 250 kN

f) Height of abutment from the top of footing to bearing level = 9.85 m

g) Unit weight of backfill soil = 18 kN/m³

h) Allowable bearing pressure = 225 kN/m²

i) Materials = M 30 grade concrete and steel of grade Fe 500

చుಚಿ