L-3/T-1/CE Date: 13/12/2010

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-3 T-1 B. Sc. Engineering Examinations 2009-2010

Sub : CE 311 (Structural Analysis and Design-I)

Full Marks : 210 Time : 3 Hours

The questions are of equal value.

USE SEPARATE SCRIPTS FOR EACH SECTION

SECTION – A

There are SEVEN questions in this Section. Answer any FIVE.

1. Find the maximum shear force at 20 feet away from the left support of a simply supported beam of 70 feet due to the wheel loads shown in Fig. 1.

2. Draw influence lines for:
   (a) bending moment at panel point 3 and 4, and
   (b) Shear force in panel 3 - 4 of the girder with floor beams in Fig. 2.

3. Compiete the maximum reaction of the support B of the Beam in Fig. 3, due to the wheel loads shown in Fig. 1.

4. Draw influence lines for:
   (a) Reaction at D
   (b) Shear force at C and at the left of D
   (c) Bending moment at C and D of the beam in Fig. 4.

5. Draw influence lines for bar force in U_2U_3, L_2L_3, U_2U_5 and U_6L_5 of the truss in Fig. 5.

6. Compute the maximum value of the shear force and bending moment of E of the beam in Fig. 6 due to due to the combined effect of
   (a) self weight = 2 kips/ft
   (b) moving uniform live load = 5 kips/ft
   (c) roving concentrated live load = 60 kip.

7. Compute the maximum bar force in U_4L_4 and L_3L_4 of the truss in Fig. 5 due to combined effect of :
   (a) self weight = 2 kips/ft
   (b) moving live load = 5 kips/ft
   (c) roving concentrated live load = 60 kip.

SECTION – B

There are SEVEN questions in this Section. Answer any **FIVE**.

8. For the Frame shown in Fig. 7 (i) calculate reactions at the supports. (ii) draw shear force and bending moment diagram for the member "CH"

9. Determine the bar force in members "a", "b", "c" and "d" of the truss as given in Fig. 8.

10. Compute maximum shear and moment at section "D" for the beam shown in Fig. 9 due to dead load of 3 kip ft and a moving uniform load of 5 kip/ft combined with a roving concentrated load of 90 kip.

11. Derive the criterion for "maximum reaction" a simply supported beam of span "L" due to a set of moving concentrated loads.

12. For the cable shown in Fig. 10, compute
    (i) Cable stresses in various segments of cable
    (ii) Cable length.

    Given: Maximum sag = 70'
    E = 30,000 ksi
    A = 10 in^2

13. Find hanger force and draw bending moment diagram for the stiffening girders of the bridge shown in Fig. 11.

14. The cable of a suspension bridge with mid-span of 1000 ft. and sag ratio of $\frac{1}{30}$ carries uniformly distributed load of 1000 lb per horizontal foot. Calculate the followings. Assume, E = 29000 ksi, A = 30 in^2
    (i) Maximum cable tension
    (ii) Cable stretch
    (iii) Unstressed length of cable.

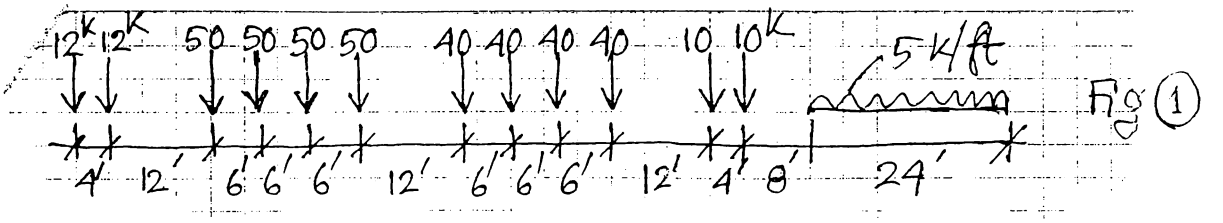

Fig (1)

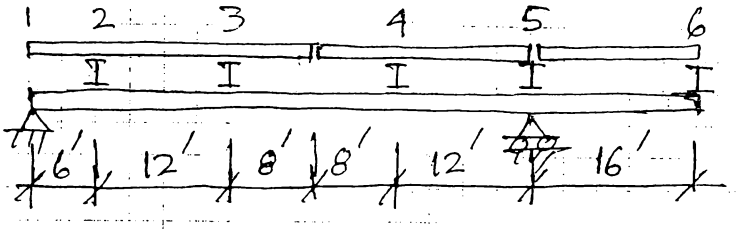

Fig (2)

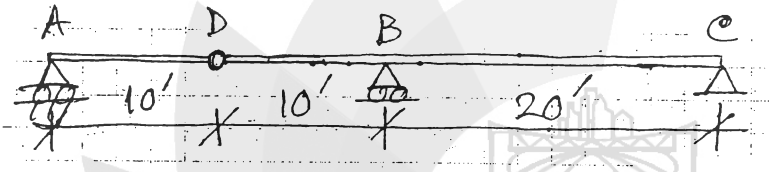

Fig (3)

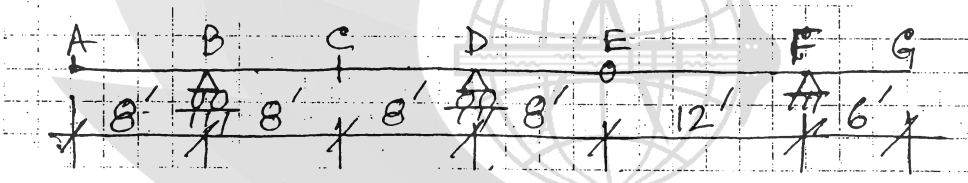

Fig. (4)

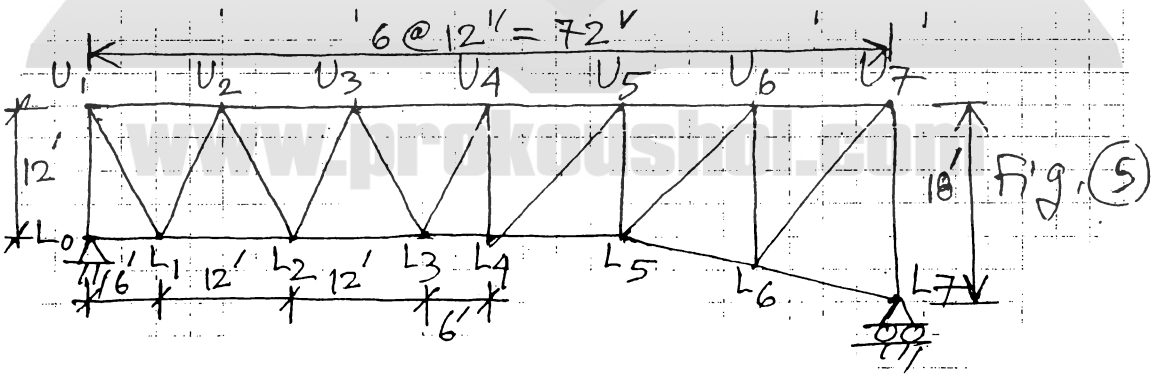

Fig. (5)

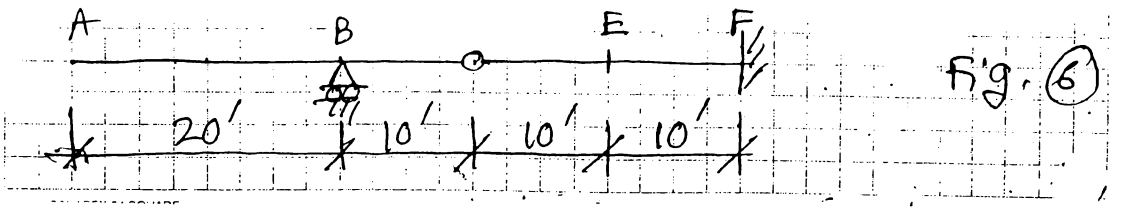

Fig. (6)

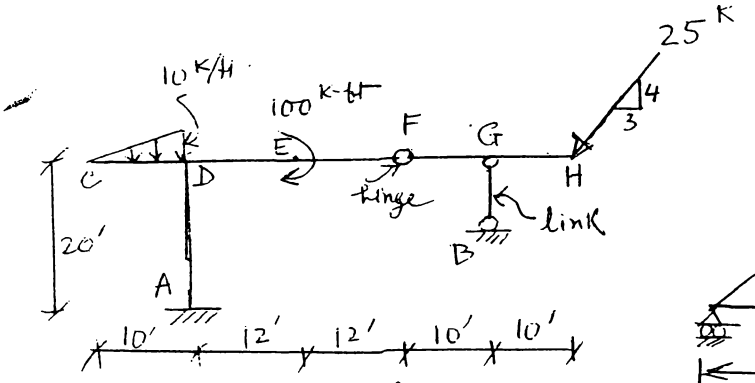

Fig:- 7

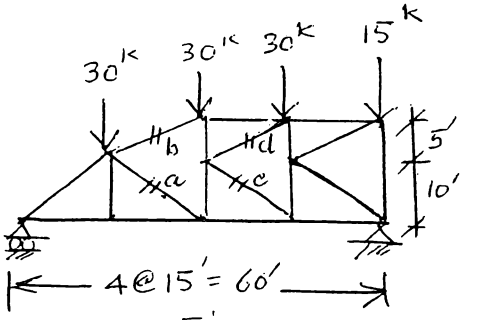

Fig:- 8

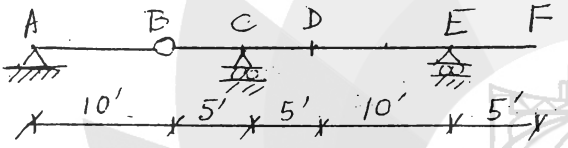

Fig:- 9

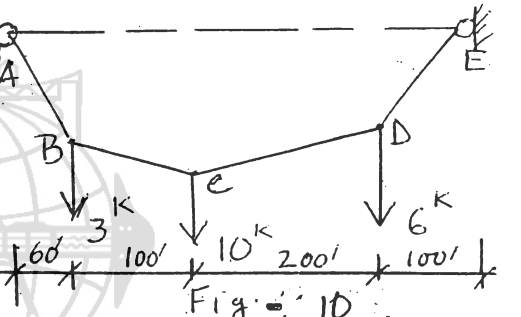

Fig:- 10

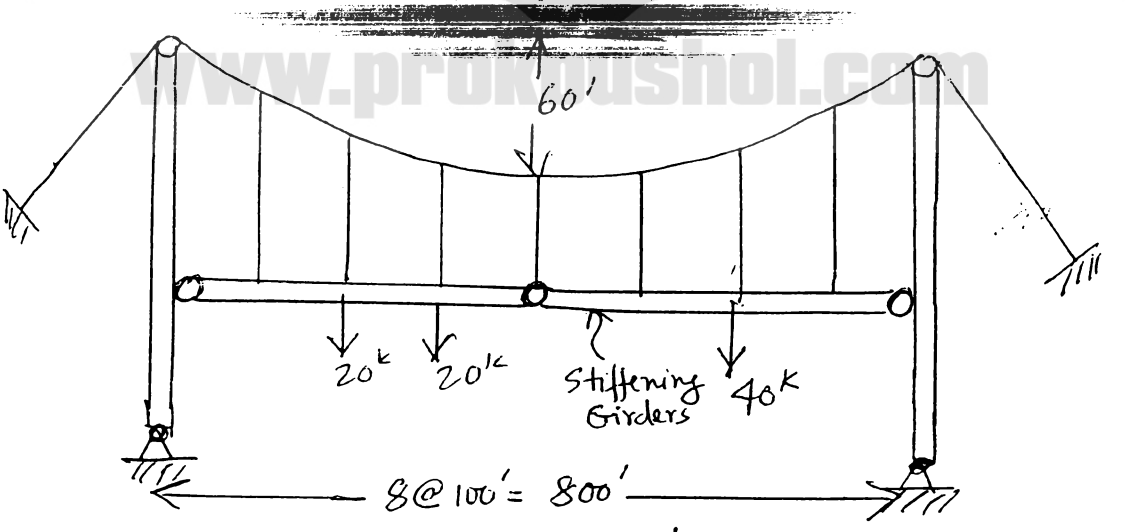

Fig:- 11