Printed Pages : 7　　　　　　　　　　　　　**CE – 402**

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 0022　　**Roll No.** ☐☐☐☐☐☐☐☐☐☐

B. Tech.

(SEM. V) EXAMINATION, 2006-07
STRUCTURAL ANALYSIS
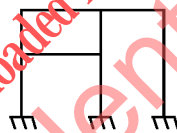
Time : 3 Hours]　　　　　　　　　　　*[Total Marks : **100***

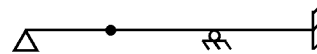*Note :*　　*(1)　Attempt **all** questions.*

　　　　　*(2)　Assume any **data** required, but not given.*

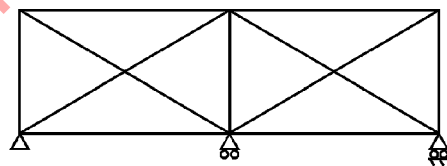**1**　　Attempt any **four** parts of the following :　**10×4 = 20**

　　a)　What do you understand by static indetermining of a structure ? Determine the same for structure shown in Fig. 1

(i)　　　　　　　　　　　　　　　(ii)

(ii)

Fig. 1

b) What do you understand by kinematic indeterminancy of a structure? Determine same for the structures shown in Fig.1.

c) What is the method of tension coefficient? Explain with a suitable example.

d) What is perfect frame? Enumerate the assumption made while finding out the forces in a truss.

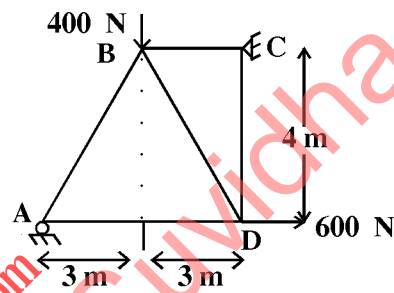e) Determine the force in each number of truss shown in Fig.2.

Fig. 2

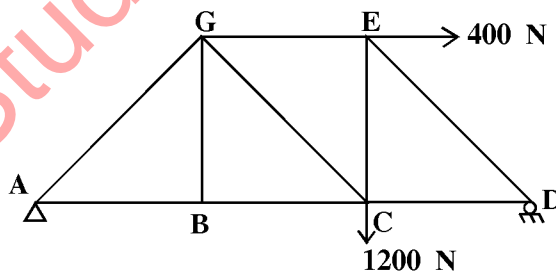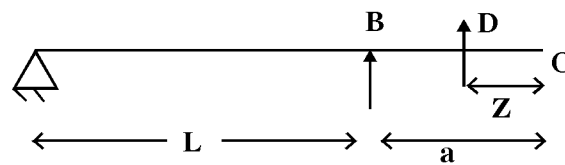f) Determine the forces in members GE, GC and BC of the truss shown in fig.3 using method of sections.
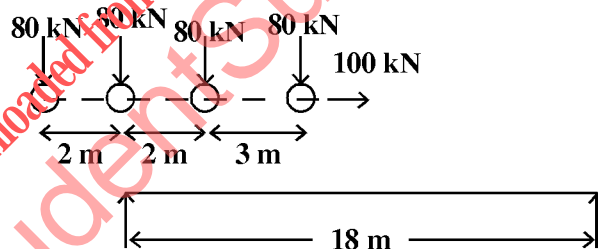

Fig. 3

2 Attempt any **four** parts of the following :   **5×4=20**

a) Draw influence line diagram for the shear force and bending moment of section D of the beam shown in fig.4.


Fig. 4

b) The simply supported beam shown in fig. 5 is subjected to a set of four concentrated loads which move from left to right. Determine absolute max. moment in the beam.

Fig. 5

c) What is Mulle Breslau's principles? Explain with a suitable example how it is used to obtain influence line diagram in a beam.

d) Determine maximum shear force and maximum bending moment at quarter span from end when a uniformly distributed load longer than span of intensity 20 kN/m, accompanied by a 100 kN concentrated load crosses the span of 12 m. The concentrated load can occupy any position.

e) Prove that, when a system of point load crosses a beam, simply supported at the ends the maximum B.M under any given wheel occurrs when this wheel and the centre of gravity of the total load system are equidistant from the ends of the beam.

f) Draw the influence diagrams for the forces in the members $V_1 L_2$ of the truss shown in fig.6
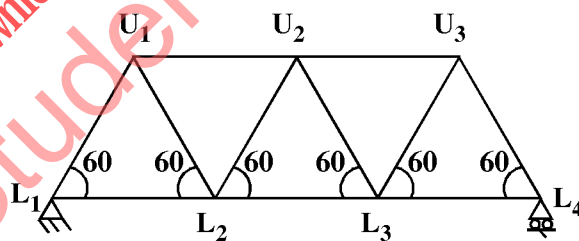
Fig. 6

3   Attempt any **two** parts of the following :   **10×2=20**

a)   A two hinged parabolic arch of span l and rise h carries a concentrated load W at the crown. Show that the horizontal thrust equals $\dfrac{25}{128}\dfrac{wl}{h}$ at each support.

b)   A three hinged parabolic arch of span l has its abatments A and B at depths h_i and h_2 below the crown C. The arch carries a concentrated load w at the crown. Show that the horizontal thrust at each support is $\dfrac{wd}{\left(\sqrt{h_1}+\sqrt{h_2}\right)^2}$

c)   A three hinged parabolic arch has a span of 40 metres and a rise of 8 meters. Draw influence lines for bending moment and normal thrust at a section 15 m from the left end.

4   Attempt any **two** parts of the following :   **10×2=20**

a)   A cable of spanl has its ends at heights h_i and h_2 above the lowest point of the cable. It carries a uniformly distributed load of w per unit run of the span. Determine the vertical and horizontal reactions at each end.

b)   State and prove general cable theorem.

c) A suspension bridge of 100 m spaces has a three hinged stiffening girder supported by cables having central dip of 10m. The left half span of bridge is loaded with a u.d.l of 30 kN/m. Determine the reactions and draw the bending moment diagram.

5 Attempt any **two** parts of the following : **10×2=20**

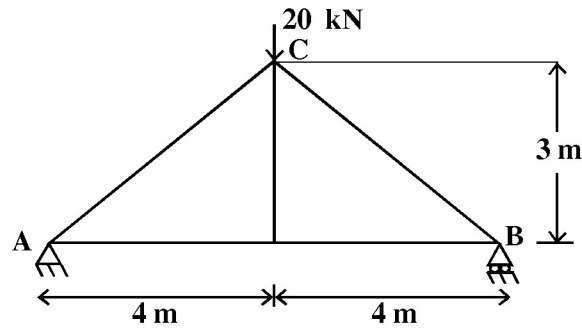a) Using conjugate beam method, determine the deflection at the free end of a beam shown in fig.7

$$E = 200 \times 10^6 \ kN/m^2$$

$$I = 2 \times 10^{-4} \ m^4$$

Fig. 7

b) For the given truss shown in fig. 8 find the horizontal and vertical deflection of the joint C using castigiano's theorem.
Take, AE = 10,000 kN.

Fig. 8

c)   State and prove Betti's and Maxwell's law of reciprocal deflections.