
Mahatma Education Society's
PILLAI'S COLLEGE OF ARCHITECTURE
Sector-16, Plot No.10, New Panvel-410 206

SECOND YEAR B.ARCH: APRIL 2012

THEORY OF STRUCTURES

TIME: 3 HRS

DATE: 04/04/2012

MAX.MARKS 100

- NOTES:** 1) ALL QUESTIONS CARRY 16 MARKS EACH.
2) SOLVE ANY THREE QUESTIONS FROM EACH SECTION.
3) DRAW SKETCHES WHEREVER NECESSARY.
4) FOUR MARKS ARE RESERVED FOR NEAT SKETCHES.

SECTION A

- Q.1 a) What is the importance of soil mechanics with reference to construction works.
b) Define the following.(Any Three):-
I) Void Ratio II) Porosity III) Dry density IV) Plastic Limit
- Q.2) A fixed beam AB is loaded as shown in **FIG 1**. Calculate the fixed end moments, reactions values of shear force and bending moment, Also draw S.F.D and B.M.D.
- Q.3) A continuous beam ABCD is loaded as shown in **FIG 2**. Find the moments, Also find the reactions and draw Shear Force & Bending Moment Diagrams. [USE MOMENT DISTRIBUTION METHOD ONLY.]
- Q.4) A continuous beam ABCD has both ends simply supported and is loaded as shown in loaded as shown in **FIG.3**. Calculate the moments, reactions, also draw shear force and bending moment diagram. [USE THREE MOMENT THEOREM ONLY.]
- Q.5) Find Euler's crippling load & load by Rankine's formula for a hollow circular tube having 200 mm external diameter & 20 mm thickness. The original length of the column is 5m, with both ends hinged.
 $E = 1 \times 10^5 \text{ N/mm}^2$, $f_c = 550$, $a = 1/1600$

SECTION B

Q.6) a) Why is de-watering of soil necessary before foundation? State the methods of dewatering & explain any one method with sketch.

b) Write a note with sketch about the test in accessing the load bearing capacity of soil.

Q.7) A retaining wall has overall height of 4m. It is 0.75 m wide at the top and 2.5 m wide at the base. The earth filling is upto the level of top edge as shown in FIG 4. If the density of earth is 13 KN/m^3 , density of wall material is 20 KN/m^3 , co-efficient of friction is 0.5 & angle of repose is 30° . Find the maximum & minimum stresses at the base. Also state the stability of the wall.

Q.8) The cross section of a column is as shown in FIG 5. There is an eccentric load of 100 KN as shown. Find the stresses at the corners of column. What additional load is required for no tension at any of the corners. With this additional load what are the stresses at the corners.

Q.9) a) A cantilever beam is fixed at A and free at other end and is 5.0 m long. There is a point load of P at the free end B. If the maximum bending stress is 120 N/mm^2 . Find the value of load P. Given diameter of round bar 340 mm, $E = C$ and $I = 7000 \times 10^4 \text{ mm}^4$.

b) A cantilever beam AB, 4.5 m long is loaded with U.D load of 40 kN/m on the entire span.

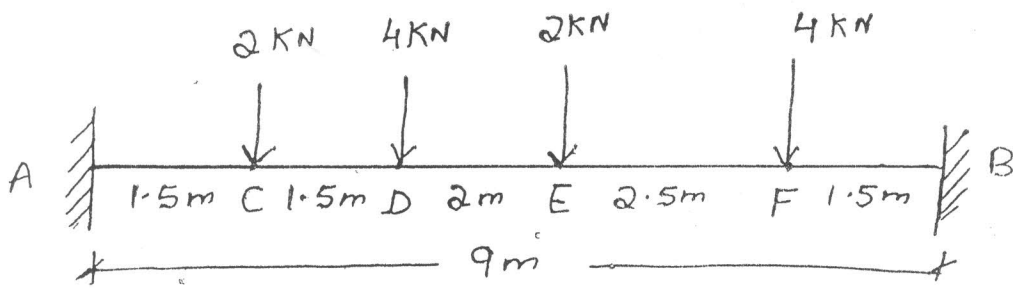
If $E = 200 \text{ KN/mm}^2$ and $I = 70 \times 10^6 \text{ mm}^4$. Find deflection.

Q.10) a) A simply supported wooden beam 140 mm width & 240 mm deep has a span of 4.0 m.

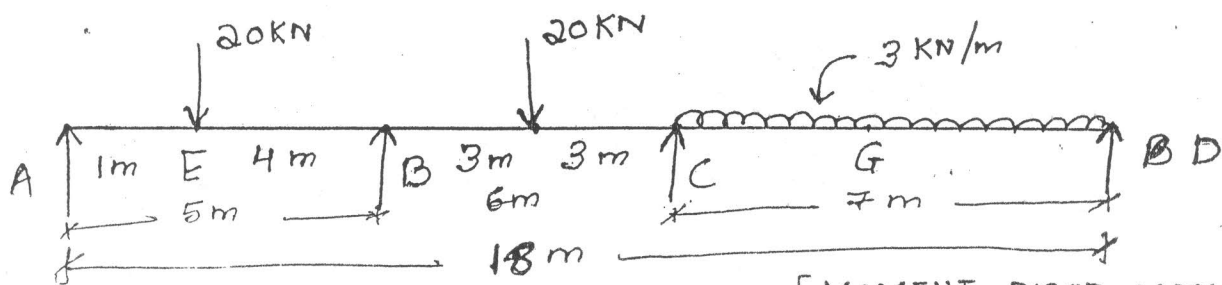
Determine the point load that can be placed at the centre of the beam which can produce maximum deflection of 10mm at the centre. $E = 6 \times 10^3 \text{ N/mm}^2$.

b) A simply supported beam is 100 mm wide & 240 mm deep. It carries a uniformly distributed load of 2251 N/m on the entire span of 4m. Find the deflection produced. ($E = 1.1 \times 10^4 \text{ N/mm}^2$)

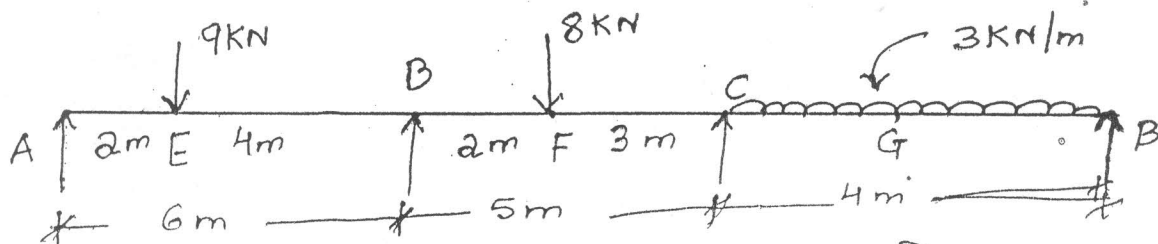
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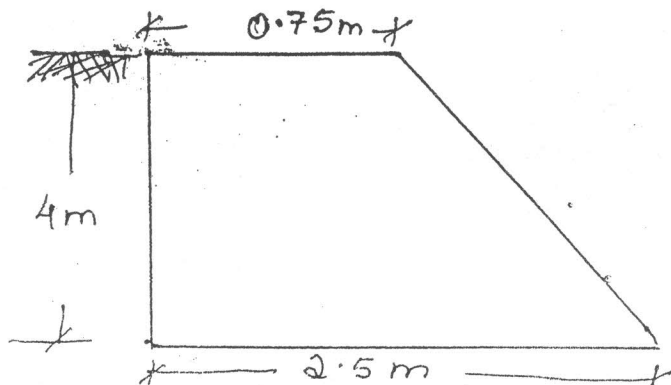
Q.2 (FIG:1)



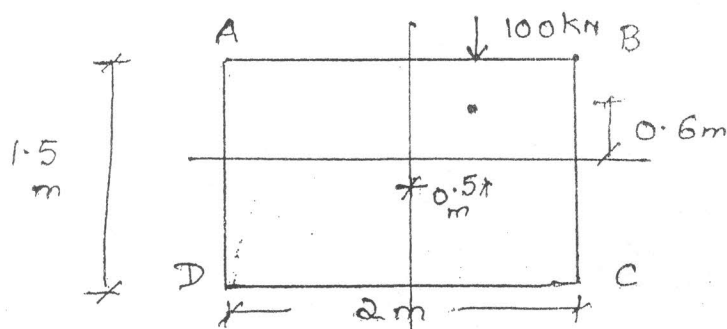
Q.3 (FIG:2) [MOMENT DISTR. METHOD]



Q.4 (FIG:3) [T.M.T]



Q.7 (FIG:4)



Q.8 (FIG:5)