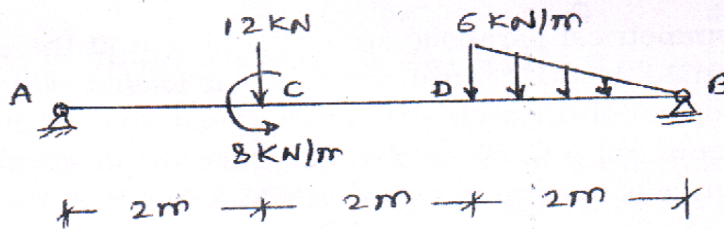


N.B.

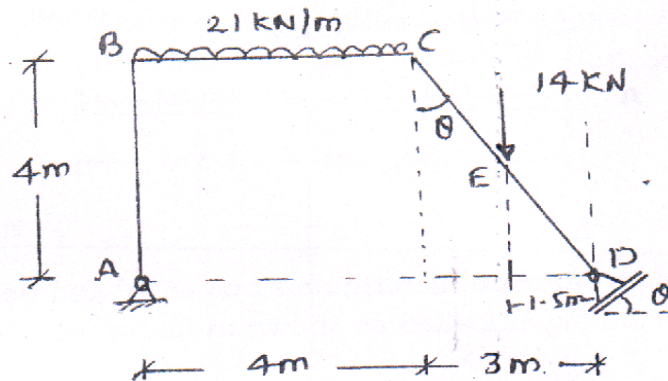
- 1) Question No. 1 is **compulsory**. Attempt **any four** out of remaining **six** questions.
- 2) Figures to the **right** indicate full marks.
- 3) Assume suitable data if needed but justify the same.

Q.1 Answer **any four** questions-

- a) State and explain- (i) Castigliano's 2nd Theorem (ii) Betti's Theorem. (5)
- b) Show that the Rankine's formula used to find critical load can be applied to both short as well as long column. (5)
- c) Show that the radial shear force at any section of a three hinged parabolic is zero when the arch is loaded with udl loading over the entire span. (5)
- d) Derive the expression for length of a light flexible cable suspended from two points which are at the same level (5)
- e) For the beam loaded as shown in figure, write the appropriate BM equation that shall be used to find deflection using **Macaulay's method**. (5)



- Q.2 a) For the rigid jointed plane frame loaded as shown in figure, draw AFD, SFD and BMD by constructing free body diagram of each member. (13)



- b) A simply supported timber beam of span 4.5 m carries udl of intensity 20. KN/m over the entire span. The C/S of beam is a rectangle of size 150 mm x 250 mm. Find maximum bending stress at mid span section if the plane of loading makes an angle of 30° clockwise with minor principal axis of beam section. (7)

[TURN OVER