CLASS: BTECH
BRANCH: CS/ECE/AI/EEE

SUBJECT: ME101 BASICS OF MECHANICAL ENGINEERING

SEMESTER : I
SESSION : MO/2022

TIME: 3 Hours

FULL MARKS: 50

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

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Q.1(a) Find out the internal forces in the members FH, GH and GI of Figure 1   [5] CO1 4
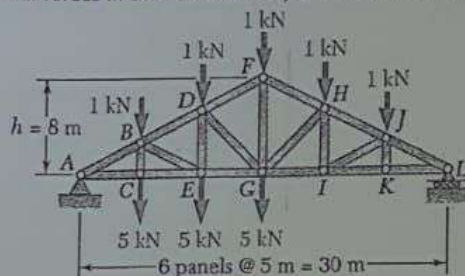

Figure 1

Q.1(b) A steel bar 35 mm x 35 mm in section and 100 mm in length is acted upon by a tensile [5] CO1 4
load of 180 kN along its longitudinal axis and 400 kN and 300 kN along the axis of the
lateral surfaces. Determine : (i) change in the dimensions of the bar, (ii) change in
volume, (iii) longitudinal axial load acting alone to produce the same longitudinal
strain as in (i). Take $E = 205$ GPa; $v = 0.3$.

Q.2(a) The crank AB in the mechanism shown in Figure 2, rotates at 5 rev/s is 300 mm long. [5] CO2 4
The link CB is 600 mm long, and the piston C moves in horizontal guides. Find for the
position shown (i) velocity of piston C, (ii) angular velocity of the connecting rod BC
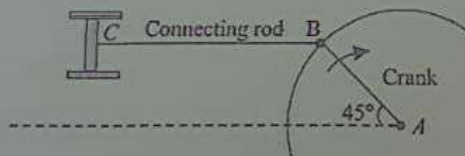and (iii) velocity of a point D at the center AB.

Figure 2

Q.2(b) The ladder AB of length l makes an angle θ with the vertical wall. The foot of the [5] CO2 3
ladder moves to the right with constant speed v_A. Determine velocity and acceleration
of point B of ladder in terms of v_A, l and θ.

Q.3(a) Two blocks A and B of weights 1 kN and 2 kN, respectively are in equilibrium as shown [5] CO3 3
in Figure 3. If the co-efficient of friction between two blocks as well as the block B
and the floor is 0.3, find the force (P) required to move the block B.