FIRST SEMESTER (COMMON TO ALL BRANCHES)

B.Tech. MID SEMESTER EXAMINATION-SEPTEMBER-2019
FCME006: BASICS OF MECHANICAL ENGINEERING

Time: 1.30 Hours   Max. Marks: 25

Note:
1. Attempt **ALL** questions
2. Give suitable sketches, where needed. Assume suitable data, where necessary.

1.   (2 + 2 + 3 = 7)

    a. Define 'frictional force'. Explain how is friction both desirable and undesirable in engineering applications?

    b. List out various types of patterns. What is the difference between a split pattern and a match-plate pattern?

    c. Distinguish between the following, giving due explanation:
        i. Stress and strain
        ii. Force and stress, and
        iii. Tensile stress and compressive stress

2.   (3+3 = 6)

    a. The extremities A and D of a light inextensible string ABCD are tied to two points in the same horizontal line as shown in Fig.1. Weights W and 3W are tied to the string at the points B and C respectively. If AB and CD are inclined to the vertical at angles 60° and 30° respectively, show that BC is horizontal and find the tension in the various part of the string.
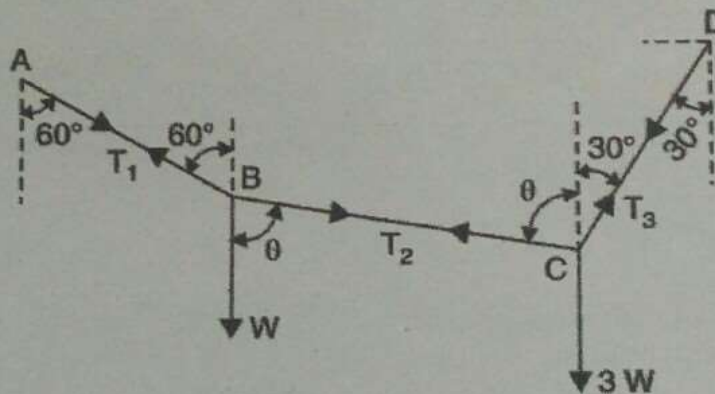

Fg.1.

    b. A system consisting of two blocks connected by a cable is as shown in Fig.2. The masses of the block A and block B are 7.5 kg and 25 kg respectively. Determine the magnitude of minimum force and its inclination with reference to the horizontal, to be applied on block B. The block has impending motion towards the right. Take the coefficient of friction at all contact surfaces to be 0.28.
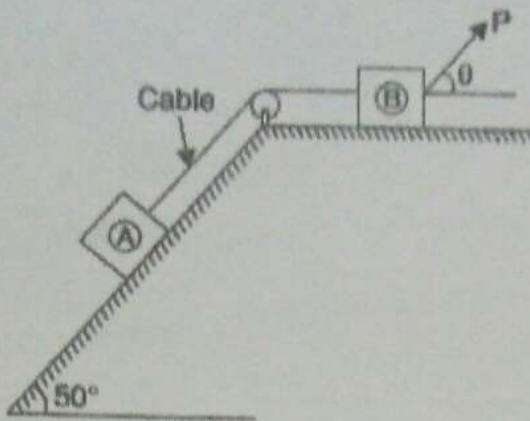
Fig. 2.

3.

$(3 + 3 = 6)$

a. A brass bar, having cross-sectional area of 1000 mm² subjected to axial forces as shown in Fig.3. Find the total elongation of the bar, Take E = 1.05 x 105 N/mm².
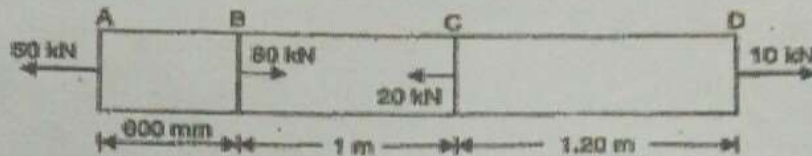

Fig.3.

b. A cantilever 1.5 m long is loaded with a uniformly distributed load of 2 kN/m run over a length of 1.25 m from the free end shown in Fig.4. It also carries a point load of 3kN at a distance of 0.25 m from the free end. Draw the shear force and bending moment diagrams of the cantilever.
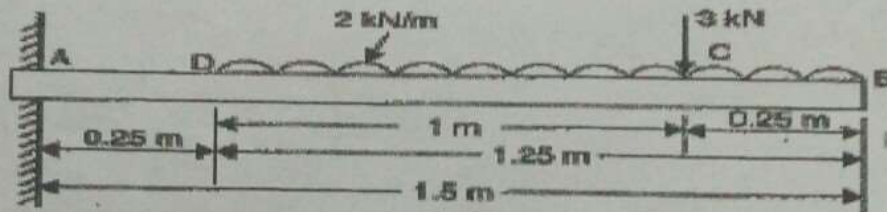

Fig.4.

4.

$(2 + 2 + 2 = 6)$

a. Draw a stress-strain curve for a ductile material. In what respects, a similar curve for a brittle material will be different?

b. Discuss various type of casting defects.

c. What do you understand the term 'machining'? How it is different from other manufacturing processes?

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