

Printed pages:

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B. TECH.
(SEM-II) THEORY EXAMINATION 2017-18
ENGG MECHANICS

Time: 3 Hours

Total Marks: 100

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION-A

1. Attempt all the parts. Write answer of each part in short. (10x2 =20)

- a) State the parallelogram law of forces.
- b) Define moment and moment of force.
- c) What do you understand by the term “parallel forces”?
- d) State the laws of friction.
- e) Distinguish between uniformly distributed load and uniformly varying load.
- f) What is the point of contraflexure?
- g) Write down the condition for a perfect truss.
- h) Distinguish between center of gravity and centroid.
- i) Differentiate between simple stress and simple strain.
- j) Define the term “Modulus of rigidity”.

SECTION-B

2. Attempt any Five questions from this section: (5x10 =50)

- a) Two cylinders, A of weight 4000N and B of weight 2000N rest on smooth inclined planes as shown in Fig-1. They are connected by a bar of negligible weight hinged to each cylinder at its geometric centers by smooth pins. Find the Force **P** to be applied as shown in figure such that it will hold the system in the given position.

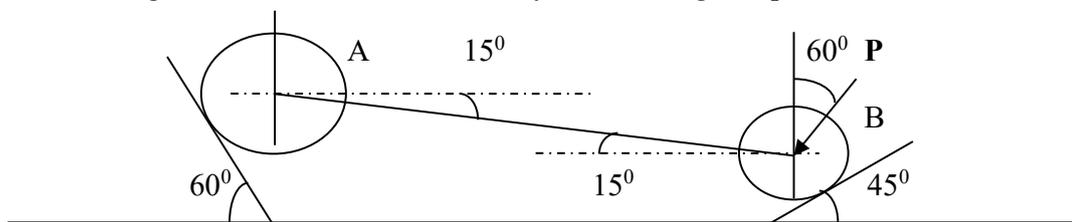
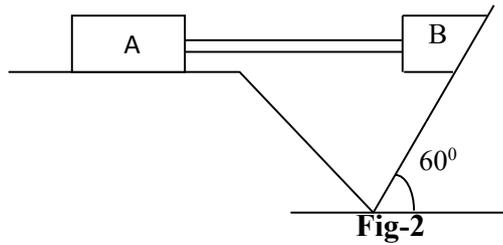


Fig-1

- b) Two blocks A and B, connected by a horizontal rod and frictionless hinges are supported on two rough horizontal planes as shown in Fig-2.



The coefficient of friction are 0.3 between block A and horizontal surface, and 0.4 between block B and the inclined surface. If the block B weighs 100N, what is the smallest weight of block A that will hold the system in equilibrium?

- c) Calculate the support reactions at supports A and B of the beam as shown in fig-3.

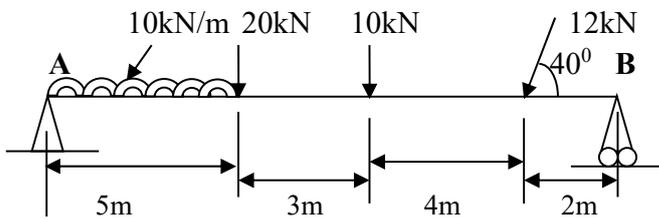


Fig-3

- d) Figure-4 shows a Warren girder consisting of seven members each of 3 m length freely supported at its end points. Find the forces in all the members of the truss.

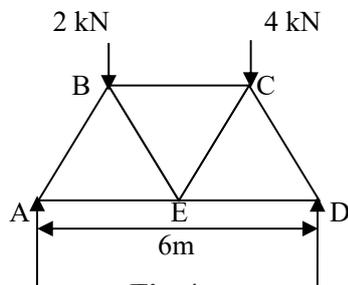


Fig-4

- e) Find the center of gravity of the lamina as shown in Fig-5.

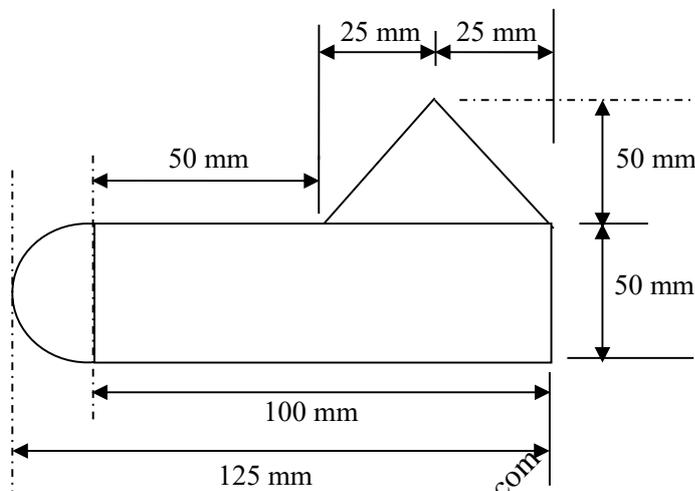
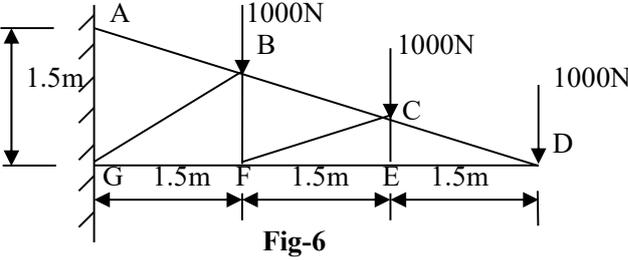


Fig-5

- f) State and prove the theorem of parallel axis in the determination of moment of inertia of areas with the help of neat sketch.

g) The Fig-6 shows a cantilever truss having a span of 4.5 meters. It is hinged at two joints to a wall and loaded as shown in figure. Find the forces in all the members of the truss.

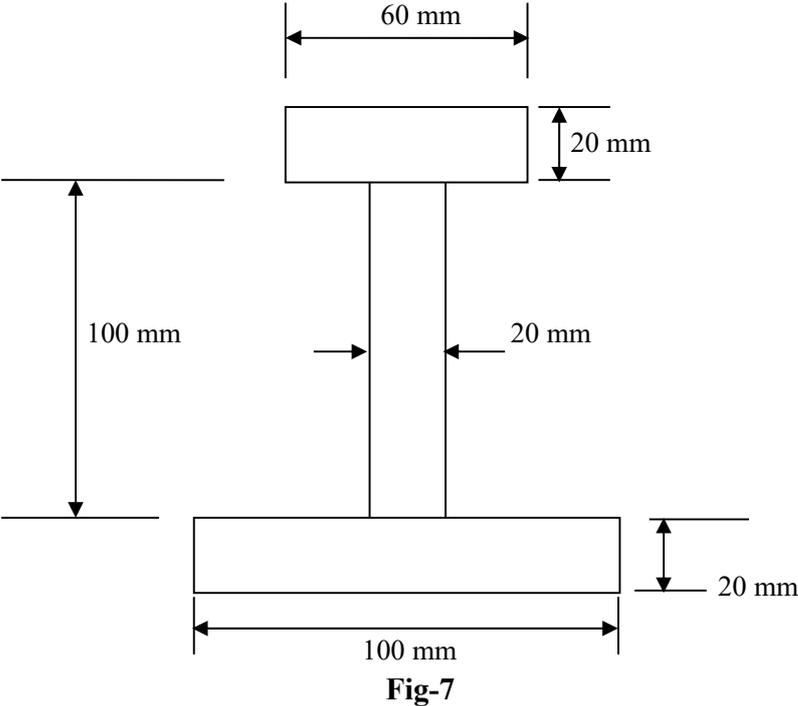


h) Deduce the relation between the tensions on the tight side and the slack side of a belt connecting two pulleys and transmitting power.

SECTION-C

5. Attempt any two questions from the following: (2x15 =30)

a) For the I – Section, as shown in Fig-7, find the moment of inertia about horizontal axis passing through the center of gravity.



- b) Draw stress-strain diagram for Ductile materials and describe the salient features. A bar of ABCD having cross-section 500 mm^2 is subjected to axial forces as shown in Fig-8. Find total elongation of the bar. Take $E = 80 \text{ GPa}$.

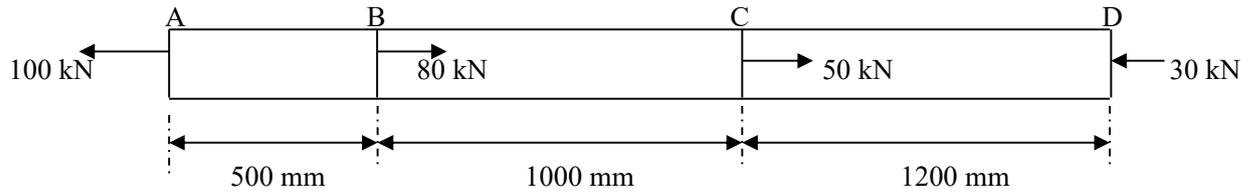


Fig-8

- c) Draw the shear force and bending moment diagram for the simply supported beam as shown in Fig-9:

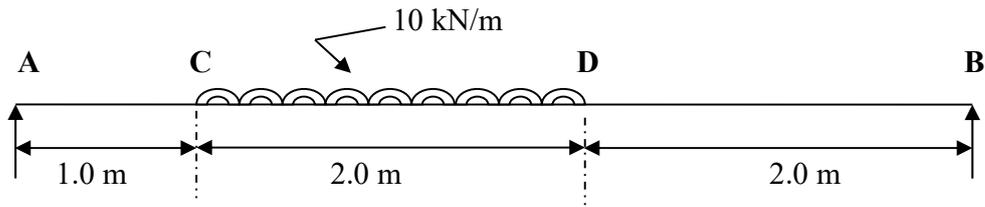


Fig-9
