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B. TECH.

THEORY EXAMINATION (SEM–II) 2016-17

ELEMENTS OF MECHANICAL ENGINEERING

Time : 3 Hours ***Max. Marks : 70***

Note : *Be precise in your answer. In case of numerical problem assume data wherever not provided.*

SECTION-A

1 **Attempt any Seven questions of the following:** **(7x2=14)**

a) Define angle of friction and angle of repose.

b) What is the assumption of truss? Also write condition for perfect truss.

c) Write down the difference between resilience and toughness.

d) What are the characteristics of a force couple?

e) Define first law of thermodynamics.

f) Explain Carnot theorem?

g) Write down the difference between centroid and center of gravity.

h) Define parallel axis theorem.

i) State that Varignon theorem.

j) Write the difference between fire tube and water tube boiler.

SECTION-B

2 **Attempt any Five questions of the following:** **(5x7=35)**

a) Explain the working of lathe machine and explain its major parts.

b) Cylinder A and B weighing 5kN and 2.5N rest on smooth incline planes as shown in **fig.1** Neglecting the weight of connecting bar and assuming smooth pin connections, find the force P to be applied such that the system is in the equilibrium.

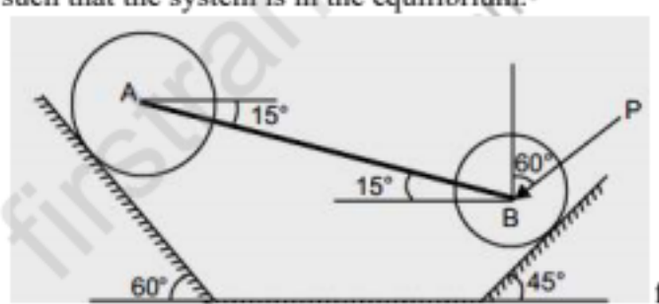

fig.1

c) Determine the reaction force in all members of truss and their nature.

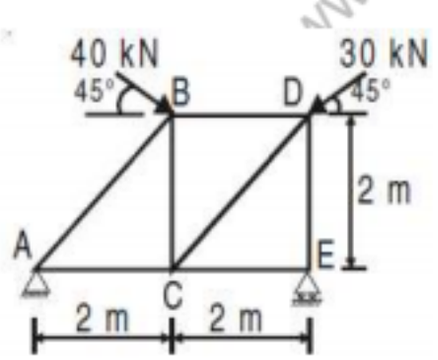

Fig 2

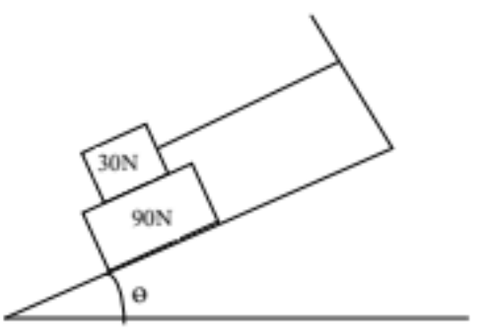

Fig 3

d) What should be the value of the angle θ in fig.3. so that the motion of the 90N block impends down the plane? The co-efficient of friction μ for all the surfaces is1/3.

e) Explain the reversible and irreversible processes. Define boiler mountings and accessories. Also write down the types of mountings and accessories.

f) Explain the working of 2 stroke and 4 stroke petrol engine with diagram.

g) A Carnot engine getting heat at 800K is used to drive a Carnot refrigerator maintaining 280K temperature. Both engine and refrigerator reject heat at some temperature when heat given to engine is equal to heat absorbed by refrigerator. Determine efficiency of engine and COP of refrigerator.

h) State the Kelvin- Planck and Clausius statements of second law of thermodynamics.

SECTION-C

Attempt any Two questions of the following: (2x10.5=21)

3. Determine the moment of inertia of shaded area about centroidal axes as shown in **fig.4** (All dimensions in mm)

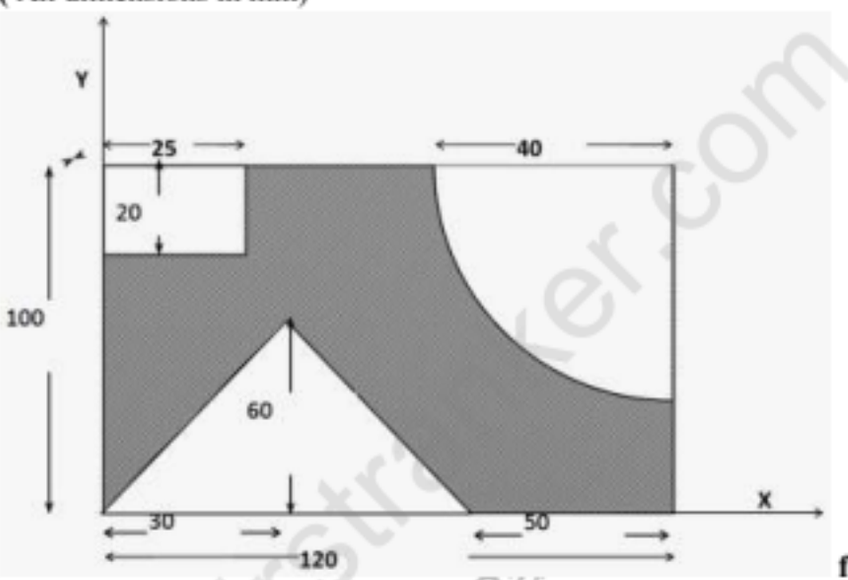

fig.4

4. Write down the classification of engineering materials. Give the difference between hot working and cold working process.

5. Define thefollowing –
   a) Entropy
   b) Zeroth law
   c) Brake power
   d) Cone of friction
   e) Latent heat