



GIET UNIVERSITY, GUNUPUR – 765022
B. Tech (First Semester) Regular Examinations, January – 2024
23BBSES10002 - Elements of Mechanical Engineering
 (Common to all branches)

Time: 3 hrs

Maximum: 60 Marks

(The figures in the right hand margin indicate marks)

PART – A**(2 x 5 = 10 Marks)**Q.1. Answer **ALL** questions

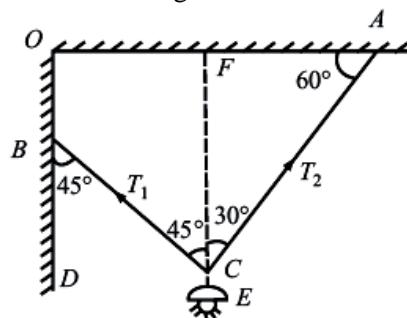
- What is the free body diagram? Explain it with a suitable example.
- Differentiate between static and dynamic friction.
- Define intensive and extensive properties with examples.
- What is a PMM1? Why is it impossible?
- Write down the various benefits of industrial robot.

CO #	Blooms Level
CO1	K2
CO2	K1
CO3	K1
CO4	K2
CO6	K2

PART – B**(10 x 5 = 50 Marks)**Answer **ALL** questions

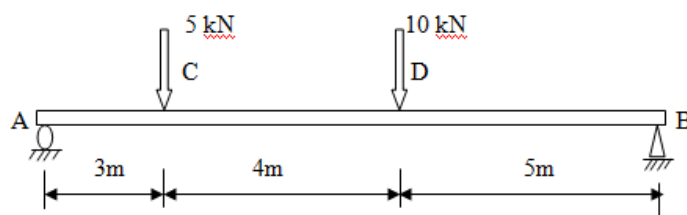
Marks	CO #	Blooms Level
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2. a. An Electric light fixture weighing 15N hangs from a point C, by two strings AC and BC. AC is inclined at 60° to the horizontal and BC at 45° to the vertical as shown in figure, Determine the forces in the strings AC and BC



5 CO1 K3

- b. Find the Reaction at A and B.

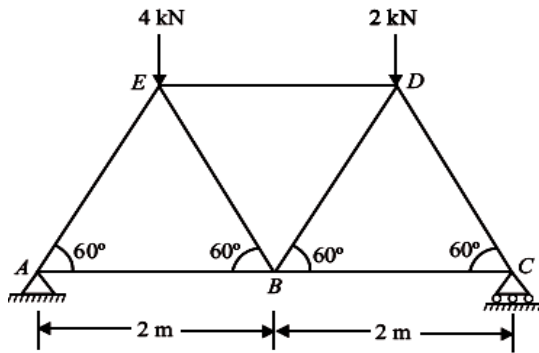


5 CO1 K3

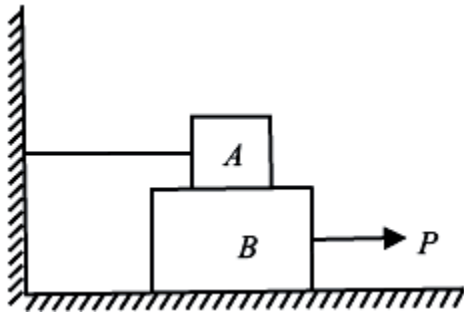
(OR)

- c. Determine the reaction and the forces in each member of a simple triangle truss supporting two loads as shown in figure.

10 CO1 K3



- 3.a. Block A weighing 1000N rests over block B which weights 2000N as shown in figure. Block A is tied to wall with a horizontal string. If the coefficient of friction between A and B is $\frac{1}{4}$ and between B and floor is $\frac{1}{3}$, what should be the value of P to move the block B, if P is applied horizontally.



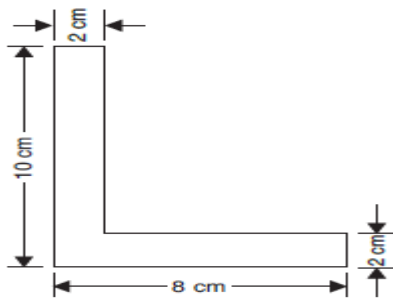
5 CO2 K3

- b. Define angle of friction, angle of repose, coefficient of friction with a suitable sketch.

5 CO3 K3

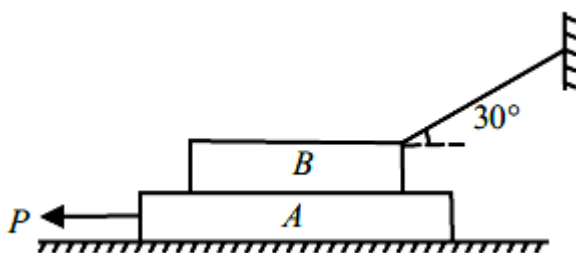
(OR)

- c. Find the centroid of the lamina as shown in Figure.



5 CO2 K3

- d. Two blocks A and B of weight 4kN and 2kN respectively are in equilibrium position as shown in figure. Coefficient of friction for both surfaces are same as 0.25, make calculations for the force P required to move the block A.



5 CO3 K3

- 4.a. What is Heat Transfer? Explain different modes of heat transfer.

5 CO4 K2

b.	A vessel of capacity 5 m^3 contains oxygen at 2bar, 45°C . Calculate the mass of the oxygen.	5	CO4	K3
(OR)				
c.	If a gas of volume 6000 cm^3 and at pressure of 100 kPa is compressed quasistatically according to $pV^2 = \text{constant}$ until the volume becomes 2000 cm^3 , determine the final pressure, work transfer, Heat Transfer, Change in internal Energy and Change in Enthalpy.	10	CO4	K3
5.a.	With neat sketch Explain the working principle of 4 stroke IC engine?	10	CO5	K2
(OR)				
b.	A turbine operates under steady flow condition receiving air at pressure 15 bar, internal energy 2700 kJ/kg , specific volume $0.17\text{ m}^3/\text{kg}$ and velocity 100 m/sec . Exhaust air from the turbine is at 0.1 bar with internal energy 2175 kJ/kg , specific volume $15\text{ m}^3/\text{kg}$ and velocity 300 m/sec . The turbine develops 35 kw and heat lost over the surface of turbine is 20 kJ/kg . Determine the air flow rate through the turbine.	10	CO5	K3
6.a.	Convert the following reading of pressure to Kpa assuming that the Barometers reading in 760 mm of Hg i) 40 cm of HG vacuum ii) 1.2 met of H_2O gauge	6	CO6	K3
b.	Find the surface tension in a soap bubble of 40 mm diameter, when the inside pressure is 0.5 N/m^2 above atmospheric pressure.	4	CO6	K3
(OR)				
c.	Explain briefly about the basic components of CNC Machine.	5	CO6	K2
d.	Write A note on “Flexible Manufacturing System (FMS)”.	5	CO6	K2

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