PAPER ID-311523

Roll No: | | | | | | | | | | | | | |

BTECH
(SEM I) THEORY EXAMINATION 2024-25
ELEMENTS OF MECHANICAL ENGG

TIME: 3 HRS **M.MARKS: 70**

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

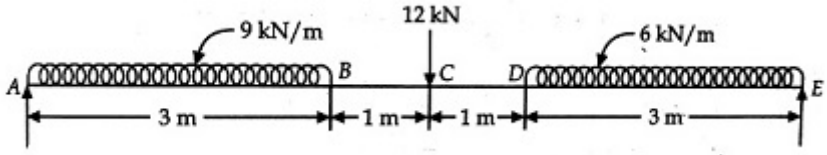
SECTION A

1. Attempt *all* questions in brief. **2 x 7 = 14**

a.	Give the classification of force.
b.	Differentiate between center of gravity and centroid.
c.	What do you mean by stiffness?
d.	Define modulus of rigidity and poisons ratio.
e.	Define the property of a system and its types.
f.	Write Kelvin Plank statement.
g.	Differentiate between S.I and C.I. engine.

SECTION B

2. Attempt any *three* of the following: **7 x 3 = 21**

a.	Define the fallowing. 1. Parallelogram Law of forces 2. Varignon's Theorem 3. Law of transmissibility of force
b.	Find reactions and draw shear force and bending moment diagram for a given simply supported beam. 
c.	Discuss stress strain diagram for ductile material.
d.	Write short note on: 1. Quasi static process 2. Zeroth law of thermodynamics 3. Heat and work
e.	Differentiate between S.I. & C.I. engines and 2 stroke & 4 stroke engine.

SECTION C

3. Attempt any *one* part of the following: **7 x 1 = 7**

(a)	Three cylinders weighting 100 N each and of 80 mm diameter are placed in a channel of 180 mm width as shown in Fig.Determine the pressure exerted by (i) the cylinder A on B at the point of contact (ii) the cylinder B on the base and (iii) the cylinder B on the wall.

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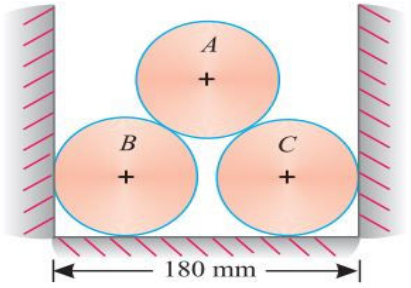
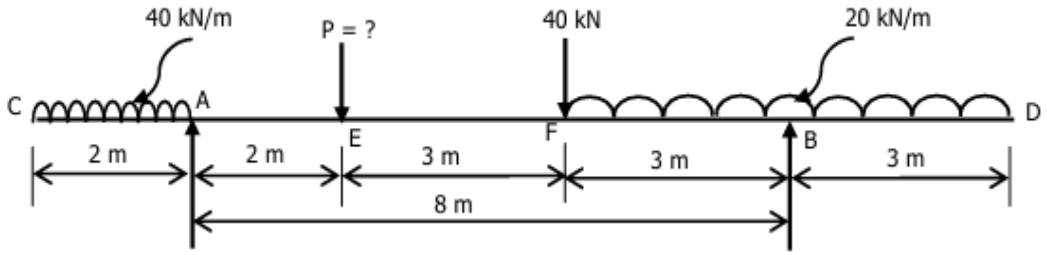
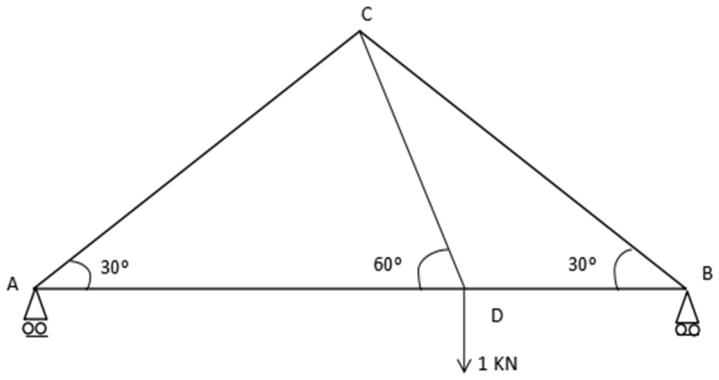
	
(b)	Define perpendicular and parallel axis theorem and prove any one of them.

4. Attempt any *one* part of the following: 7 x 1 = 7

(a)	For the beam loaded as shown in figure find the magnitude of the load 'P' acting at 'E' such that the reactions at supports A and B are equal. 
(b)	A truss of span AB=7.5 m and AD=5 m is shown in fig.6. Find reactions and forces in the members of the truss. 

5. Attempt any *one* part of the following: 7 x 1 = 7

(a)	A steel bar of square cross section 35 mm x 35 mm, 500 mm long is observed of stretch 0.2 mm under a pull of 100 kN. The same bar in single shear test under a force of 122.5 kN shows the distortion of original right angle corners by 0.00125 radians. Determine the value of the four elastic constants of material
(b)	Write short notes : (i) Ferrous and Non Ferrous materials (ii) Composite material

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6. Attempt any *one* part of the following: 7 x 1 = 7

(a)	Discuss the construction and working of Babcock and wilcox boiler.
(b)	Define the following terms- (i) Microscopic and macroscopic approach (ii) First law of thermodynamics and its limitation.

7. Attempt any *one* part of the following: 7 x 1 = 7

(a)	Discuss Rankine cycle with the help of P-v diagram.
(b)	Explain the working of 4 stroke S.I. engine with neat sketch.