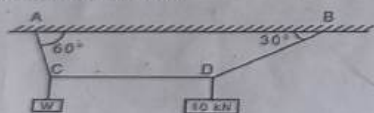


Name:	Printed Pages:
Student University Roll No.:	
School of Engineering	
Second Sessional Examination, Odd Semester (AS: 2023-24)	
B. Tech: CSE	Year: 1 st Semester: 1 st
Course Title: Engineering Mechanics	Max Marks: 60
Course Code: ME4101	Time: 3 hr

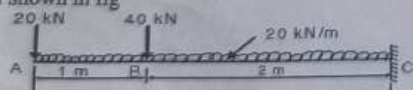
Instructions if any: Read the question Carefully.

SECTION 'A'		Course Objective	Marks
Q.N.1. Attempt all parts of the following:			
a)	State the Varignon's Theorem.	CO1	1
b)	Explain angle of Repose.	CO1	1
c)	Write the conditions of perfect trusses.	CO2	1
d)	Define Beam and its types.	CO2	1
e)	Define Poisson ratio.	CO3	1
f)	State D'Alembert's Principle.	CO3	1
g)	Define Hook's law.	CO4	1
h)	Write the relation among Modulus of elasticity, Bulk Modulus and Modulus of rigidity.	CO4	1

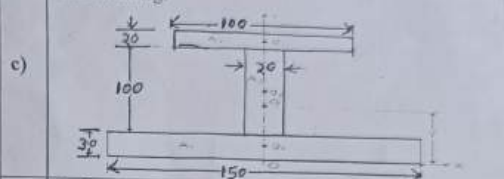
SECTION 'B'		Course Objective	Marks
Q.N.2. Attempt any two parts of the following:			
a)	A cord supported at A and B carries a load of 10 kN at D and a load of W at C, find the value of W so that CD remains horizontal.	CO1	6



b)	Find the reaction at support C, for the cantilever beam shown in fig	CO2	6
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Find the polar moment of inertia of the I-section shown in fig.



d) A 2m long steel bar having uniform diameter of 40 mm for a length of 1500mm and in the next 500mm its diameter gradually reduces from 40mm to 20 mm. Determine elongation of this rod when subjected to an axial tensile load of 200kN. Assume $E=200000\text{N/mm}^2$.

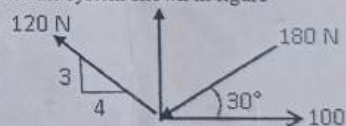
SECTION 'C'

Course Objective	Marks
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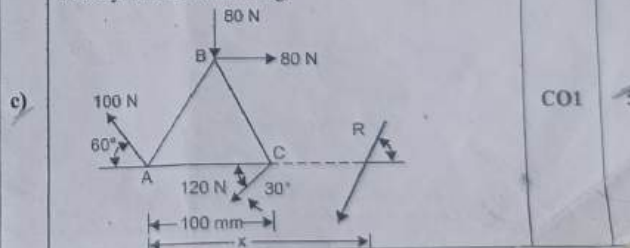
Q.N.3. Attempt any Two part of the following:

a)	State and explain the following laws of forces: (i) Triangle law of forces. (ii) Law of parallelogram of forces	CO1	5
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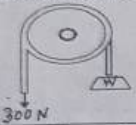
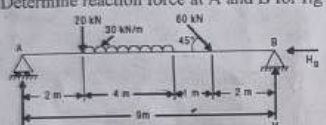
b)	Determine magnitude and direction of resultant force for the system shown in figure	CO1	5
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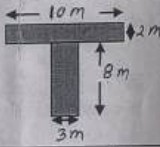
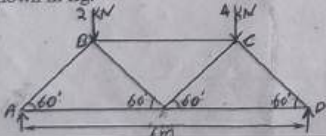
c) Find the magnitude, direction and position of the resultant force system as shown in fig.



Q.N.4. Attempt any Two part of the following:

- a) What is friction? Derive the relation between tight side and slack side. CO2 5
- b) Determine the maximum weight that can be lowered by a person who can exert a 300N pull on rope as shown in fig. if the rope is wrapped 2.5 turns around horizontal spur. Take $\mu=0.3$ CO2 5
- 
- c) Determine reaction force at A and B for fig CO2 5
- 

Q.N.5. Attempt any Two part of the following:

- a) Derive an expression for the moment of inertia of a Triangular Section of base b and height h about the base. CO1 5
- b) State and prove parallel axis theorem and find Moment of Inertia of T section about centroidal axis. CO1 5
- 
- c) Determine the forces in all the members of truss shown in fig. CO3 5
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Q.N.6. Attempt any two part of the following:

- a) Draw and Explain stress-strain curve for ductile material. CO4 5
- b) The motion of a particle is given by $a = t^3 - 3t^2 + 5$, where a is the acceleration in m/s^2 and t is time in second. The velocity of the particle at $t = 1$ s is 6.25 m/s and the displacement is 8.30 m. Calculate the displacement and velocity at $t = 2$ s. CO4 5
- c) Define the following terms:
(i) Strain (ii) Modulus of Rigidity
(iii) Factor of safety (iv) Stress (v) Strain Energy CO4 5

Table 1: Mapping between COs and questions

(Number of COs may vary from course to course)

COs	Questions Numbers	Total Marks
CO1	1-a, 1-b, 2-a, 3-a, 3-b, 3-c	23
CO2	1-c, 2-b, 4-a, 4-b, 4-c	22
CO3	1-d, 1-f, 2-c, 5-a, 5-b, 5-c	23
CO4	1-e, 1-g, 1-h, 2-d, 6-a, 6-b, 6-c	24