Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S2 (S) Examination January 2026 (2024 Scheme)

Course Code: PCCET205

Course Name: MECHANICS OF SOLIDS

Max. Marks: 60 Duration: 2 hours 30 minutes

PART A

(Answer all questions. Each question carries 3 marks)

		CO	Marks
1	Draw the stress strain diagram of mild steel and mark its salient points.	CO1	(3)
2	If the values of modulus of elasticity and Poisson's ratio for an alloy body are 150 GPa and 0.25 respectively, determine the value of bulk modulus for the alloy.	CO4	(3)
3	Explain any 3 types of beams	CO1	(3)
4	Draw the shear force diagram and bending moment diagram for simply supported beam of span L m carrying a point load of W kN at its midpoint.	CO3	(3)
5	Write down the basic differential equation for calculating the deflection of beam and state each term involved in it.	CO2	(3)
6	State the assumptions in the Theory of Simple Bending	CO1	(3)
7	Explain the limitation of Euler's formula.	CO1	(3)
8	A circular shaft of 50 mm diameter is required to transmit torque from one shaft to another. Find the safe torque, which the shaft can transmit, if the shear stress is not to exceed 40 MPa.	CO3	(3)

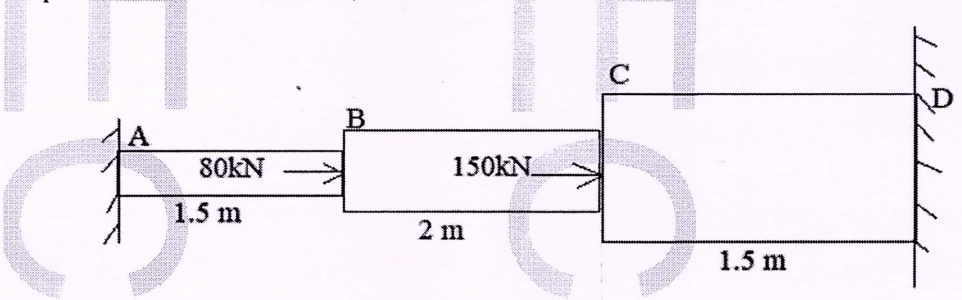
PART B

(Answer any one full question from each module, each question carries 9 marks)

Module -1

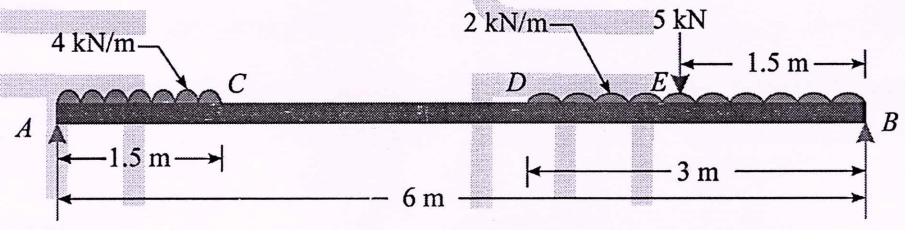
9	a)	Derive the equation for determining deformation of a body due to self weight.	CO2	(5)

	b)	A steel bar 2 m long, 20 mm wide and 15 mm thick is subjected to an axial tensile load of 30 kN. Find the Young's modulus of the material, if Poisson's ratio is 0.25 and change in volume is 150 mm^3.	CO4	(4)
10	a)	A circular bar ABCD is rigidly fixed at A and D is subjected to axial forces as shown in figure. Determine the reactions, forces in each portion of the bar and displacement of point B and C. Take E = 200GPa. Cross- sectional area of portions AB = 1000mm^2 , BC=1500mm^2 and CD = 2000mm^2.	CO3	9



Module -2

11	a)	A simply supported beam AB, 6 m long is loaded as shown in Fig. Construct the shear force and bending moment diagrams for the beam and find the position and value of maximum bending moment.	CO3	9



12	a)	Draw the SFD and BMD of a cantilever beam of length L, carrying a gradually varying load from **zero** at the free end to **'w'** per unit length at the fixed end.	CO3	6
	b)	Draw shear force and bending moment diagram for a simply supported beam of span L meter carrying central concentrated load W kN	CO3	3

Module -3

13	a)	An I-sections, with rectangular ends, has the following dimensions: Flanges 200mm x 25 mm. Web 12.5mm thick and 300 mm deep. It is used as a simply supported beam of span 10 meter and carrying a UDL of 40 kN/m for the entire length. Draw the shear stress distribution considering the critical section for shear		(9)

14	a)	Find the dimensions of a simply supported timber joist, span 6 meters, to carry a brick wall 230 mm thick and 3 m high if the unit weight of brick work is 20kN/m^3. Permissible flexural stress in timber is 8.2 N/mm2. Depth of the joist is twice the width. Neglect the self weight of the joist. (Note- Unit weight is the weight of a material per unit volume)	CO6	(7)
	b)	Define Section Modulus. Write the Expression for rectangular cross section having width 'b' and depth 'd'.	CO1	(2)

Module -4

15	a)	A plane element in a body is subjected to a tensile stress of 100 MPa accompanied by a clockwise shear stress of 25 MPa. Find (i) the normal and shear stress on a plane inclined at an angle of 20° with the tensile stress ; and (ii) the maximum shear stress on the plane.	CO5	(7)
	b)	Explain the failure of long columns and short columns.	CO2	(2)
16	a)	A short column of rectangular cross section 80 mm X 60 mm carries a load of 40 kN at a point 20 mm from the longer side and 35 mm from shorter side. Determine the stresses at all corners of the column. Draw stress distribution diagram for any one side.	CO3	(9)

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