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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S2 (R,S) Examinations April 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	Differentiate between normal stress and shear stress:-	CO1	(3)
2	Explain strain energy concept and derive an equation for strain energy stored in a body due to axial stress.	CO3	(3)
3	Draw the shear force diagram and bending moment diagram for a cantilever beam of span 'L' m carrying a point load W kN at the free end.	CO2	(3)
4	What are the different types of beams? Differentiate between a cantilever and simply supported beam.	CO1	(3)
5	What do you mean by simple bending or pure bending. What are the assumptions made in theory of simple bending.	CO1	(3)
6	Show that for a rectangular section of maximum shear stress is 1.5 times the average stress	CO3	(3)
7	Write torsion equation and state each term involved in it.	CO3	(3)
8	What is slenderness ratio? State its significance	CO2	(3)

PART B

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

Module -1

9	a)	A brass bar having cross sectional area 900mm^2 is subjected to axial forces as shown in Fig 1.1in which AB = 0.6m BC = 0.8m and CD = 1m. Find the total extension of the bar. Take E = 1x10^5 N/mm^2	CO2	(9)

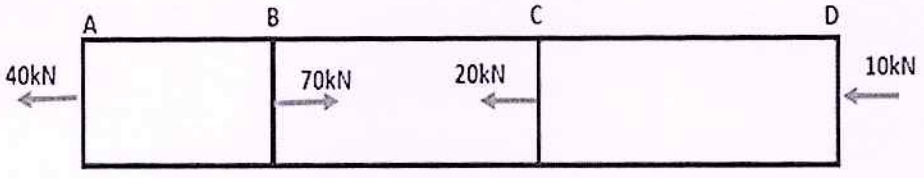

Fig 1.1

10 a) A bar of 30mm diameter is subjected to a pull of 60kN. The measured extension on gauge length of 200mm is 0.1mm and change in diameter is 0.004mm. Calculate CO4 (9)

i. Young's modulus
ii. Poisson's ratio
iii. Bulk modulus

Module -2

11 a) Analyse the beam shown in Fig 1.2 and draw Shear force diagram and Bending moment diagram CO3 (9)

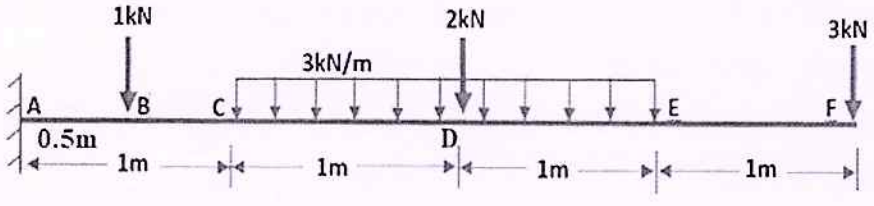

Fig 1.2

12 a) Analyse the beam shown in Fig 1.3. Draw Shear force diagram and Bending moment diagram also Find the maximum Bending moment. CO3 (9)

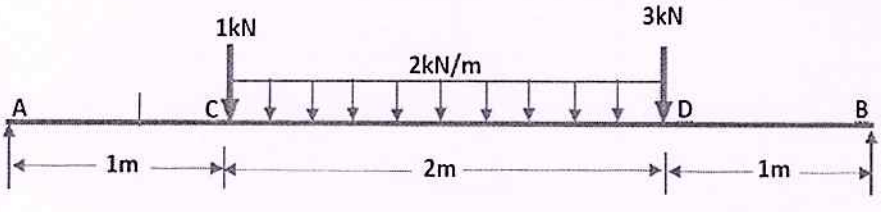

Fig 1.3

Module -3

13 a) Draw the bending stress variation for a rectangular cross section of a beam. CO3 (3)

	b)	A rectangular beam 100 mm wide and 250mm deep is subjected to a maximum shear force of 60kN. Determine: (i) Average shear stress (ii) Maximum shear stress (iii) Shear stress at a distance of 25mm above the neutral axis.	CO3	(5)
14	a)	A square beam 20mm x 20mm in section and 2m long is supported at the ends. The beam fails when a point load of 400 N is applied at the centre of the beam. what UDL per metre length will break a cantilever of same material, 40mm wide, 60mm deep and 3m long.	CO3	(9)

Module -4

15	a)	A body subjected to direct stresses in two mutually perpendicular directions. How will you graphically determine the resultant stress on an oblique plane when the stresses are unequal and unlike.	CO5	(4)
	b)	A Rectangular block of material is subjected to tensile stress of 110 N/mm^2 on one plane and a tensile stress of 47 N/mm^2 on a plane at right angle to the former. Each of the above stresses is accompanied by a shear stress of 63 N/mm^2 and that associated with the former tensile stress tends to rotate the block anticlockwise. Find i. The direction and magnitude of each principal stress. ii. Magnitude of greatest shear stress.	CO5	(5)
16	a)	A 1.5m long column has a circular cross section of 5cm diameter. One end of the column is fixed and another end is free. Taking factor of safety 3 calculate the safe loading using. i. Rankine's formula, Take σ_c = 550 N/mm^2 and α = 1/1600 for pinned ends. ii. Euler's formula, Take E= 1.2 x 10^5 N/mm^2	CO6	(9)

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