GALGOTIAS UNIVERSITY

ADMISSION NUMBER												

School of Engineering

B.TECH Mechanical Engineering
Semester End Examination - Jun 2024

Duration : 180 Minutes
Max Marks : 100

Sem IV - G3UB401B - BTME2008 Mechanics of Materials

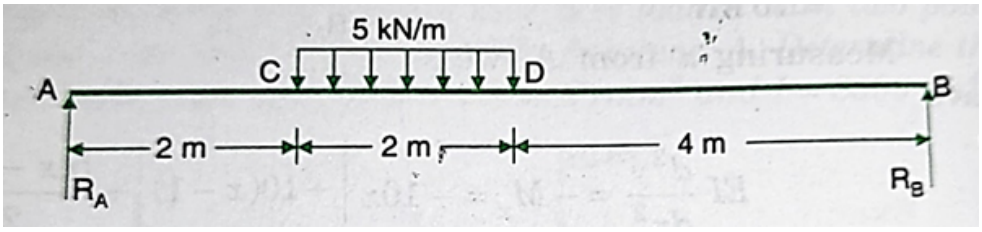
General Instructions
Answer to the specific question asked
Draw neat, labelled diagrams wherever necessary
Approved data hand books are allowed subject to verification by the Invigilator

1) What do you mean by theories of failure? K1 (2)

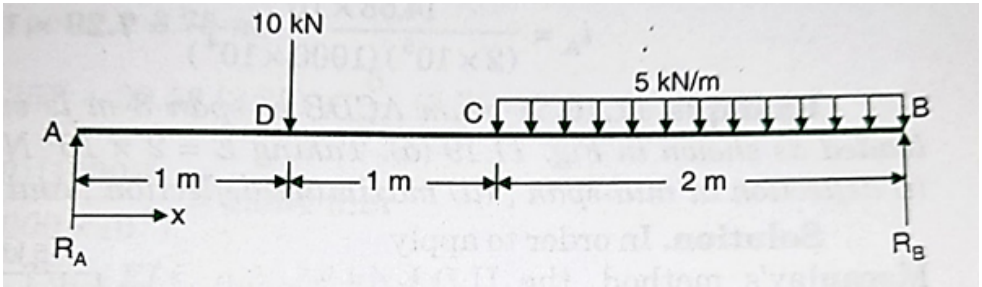
2) Explain the advantages of using Macaulay's method over the Double integration method of beam deflection analysis. K2 (4)

3) Deduce the governing equation in theory of simple bending. K2 (6)

4) A simply supported beam is shown in figure. Solve for the deflection at midspan and the maximum deflection in the beam. E = 200 GPa, I = 8000 cm4 K3 (9)



5) A simply supported beam is shown in figure. Solve for the deflection at Point C and the maximum deflection in the beam. E = 200 GPa, I = 1000 cm4 K3 (9)



6) A 450 KW power has to be transmitted at 100 RPM. Evaluate (i) the necessary diameter of a solid circular shaft, (ii) the necessary diameter of a hollow circular section, the inside diameter being 0 .75 of the external diameter. Allowable shear stress is 75MPa. The density of the material is 77 kilo newton per meter cube. K5 (10)

7)	Determine the section of a cast iron hollow cylindrical column 5 meters long with ends firmly built-in, if it carries an axial load of 300 kN. The ratio of internal to external diameter is 0.75. factor of safety = 8, compressive stress = 567 MPa. Rankine's constant a = 1/1600.	K4	(12)
8)	A bolt is subjected to a pull of 12 kN together with a transverse shear of 6 kN. Evaluate the diameter of the bolt required if it is to be safe according to (i) maximum principal stress theory, (ii) maximum shear stress theory, (iii) maximum strain energy theory. Elastic limit in simple tension is 300 MPa. factor of safety is 3. Poisson's ratio = 0.3.	K5	(15)
9)	The principle stresses at a point in an elastic limit are 1.5 σ (tensile), σ (tensile), and 0.5 σ (compressive). the elastic limit in tension is 210 MPa and Poisson's ratio is 0.3. Evaluate the value of σ at the failure when computed by different theories of failure.	K5	(15)
10)	The principal stresses at a point in an elastic material of 1.5 σ (tensile), σ (tensile) and 0.5 σ (compressive). If the elastic limit in simple tension is 200 MPa, estimate the value of σ at failure, according to any three different theories of failures. μ = 0.3.	K6	(18)