OBJECTIVES

To impart adequate knowledge on how to analyze and design structural members subjected to tension, compression, torsion, bending and combined stresses using the fundamental concepts of stress, strain and elastic behavior of materials. Develop an understanding of the concepts of stress and strain and their use in the analysis and design of structures. To understand the failure phenomenon and learn how to prevent the failure. Utilize appropriate materials in design considering engineering properties, sustainability, cost and weight. Perform engineering work in accordance with ethical and economic constraints related to the design of structures.

1. Group - A (Short Answer Questions)

S. No	Questions	Blooms Taxonomy Level	Program Outcome
	UNIT – I **SIMPLE STRESSES AND STRAINS – STRAIN ENERGY**		
1	What is the Principle of surveying	Understanding	a
2	Define Magnetic, True & Arbitrary Meridians.	Understanding	a
3	Mention different types of chains	Understanding	a
4	Differentiate between direct and indirect ranging.	Understanding	a
5	What is the Principle of chain surveying	Understanding	b
6	What are the Obstacles in chain surveying	Understanding	b
7	Write down the conditions for closed traverse	Understanding	b
8	Mention the Errors in chain surveying	Understanding & remembering	b
9	Differentiate Between Prismatic Compass and Surveyors Compass	Understanding	c
10	Define local attraction	Understanding	c

S. No	Questions	Blooms Taxonomy Level	Program Outcome
	UNIT- II **SHEAR FORCE AND BENDING MOMENT**		
1	Write about Methods of leveling	Understanding	d
2	Define Curvature & Refraction	Understanding	d
3	Write a note on Errors in leveling	Understanding ,remembering	d
4	Write a note on Temporary adjustments to leveling instrument	Understanding , remembering	d
5	Define leveling	Understanding , remembering	d
6	Define Benchmark	Understanding , remembering	d
7	Draw a neat sketch to indicate the following : level surface, horizontal surface, vertical line, level line and horizontal line	Understanding , remembering	d
8	Explain the differences between the height of collimation method and the rise and fall method of reduction of levels.	Understanding ,remembering	d
9	Define contour & Contour gradient	Understanding , remembering	d
10	Mention the Method of plotting of contours	Understanding , remembering	d
	UNIT – III **FLEXURAL STRESSES - SHEAR STRESSES**		
1	Mention different methods of Calculation of area of traverse	understanding	e
2	Mention different methods of Calculation of area between a survey line and an irregular boundary	understanding	e
3	Mention different methods of Calculation of area of a plane figure	understanding	e
4	Write about Calculation of volumes using Simpson's & Trapezoidal rule	understanding	e
5	Write about Calculation of capacity of reservoir and barrow pits	Understanding	e
6	Write about prismoidal rule	understanding	f
7	Write about Mid-ordinate rule	Remembering	f
8	Write about Average - ordinate rule	Understanding & evaluate	f
9	Write about Trapezoidal rule	Understanding & evaluate	f
10	Write about Simpson's rule	Understanding & Evaluate	f
	UNIT-IV **PRINCIPAL STRESSES AND STRAINS – THEORIES OF FAILURE**		
1	Define Principal plane.	understanding	g
2	Define principal stress. What are the methods used	understanding	g
3	What are the methods used to determine the stresses on oblique section?	remembering	g
4	What are the cases considered in determining the stresses on oblique section using analytical method ?	remembering	g
5	Define obliquity and write an expression for it.	understanding	g

S. No	Questions	Blooms Taxonomy Level	Program Outcome
6	What are the cases considered in determining the stresses on oblique section using graphical method?	remembering	g
7	Write short notes on Mohr's circle of stresses.	Understanding	g
8	State distortion energy theorem for failure.	Understanding & remembering	h
9	What do you understand by the term Theories of failure? Name the important theories of failure.	Understanding & remembering	h
10	Explain the reasons why theory of failure is best suited for (i) ductile materials; (ii) Brittle materials	Understanding	h
	UNIT – V **DEFLECTION OF BEAMS – CONJUGATE BEAM METHOD**		
1	Define deflection and slope.	Understanding	i
2	List out the different methods for finding slope and deflection of a beam.	Remembering	i
3	What is Macaulay's method? Where is it used?	Remembering, Understanding	i
4	What is moment area method? Where is it used?	Remembering ,Understanding	i
5	What is a cantilever? What are the different methods of finding slope and deflection of cantilever method?	Understanding	i
6	Define and explain the terms: conjugate beam, conjugate beam method, flexural rigidity.	Understanding	i
7	Write the boundary conditions for the following beams: Simply supported beam, cantilever beam.	Understanding , remembering	i
8	What is the use of conjugate beam method over other methods?	Understanding	j
9	How will you use conjugate beam method for finding slope and deflection at any section of a given beam?	Remembering , Understanding	j
10	What is the relation between an actual beam and the corresponding conjugate beam for different end conditions?	Understanding	j

2. Group - II (Long Answer Questions)

S. No	Questions	Blooms Taxonomy Level	Program Outcome
	UNIT – I **SIMPLE STRESSES AND STRAINS – STRAIN ENERGY**		
1	What is the Principle of surveying	Understanding ,remembering	a
2	Write brief notes on a) Optical square b) Cross- staff c) Hypotenusal allowance	analyze	a
3	Write about different scales and maps	analyze	a

S. No	Questions	Blooms Taxonomy Level	Program Outcome
4	What are the sources of errors in surveying	analyze & Apply	b
5	Classification of surveying in brief	analyze & Apply	b
6	What are the objectives of surveying	analyze & Apply	b
7	Explain with neat sketches, the following methods of locating a point by plane table survey. a) Radiation b) Intersection c) Resection	analyze Apply	b
8	Determine the back bearings corresponding to the following fore bearings a.30^0 36' b. 190^0 10' c. 90^0 39' d. 286^0 51'	analyze Apply	c
9	Define three-point problem and show how it may be solved by tracing paper method.	analyze & Apply	c
10	Enlist and explain briefly the different methods of plane table surveying	analyze Apply	c
	UNIT – II **SHEAR FORCE AND BENDING MOMENT**		
1	Define Cross sectioning	Understanding	d
2	Write a note on Characteristics of contours	Understanding	d
3	Write a note on Uses and advantage s of contours	Understanding	d
4	What do you mean by interpolation of contours	analyze & Apply	d
5	What is profile leveling? Describe the procedure for conducting profile leveling of a proposed highway.	analyze & Apply	c
6	What is cross-sectioning? What is its importance? How would you draw a longitudinal section and a cross section?	analyze & Apply	d
7	Define Profile leveling	analyze & Apply	d
8	What is bench mark? Explain different types of Bench marks	analyze & Apply	d
9	Two stations A and B are 1200 m apart. A level was set up between the two stations 100 m away from A. the readings observed were 1.375 m on A and 2.465 on B. Find the true difference in elevation between A and B.	analyze & Apply	d
10	Describe briefly the processes of i. Differential leveling ii. Profile leveling iii. Cross sectioning	analyze & Apply	d
	UNIT – III **FLEXURAL STRESSES - SHEAR STRESSES**		
1	Discuss the following methods of computation of area of a tract with straight but irregular boundaries. a. Mid-ordinate rule b. Average - ordinate rule c. Trapezoidal rule	Understanding	e

<table>
<tr><th>S. No</th><th>Questions</th><th>Blooms Taxonomy Level</th><th>Program Outcome</th></tr>
<tr><td>2</td><td>Derive the formula for Simpson’s rule. What are its limitations?</td><td>analyze & Apply</td><td>e</td></tr>
<tr><td>3</td><td>Explain the double meridian distance (D.M.D) method for the computation of area of a closed traverse.</td><td>analyze & Apply</td><td>e</td></tr>
<tr><td>4</td><td>Describe the method of independent co – ordinates for computation of area. What are its advantages over the D.M.D. method?</td><td>analyze & Apply</td><td>f</td></tr>
<tr><td>5</td><td>Describe any two methods of the determination of area of triangle? How would you determine the area of a quadrilateral or a polygon by triangle method?</td><td>analyze & Apply</td><td>f</td></tr>
<tr><td>6</td><td>The following offsets were taken from a chain line to hedge
<table><tr><td>distance</td><td>0</td><td>20</td><td>40</td><td>60</td><td>80</td><td>120</td><td>160</td><td>220</td><td>280</td></tr><tr><td>offset</td><td>9.4</td><td>10.8</td><td>13.6</td><td>11.2</td><td>9.6</td><td>8.4</td><td>7.5</td><td>6.3</td><td>4.6</td></tr></table>Compute the area included between the chain line, the hedge and offset by Simpson’s rule.</td><td>analyze & Apply</td><td>f</td></tr>
<tr><td>7</td><td>Determine the area of the closed traverse ABCDE by the D.M.D. method
<table><tr><th>Line</th><th>Departure in m</th><th>Latitude in m</th></tr><tr><td>AB</td><td>220</td><td>120</td></tr><tr><td>BC</td><td>230</td><td>-250</td></tr><tr><td>CD</td><td>-100</td><td>-250</td></tr><tr><td>DE</td><td>-290</td><td>100</td></tr><tr><td>EA</td><td>-60</td><td>280</td></tr></table></td><td>analyze & Apply</td><td>f</td></tr>
<tr><td>8</td><td>Taking the origin at ‘A’ , determine the independent coordinates of the stations of the traverse in the above problem. Hence determine the area of the traverse.</td><td>analyze & Apply</td><td>f</td></tr>
<tr><td>9</td><td>Determine the area of the closed traverse given in problem(7) by the double parallel distance method.</td><td>analyze & Apply</td><td>f</td></tr>
<tr><td>10</td><td>Determine the included between the chain line, the hedge and end offsets in problem (6) by the trapezoidal rule.</td><td>analyze & Apply</td><td>f</td></tr>
<tr><td colspan="4">UNIT – IV
PRINCIPAL STRESSES AND STRAINS – THEORIES OF FAILURE</td></tr>
<tr><td>1</td><td>A rectangular bar is subjected to a direct stress (σ) in one plane only. Prove that the normal and shear stresses on an oblique plane are given by $\sigma_n = \sigma cos^2\theta$ and $\sigma_n = \frac{\sigma}{2} sin2\theta$
Where θ = angle made by oblique plane with the normal cross-section of bar σ_n = normal stress; σ_t = tangential or shear stress</td><td>analyze & Apply</td><td>g</td></tr>
<tr><td>2</td><td>A rectangular bar is subjected to two direct stresses σ_1 and σ_2 in two mutually perpendicular directions. Prove that the normal stress and shear stress on an oblique plane which is inclined at an angle θ with the axis of minor stress are given by $\sigma_n = \frac{\sigma_1+\sigma_2}{2} + \frac{\sigma_1-\sigma_2}{2} cos2\theta$ and $\sigma_t = \frac{\sigma_1-\sigma_2}{2} sin2\theta$</td><td>analyze & Apply</td><td>g</td></tr>
</table>

S. No	Questions	Blooms Taxonomy Level	Program Outcome
3	Derive an expression for the stresses on an oblique plane of a rectangular body, when the body is subjected to a simple shear stress.	analyze & Apply	g
4	A rectangular body is subjected to direct stresses in two mutually perpendicular directions accompanied by a shear stress. Prove that the normal stress and shear stress on an oblique pane inclined at angle θ with the plane of major direct stress are given by $\sigma_n = \frac{\sigma_1+\sigma_2}{2} + \frac{\sigma_1-\sigma_2}{2} cos2\theta + \tau sin2\theta$ and $\sigma_t = \frac{\sigma_1-\sigma_2}{2} sin2\theta - \tau cos2\theta$	analyze & Apply	g
5	Derive an expression for the major and minor principal stresses on an oblique plane, when the body is subjected to direct stresses in two mutually perpendicular directions accompanied by a shear stress.	analyze & Apply	g
6	Define and explain he theories of failure: (i) Maximum principal stress theory (ii) Maximum principal strain theory	Understanding	h
7	Define and explain he theories of failure: (i) Maximum shear stress theory (ii) Maximum shear strain energy theory	Understanding	h
8	A body is subjected to direct stresses in two mutually perpendicular principal tensile stresses accompanied by a simple shear stress. Draw the Mohr's circle of stresses and explain how you will obtain the principal stresses and strains.	Evaluate	h
9	A body is subjected to direct stresses in two mutually perpendicular directions. How will you determine graphically the resultant stresses on an oblique plane when (i) the stresses are unequal and unlike; (ii) the stresses are unequal and like.	Evaluate	h
10	Derive an expression for the distortion energy per unit volume when a body is subjected to principal stresses σ_1, σ_2 and σ_3.	analyze & Apply	h
UNIT – V **DEFLECTION OF BEAMS – CONJUGATE BEAM METHOD**			
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S. No	Questions	Blooms Taxonomy Level	Program Outcome
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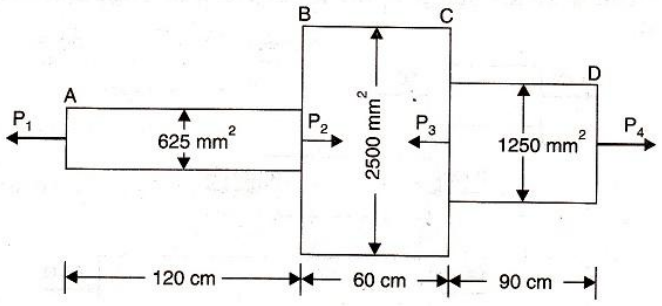
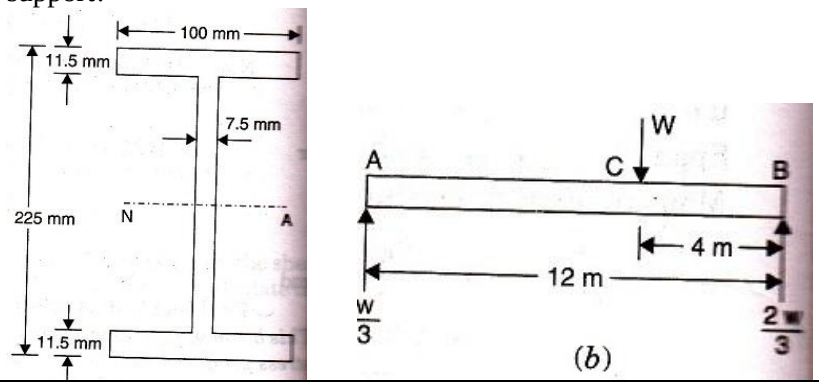
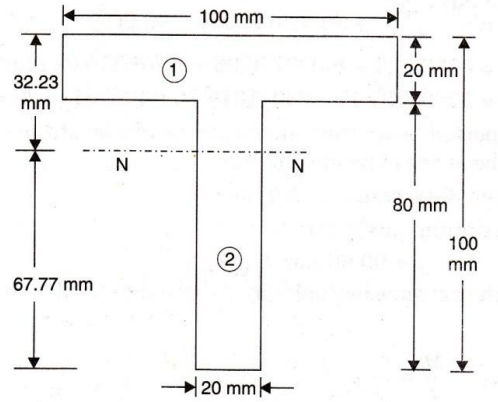
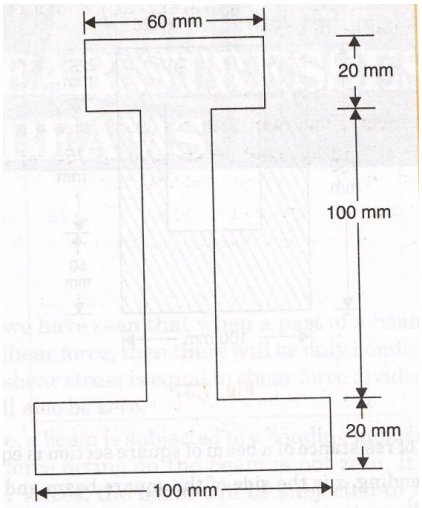
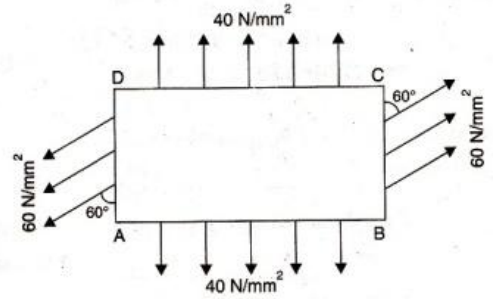
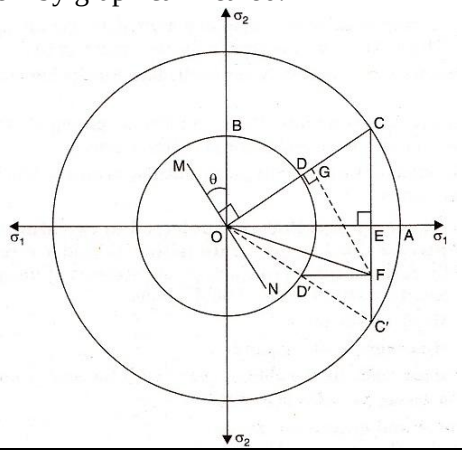
3. Group - III (Analytical Questions)

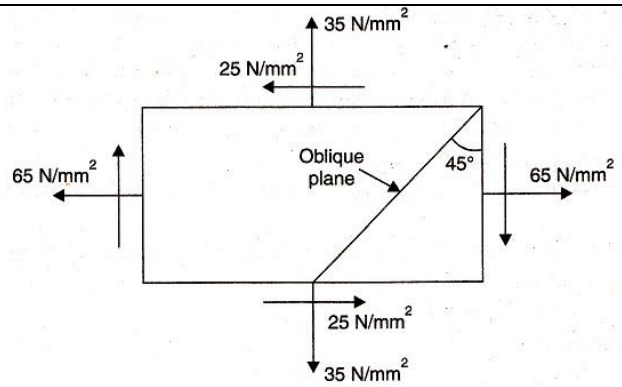
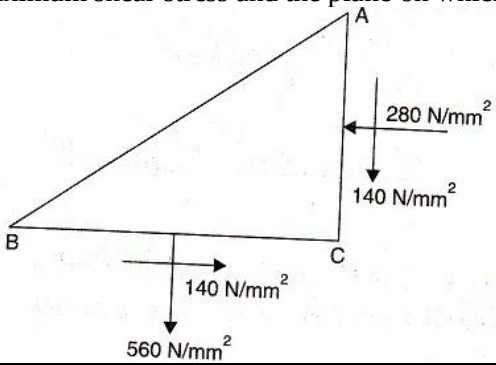
S. No	Questions	Blooms Taxonomy Level	Program Outcome
	UNIT – I **SIMPLE STRESSES AND STRAINS – STRAIN ENERGY**		
1	A tensile test was conducted on a mild steel bar. The following data was obtained from the test: Diameter of steel bar = 3cm Gauge length of the bar = 20cm Load at elastic limit = 250kN Extension at load of 150kN = 0.21mm Maximum load = 380kN Total extension = 60mm Diameter of rod at failure = 2.25cm Determine: (a) Young's modulus (b) stress at elastic limit (c) percentage elongation (d) percentage decrease in area	Apply & evaluate	a
2	A member ABCD is subjected to point loads P1, P2, P3 and P4 as shown in figure below. Calculate the force P2 necessary for equilibrium, if P1 = 45kN, P2 = 450kN and P4 = 130kN. Determine the total elongation of the member, assuming the modulus of elasticity to be $2.1x10^5$ N/mm^2. 	Apply & evaluate	a
3	A compound tube consists of a steel tube 140mm internal diameter and 160mm external diameter and an outer brass tube 160mm internal diameter and 180mm external diameter. The two tubes are of the same length. The compound tube carries an axial load of 900kN. Find the stresses and the load carried by each tube and the amount it shortens. Length of each tube is 140mm. Take E for steel as $2x10^5$ N/mm^2 and for brass as $1x10^5$ N/mm^2.	Apply & evaluate	a
4	A steel rod of 3cm diameter and 5m long is connected to two grips and the rod is maintained at a temperature of 95^{o}C. Determine the stress and pull exerted when the temperature falls to 30^{o}C, if (i) the ends do not yield, and (ii) the ends yield by 0.12cm. Take E = $2x10^5$	Apply & evaluate	b

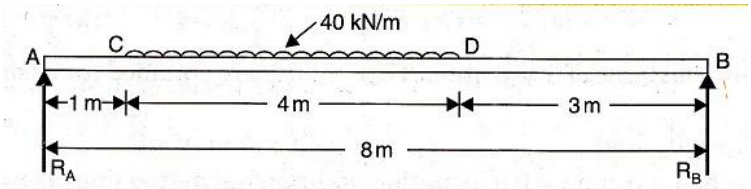
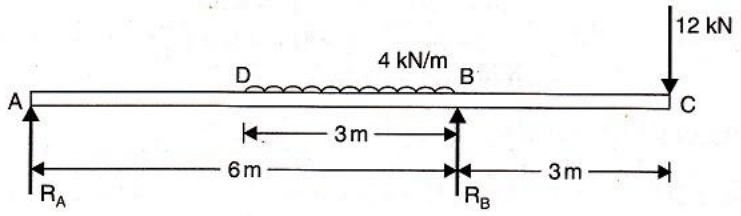
S. No	Questions	Blooms Taxonomy Level	Program Outcome
	MN/m^2 and $\alpha = 12x10^{-6}/^oC$.		
5	Determine the value of Young's modulus and Poisson's ratio of a metallic bar of length 25cm, breadth 3cm and depth 2cm when the bar is subjected to an axial compressive load of 240kN. The decrease in length is given as 0.05cm and increase in breadth is 0.002cm.	Apply & evaluate	b
6	A metallic block 250mm x 80mm x 30mm is subjected to a tensile force of 20kN, 30kN and 15kN along x, y and z directions respectively. Determine the change in volume of the block. Take E= $2x10^5$ N/mm^2 and Poisson's ratio = 0.30.	Apply & evaluate	b
7	Determine the Poisson's ratio and bulk modulus of a material, for which Young's modulus is $1.2x10^5$ N/mm^2 and modulus of rigidity is $4.5x10^4$ N/mm^2	Apply & evaluate	b
8	A bar of 30mm in diameter was subjected to tensile load of 54kN and the measured extension on 300mm gauge length was 0.112mm and change in diameter was 0.0036mm. Calculate the Poisson's ratio and three modulii.	Apply & evaluate	b
9	A bar of uniform cross-section 'A' and length 'L' hangs vertically, subjected to its own weight. Prove that the strain energy stored within the bar is given by $U = \frac{A x \rho^2 x L^3}{6E}$	Apply & evaluate	c
10	A vertical round steel rod 1.82m long is securely held at its upper end. A weight can slide freely on the rod and its fall is arrested by a stop provided at the lower end of the rod. When the weight falls from a height of 30mm above the stop, the maximum stress reached in the rod is estimated to be $157N/mm^2$. Determine the stress if the load has been applied gradually and also the maximum stress if the load had fallen from a height of 47.5mm. Take E = $2.1x10^5$ N/mm^2.	Apply & evaluate	c
	UNIT – II **SHEAR FORCE AND BENDING MOMENT**		
1	A cantilever beam of length 4m carries point loads of 1kN, 2kN and 3kN at 1, 2 and 4m from the fixed end. Draw the S.F and B.M diagrams for the cantilever.	Apply & evaluate	d
2	A cantilever of length 4m carries a uniformly distributed load of 2kN/m run over the whole span and a point load of 2kN at a distance of 1m from the free end. Draw the S.F and B.M diagrams for the cantilever.	Apply & evaluate	d
3	A cantilever of length 6m carries two point loads 2kN And 3kN at a distance of 1m and 6m from fixed end respectively. In addition to this the beam also carries a uniformly distributed load of 1kN/m over a length of 2m at a distance of 3m from the fixed end. Draw the S.F and B.M diagrams for the cantilever.	Apply & evaluate	d
4	A cantilever of length 4m carries a uniformly distributed load of 3kN/m run over a length of 1m from the fixed end. Draw the S.F and B.M diagrams for the cantilever.	Apply & evaluate	d
5	A cantilever of length 6m carries a gradually varying load, zero at the free end to 2kN/m at the fixed end. Draw the S.F and B.M diagrams for the cantilever.	Apply & evaluate	d

S. No	Questions	Blooms Taxonomy Level	Program Outcome
6	A simply supported beam of length 8m carries point loads of 4kN and 6kN at a distance of 2m and 4m from the left end. Draw the S.F and B.M diagrams for the beam.	Apply & evaluate	d
7	A simply supported beam of length 6m is carrying a uniformly distributed load of 2kN/m from the right end. Draw the S.F and B.M diagrams for the beam.	Apply & evaluate	d
8	A beam of length 10m is simply supported and carries point loads of 5kN each at a distance of 3m and 7m from the left end and also a uniformly distributed load of 1kN/m between the point loads. Draw the S.F and B.M diagrams for the beam.	Apply & evaluate	d
9	A beam of length 6m is simply supported at its ends. It is loaded with gradually varying load of 750N/m from left support to 1500N/m to the right support. Construct the S.F and B.M diagrams and find the amount and position of maximum B.M over the beam.	Apply & evaluate	d
10	A simply supported beam of length 8m rests on supports 6m apart, the right hand end is overhanging by 2m. The beam carries a uniformly distributed load of 1500N/m over the entire length. Draw S.F and B.M diagrams and find the point of contraflexure, if any.	Apply & evaluate	d
	UNIT-III **FLEXURAL STRESSES - SHEAR STRESSES**		
1	A square beam 20mm x 20mm in section and 2m long is supported at the ends. The beam fails when a point load of 400N is applied at the centre of the beam. What uniformly distributed load per meter length will break a cantilever of same material 40mm wide, 60mm deep and 3m long?	Apply & evaluate	e
2	An I-section shown in figure is simply supported over a span of 12m. If the maximum permissible bending stress is 80N/mm^2, what concentrated load can be carried at a distance of 4m from one support? 	Apply & evaluate	e
3	Two circular beams where one is solid of diameter D and other is a hollow of outer dia. D_o and inner dia. D_i are of same length, same material and of same weight. Find the ratio of these circular beams.	Apply & evaluate	e
4	A cast iron beam is of T-section as shown in figure. The beam is simply supported on a span of 8m. The beam carries a uniformly distributed load of 1.5kN?m length on the entire span. Determine the maximum tensile and maximum compressive stress.	Apply & evaluate	e

S. No	Questions	Blooms Taxonomy Level	Program Outcome
			
5	A beam of I-section shown in figure is simply supported over a span of 4m. Determine the load that the beam can carry per meter length, if the allowable stress in the beam is 30.82 N/mm^2. 	Apply & evaluate	e
6	A timber beam of rectangular section is simply supported at the ends and carries a point load at the centre of the beam. The maximum bending stress is 12 N/mm^2 and maximum shearing stress is 1 N/mm^2, find the ratio of span to depth.	Apply & evaluate	e
7	A circular beam of 100mm diameter is subjected to a shear force of 5kN. Calculate: (i) average shear stress, (ii) Maximum shear stress and (iii) shear stress at a distance of 40mm from NA.	Apply & evaluate	f
8	A timber beam 100mm wide and 150mm deep supports a uniformly distributed load of intensity w kN/m length over a span of 2m. If the safe stresses are 28 N/mm^2 in bending and 2 N/mm^2 in shear, calculate the safe intensity of the load which can be supported by the beam.	Apply & evaluate	f
9	An I-section has the following dimensions: Flange: 150mm x 20mm, Web: 30mm x 10mm The maximum shear stress developed in the beam is 16.8 N/m^2. Find the shear force to which the beam is subjected.	Apply & evaluate	f
10	The maximum shear stress in a beam of circular section of diameter 150mm is 5.28 N/mm^2. Find the shear force to which the beam is subjected.	Apply & evaluate	f

S. No	Questions	Blooms Taxonomy Level	Program Outcome
	UNIT-IV **PRINCIPAL STRESSES AND STRAINS – THEORIES OF FAILURE**		
1	The stresses at a point in a bar are 200 N/mm^2 (tensile) and 100 N/mm^2(compressive). Determine the resultant stress in magnitude and direction on a plane inclined at 60^o to the axis of major stress. Also determine the maximum intensity of shear stress in the material at that point.	Apply & evaluate	g
2	A point in a strained material is subjected to the stresses as shown in figure. Locate the principal planes, and evaluate the principal stresses. 	Apply & evaluate	g
3	The normal stress in two mutually perpendicular directions are 600 N/mm^2 and 300 N/mm^2 both tensile. The complimentary shear stress in these directions is of intensities 450 N/mm^2. Find the normal and tangential stresses on the two planes which are equally inclined to the plane carrying the normal stress mentioned above.	Apply & evaluate	g
4	Solve the problem by graphical method. 	Apply & evaluate	g
5	A point in a strained material is subjected to stress shown in figure. Using Mohr's circle method, determine the normal and tangential stresses across the oblique plane. Check the answer analytically.	Apply & evaluate	g

S. No	Questions	Blooms Taxonomy Level	Program Outcome
			
6	At a point in a strained material, on plane BC there are normal and shear stresses of 560 N/mm^2 and 140 N/mm^2 respectively. On plane AC, perpendicular to plane BC, there are normal and shear stresses of 280 N/mm^2 and 140 N/mm^2 respectively as shown in the figure. Determine the following: (i) principal stresses and location on which they act; (ii) maximum shear stress and the plane on which it acts. 	Apply & evaluate	g
7	The principal stresses at a point in a elastic material are 22 N/mm^2 (tensile), 110N/mm^2 (tensile) and 55 N/mm^2 (compressive). If the elastic limit in simpletension is 220 N/mm^2 and μ = 0.3, then determine whether the failure of material will occur or not according to (i) Maximum principal stress theory (ii) Maximum principal strain theory (iii) Maximum shear stress theory (iv) Maximum strain energy theorem (v) Maximum shear strain energy theory	Apply & evaluate	h
8	Determine the diameter of a bolt which is subjected to an axial pull of 12 kN together with a transverse shear force of 6kN, when the elastic limit in tension is 300 N/mm^2, factor of safety = 3 and μ = 0.3 using (i) Maximum principal stress theory (ii) Maximum principal strain theory (iii) Maximum shear stress theory (iv) Maximum strain energy theorem (v) Maximum shear strain energy theory	Apply & evaluate	h
9	A bolt is under an axial thrust of 7.2 kN together with a transverse shear force of 3.6kN. Calculate the diameter of bolt according to	Apply & evaluate	h

S. No	Questions	Blooms Taxonomy Level	Program Outcome
	(i) Maximum principal stress theory (ii) Maximum shear stress theory (iii) Maximum strain energy theorem Take elastic limit in simple tension = 202 N/mm^2, factor of safety = 3, $\mu = 0.3$.		
10	In a two dimensional stress system, the direct stresses on two mutually perpendicular planes are 120MN/mm^2. These planes also carry a shear stress of 40MN/mm^2. If the factor of safety on elastic limit is 3, then find: (i) the value of stress when shear strain energy is minimum; (ii) elastic limit of material in simple tension.	Apply & evaluate	h
	UNIT –V **DEFLECTION OF BEAMS – CONJUGATE BEAM METHOD**		
1	A beam of length 6m is simply supported at its ends and carries two point loads of 48kN and 40kN at a distance of 1m and 3m respectively from the left support. Find: (i) deflection under each load, (ii) maximum deflection and (iii) the point at which maximum deflection occurs. Given E = 2 x 10^5 N/mm^2 and I = 85 x 10^6 mm^4.	Apply & evaluate	i
2	A beam of length 8m is simply supported at is ends. It carries a uniformly distributed load of 40kN/m as shown in figure below. Determine the deflection of the beam at its midpoint and also the position of maximum deflection and maximum deflection. Take E = 2 x 10^5 N/mm^2 and I = 4.3 x 10^8 mm^4. 	Apply & evaluate	i
3	A beam ABC of length 9m has one support to the left end and the other support at a distance of 6m from the left end. The beam carries a point load of 1kN at the right end and also carries a uniformly distributed load of 4kN/m over a length of 3m as shown in the figure. Determine slope and deflection at point C. E = 2 x 10^5 N/mm^2 and I = 5 x 10^8 mm^4. 	Apply & evaluate	i
4	A beam of 4.8m and of uniform rectangular section is simply supported at its ends. It carries a uniformly distributed load of 9.375kN/m run over the entire length. Calculate the width and depth of the beam if permissible bending stress is 7N/mm^2 and maximum deflection is not to exceed 0.95cm. Take E for beam material = 1.05 x 10^4 N/mm^2	Apply & evaluate	i
5	A beam ABC of length 9m has one support to the left end and the other support at a distance of 6m from the left end. The beam carries a point load of 1kN at the right end and also carries a uniformly	Apply & evaluate	i

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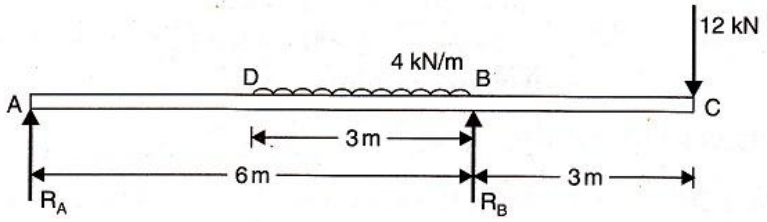
	distributed load of 4kN/m over a length of 3m as shown in the figure. Determine slope and deflection at point C. E = 2 x 10^5 N/mm^2 and I = 5 x 10^8 mm^4. Use moment–area method. 		
6	Determine the deflection at the free end of a cantilever which is 2m long and carries a point load of 9kN at the free end and a uniformly distributed load of 8kN/m over a length of 1m from the fixed end. Take E = 2.2 x 10^5 N/mm^2 and I = 2.25 x 10^7 mm^4.	Apply & evaluate	i
7	A cantilever of length 2m carries a uniformly varying load of zero intensity at free end and 45kN/m at the fixed end. If E = 2 x 10^5 N/mm^2 and I = 10^8mm^4, find the slope and deflection of the free end.	Apply & evaluate	i
8	A cantilever of length 2m carries a point load of 3kN at the free end and another load of 30kN at its centre. If EI = 10^{13} N/mm^2 for the cantilever, then determine by moment area method, the slope and deflection at the free end of cantilever.	Apply & evaluate	i
9	A beam of length 6m is simply supported at it ends and carries two point loads of 48kN and 40kN at a distance of 1m and 3m respectively from the left support. Find the deflection under each load. Take E = 2 x 10^5 N/mm^2 and I = 85 x 10^6 mm^4. Use conjugate beam method.	Apply & evaluate	j
10	A cantilever of length 3m is carrying a point load of 50kN at a distance of 2m from the fixed end. If I = 10^8mm^4 and E = 2 x 10^5 N/mm^2, find slope and deflection at free end using conjugate beam method.	Apply & evaluate	j