Model Question Paper

Theory of Structures

Time : 3 Hour *Max.Marks : 75*

PART A

I Answer all the following questions in one word or sentence, Each questions carry 1 mark

1 Algebraic sum of all the vertical forces to left or right of the section is called …

2 At point of contra flexure value of bending moment is…

3 In a rectangular homogeneous section the ratio of maximum shear stress to average shear stress is …

4 A column is subjected to bending tensile stress when the bending stress is …….. than direct stress.

5 The maximum value of bending stress in a vertical compression member subjected to moment, M and section modulus, Z is …

5 The maximum value of deflection for a simply supported beam carrying UD load, w of length l with flexural rigidity EI is……

6 The fixed end moment value for a fixed beam of span l, carrying point load W at center is …

7 The maximum value of sagging moment in a fixed beam carrying UD load w over the whole span l is……

8 A beam with more than two supports is called….

9 The ratio moment induced to moment applied in a beam is called ……….

$9 \times 1 = 9$ marks

II. Answer any eight questionsfrom the following, Each questions carry 3 marks

1 Sketch the typical shear force and bending moment diagram of a (1) cantilever beam of span. The beams carry uniformly distributed load of intensity w/unit run over the whole span.

2 Sketch the typical shear stress distribution for the following beam sections. (1) rectangular (2) Circular (3) I sections.

3 Write down the assumptions in theory of simple bending

4 Write the limitations of Euler's theorem for column loads.

5 Give the maximum and minimum stresses base of trapezoidal cross sectional dam with water face vertical.

6 A cantilever of length 3m is carrying a point load of 25kN at the free end. If the moment of inertia of the beam = 108 mm4 and value of E = 2.1 × 105 N/mm2 , Find (i) Slope of the cantilever at the free end and (ii) deflection at the free end.

7 List any three advantages of fixed beam over simply supported beam

8 Define Mohr's theorem for slope and deflection.

9 Define the terms (1) distribution factor (2) Carryover factor

10. Explain Clapeyron's three moment theorem for continuous beams

PART C
Answer ALL questions. Each question carries 7 marks

III Draw the SFD and BMD for a simply supported beam of length 9m and carrying a uniformly distributed load of 10kN/m for a distance of 6m from the left end. Also calculate the maximum BM on the section.

OR

IV A timber wooden beam of rectangular section supports a load of 40 kN uniformly distributed over a span of 3.6 m. If the depth of the beam section is twice the width and maximum bending stress is not to exceed 7 N/mm$^{2.}$ Find the dimensions of the beam section.

V A column of timber section 15 cm x 20 cm is 6 m long both ends being fixed if the young's modulus of the timber is 17.5 kN/mm^2. Determine the crippling load and safe load for the column if a factor of safety is 3.

OR

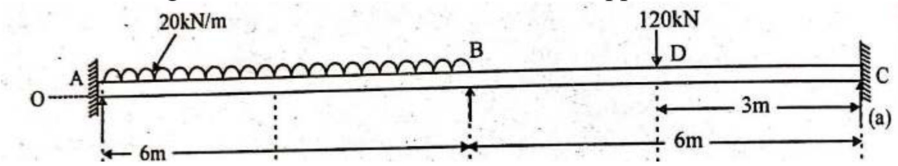
VI The following particulars relate to the retaining wall of atrapezoidal section having vertical earth face and containing earth up to its top. Height of the wall is 12 m base width 6 m top width3m angle of repose 30° specific weight of soil 20 kN/m^{3}specific weight of wall material 25 kN/m^{3}determine the maximum and minimum intensity is a pressure at the base of the retaining wall.

VII Calculate the slope and deflection of simply supported beam of length l with uniformly distributed load over the entire span using moment area method.

OR

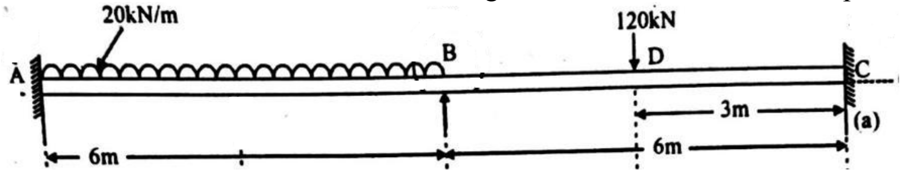
VIII A hollow circular shaft is to transmit 200kW at 80rpm. If the shear stress is not to exceed 60 MPa and internal diameter is 0.6 of the external diameter. Find the diameters of the shaft.

IX A continuous beam ABC 12 m long rests on supports AB and C at the same level and is loaded as shown in figure determine the moments at the support and draw the BMD and SFD diagrams.



OR

X A continuous been a busy with fixed in support is loaded as shown in figure find a support moment and draw the BMD and SFD diagrams EI is constant for both span.



XI An I section with rectangular ends has the following dimensions flange150 mm × 20mm web 300 mm ×10mm. Find the maximum shear stress developed in the beam for a shear force of 50 kN

OR

XII A rectangular column 20 cm wide and 15 cm deep is carrying a vertical load of 1000 kN at an eccentricity of 5 cm in a plane bisecting the depth. Determine the maximum and minimum intensities of stress in the section

XIII A fixed it beamAB 6 m long is carrying a point to load of 50 kN at its centre the moment of inertia of the beam is 78×10^{6} mm^{4} and the value of E for the material is 2.1×10^{5} N/mm^{2}.Determine fixedend moments at A and B and deflection and the load.

OR

XIV Write short note on portal frame.

Prepared by

Athira Sasidharan

Lecturer in Civil Engineering

GPTC Kothamangalam

Scrutinized by,

Athira Sasidharan

Lecturer in Civil

Engineering
GPTC
Kothamangalam

Chairman:

Designation:

Institution:

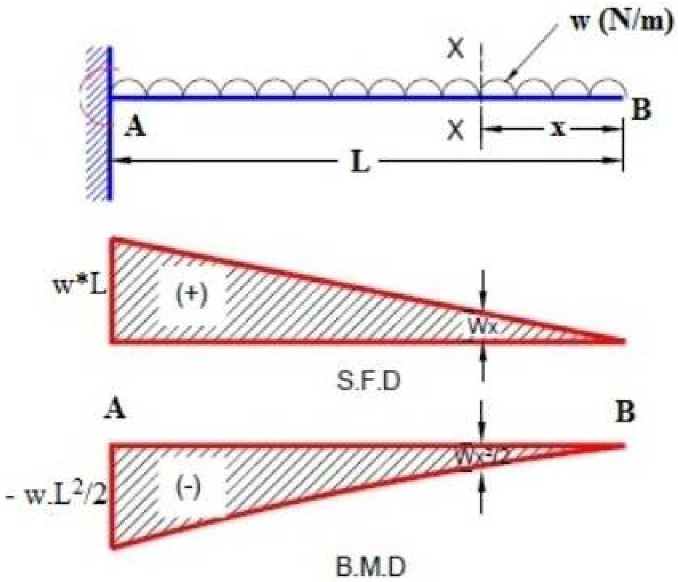
PART A

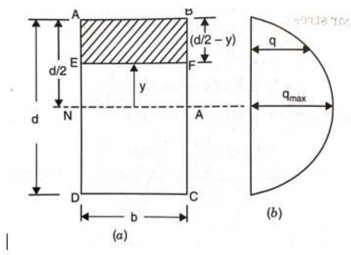
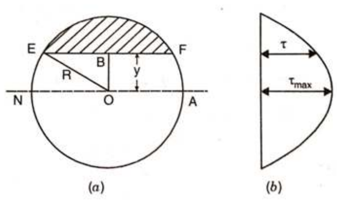
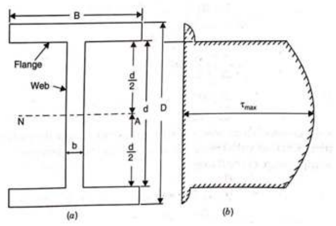
Answer all the following questions **(9 x 1 = 9 Marks)**

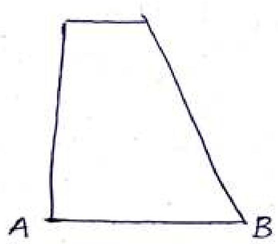
I

Q.No	Answer	Split up	Total Mark
1	Shear force	1	1
2	zero	1	1
3	greater	1	1
4	M/Z	1	1
5	$Wl^3/48EI$	1	1
6	Wl/8	1	1
7	zero	1	1
8	Continuous beam	1	1
9	Intermediate	1	1

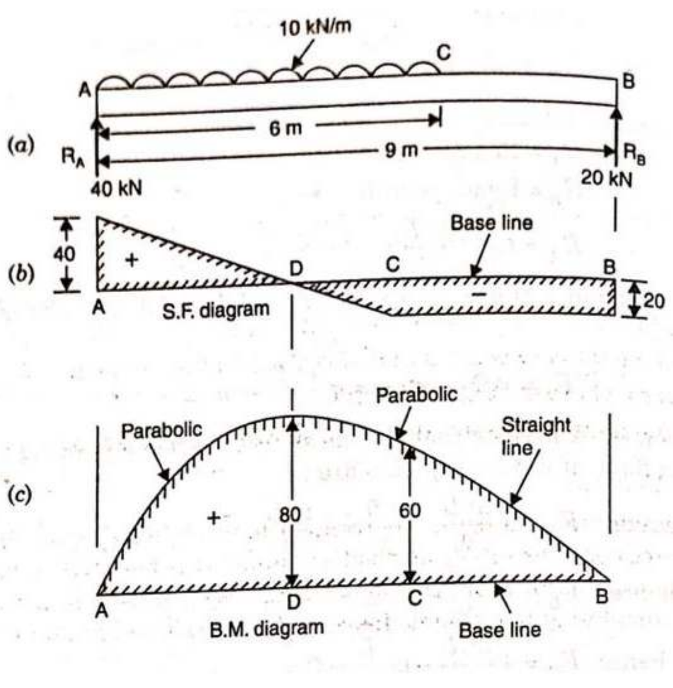
II. **PART B**

Q.No	Answer	Split up	Total Mark
1		1.5 1.5	3

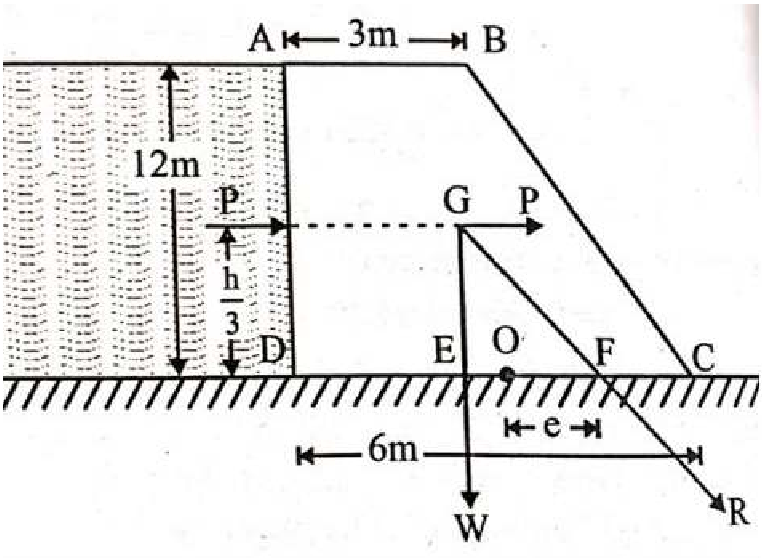
2	  	2 1	3
3	1. The material of the beam is homogeneous[1] and isotropic[2]. 2. The value of Young's Modulus of Elasticity is same in tension and compression. 3. The transverse sections which were plane before bending, remain plane after bending also. 4. The beam is initially straight and all longitudinal filaments bend into circular arcs with a common centre of curvature. 5. The radius of curvature is large as compared to the dimensions of the cross-section. 6. Each layer of the beam is free to expand or contract, independently of the layer, above or below it.	½ each	3
4	he general expression of bucking load for the long column as per Euler's theory is given as, $P = \Pi^2 E I / L^2$ $\sigma = \Pi^2 E / (Le / k)^2$ We know that, Le / k = slenderness ratio **Limitation 1:** The above formula is applied only for long columns **Limitation 2:** As the slenderness ratio decreases the crippling stress increases. Consequently if the slenderness ratio reaches to zero, then the crippling stress reaches infinity, practically which is not possible. **Limitation 3 :** if the slenderness ratio is less than certain limit, then crippling stress is greater than crushing stress ,which is not possible practically. Therefore, up to limiting extent Euler's formula is applicable with crippling stress equal to crushing stress.	1 1 1	3

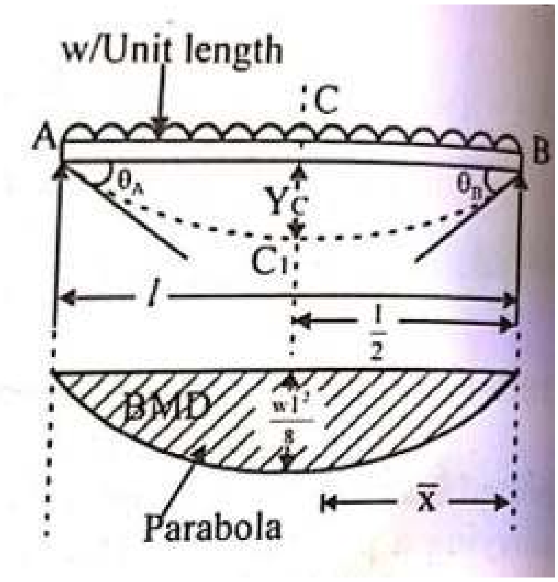
5	 At A σ_{max}= (W/b) (1+(6e/b)) At B σ_{min}= (W/b) (1-(6e/b))	1.5 1.5	3
6	L= 3m = 30000mm W = 25kN = 25000N M.O.I, I =10^8mm^4 Value of E = 2.1 × 10^5 N/mm^2 Slope at the free end $\theta_B = \frac{WL^3}{2EI} = \frac{25000 \times 3000^2}{2 \times 2.1 \times 10^5 \times 10^8} = 0.005357$ rad. Deflection at free end $y_B = \frac{WL^3}{3EI} = \frac{25000 \times 3000^3}{3 \times 2.1 \times 10^5 \times 10^8} = 10.71$mm.	1.5 1.5	3
7	1. End slopes of fixed beam are zero 2. A fixed beam is more stiff, strong and stable than a simply supported beam. 3. For the same span and loading, a fixed beam has lesser values of bending moments as compared to a simply supported beam. 4. For the same span and loading, a fixed beam has lesser values of deflections as compared to a simply supported beam.	1 1 1	3
8	**Mohr's Theorem for slope** The change of slope between two points of a loaded beam is equal to the area of BMD between two points divided by EI. **Mohr's Theorem for deflection**	1.5	3

	The deflection of a point with respect to tangent at second point is equal to the first moment of area of BMD between two points about the first point divided by EI.	1.5	3
9	Distribution factor When a joint is being released and begins to rotate under the unbalanced moment, resisting forces develop at each member framed together at the joint. Although the total resistance is equal to the unbalanced moment, the magnitudes of resisting forces developed at each member differ by the members' bending stiffness. Distribution factors can be defined as the proportions of the unbalanced moments carried by each of the members. Carry over factor When a joint is released, balancing moment occurs to counterbalance the unbalanced moment. The balancing moment is initially the same as the fixed-end moment. This balancing moment is then carried over to the member's other end. The ratio of the carried-over moment at the other end to the fixed-end moment of the initial end is the carryover factor. Determination of carryover factors Let one end (end A) of a fixed beam be released and applied a moment M_A the other end (end B) remains fixed. This will cause end A to rotate through an angle θ_A.Once the magnitude of M_B developed at end B is found, the carryover factor of this member is given as the ratio of M_B over M_A .	1.5 1.5	3
10	If AB and CD are any two consecutive span of a continuous beam subjected to an external loading, then the moments MB, M_C and M_D at supports B, C, D are given by, $M_B.L_1 + 2M_C(L_1 + L_2) + M_D.L_2 = \frac{6a_1\bar{x}_1}{L_1} + \frac{6a_2\bar{x}_2}{L_2}$ L_1 = Length of span BC L_2 = length of span CD a_1 = Area of BM diagram due to vertical loads on span BC a_2= Area of BM diagram due to vertical loads on span CD x_1 = Distance of CG of BM diagram due to vertical loads on BC from B x_1 = Distance of CG of BM diagram due to vertical loads on CD from D	1 2	3

III	$M_A = 0$ $R_B\ 9 = 10\times 6 \times 6/2$ $R_A = W - R_B = 10 \times 6 - 20 = 40kN$ SFD Consider any section at a distance x from A between A and C. the shear force at section is given by $F_x = +R_A - 10x = +40 - x$……………………(1) At x=0 $F_A = +40 - 0 = 40kN$ At x=6 $F_c = +40 - 10 \times 6 = -20kN$ Let SF is 0 at x m from A. then substituting the value of SF equal to 0 in (1) $0 = 40 - 10x$ $X = 40/10 = 4m$ BMd $Mx = R_A \times x - 10x \times x/2 = 40x - 5x^2$ ………………..(2) At x = 0 $M_A = 40 \times 0 - 5\ 0 = 0$ At x = 6m = $M_C = 40 \times 6 - 5 \times 6^2 = 240 - 180 = +60kNm$ At x = 4m = $M_D = 40 \times 4 - 5\times 4^2 = 160 - 80 = +80kNm$ Maximum bending moment = 80 kNm  	1 1 1 1 1 2	7

	OR		
IV			
	$W = 40kN = 40 \times 10^3$ N		
	$L = 3.6\times 10^3$		
	$F_{max} = 7$ N/mm^2		
	$d = 2b$	1	
	$M_{max} = wl^2/8 = 40\times 10^3 (3.6\times 10^3)^2$		
	$= 18 \times 10^6$Nmm	1	
	$I = b\,d^3/12 = b\,(2b)^3/12 = 8b^4/12$		
	$y = d/2 = 2b/2$	1	
	$M/I = f/y$	1	
	$(8 \times 10^6)/(8b^4)/12 = 7/2b/2$		
	$56b^3 = 18 \times 10^6 \times 12$		
	$b^3 = 8 \times 10^6 \times 12 / 56 = 181.71$mm		
	$d = 2\ 181.71 = 363.4$ mm	2	
		1	7
V	$P = \pi^2 EI/L_e^2$	1	
	$L_e = l/2$	1	
	$= 6000/2=3000$ mm		
	I is the least value of MOI	1	
	$I_{XX} = 15\times 20^3/12 = 10000\times 10^4$ mm^4	1	
	$I_{YY} = 20\times 15^3/12 = 5625\times 10^4$mm^4	1	
	$I_{YY} < I_{XX}$, column will buckle in YY direction		
	$P = (\pi^2 \times 17.5\ 5625 \times 10^4)/3000 = 1079.48$kN	1	
	Safe load		
	FOS = 3.0(given)		7
	Safe load = Crippling load/FOS = 107948/3 = 359.8 say 360kN	1	

VI	h = 12m , a = 3m , b = 6m , φ = 30 ° , w = 20kn/m^3 ρ = 25kn/m^3 P =(wh^2 /2) (1-sinφ) / (1-sinφ) =(20×12^2)/2 ×(1-sin30) / (1-sin30) = 480 kN	2	
			
	Weight of masonry wall per meter length W = (6+3)/2 × 12 × 1× 25 = 1350kN Horizontal distance of CG of the retaining wall from the vertical face AD	1	
	DE = (a^2+ ab + b^2)/3(a+b) = (3^2 + 3×6 +6^2)/3(3+6) = 2.33 m	1	
	EF = P/w × h/3 = (480)/1350 × (12/3) = 1.42m DF = DE +EF = 2.33+14.2 = 3.75 m	1	
	e = DF -b/2 = 3.75-(6/2) = 0.75m fmax =W/b (1+6e/b) = 1350/6(1+(6×0.75/6)) = 393.75kN/m^2	1	7
	f min = W/b (1-6e/b) = 1350/6(1-(6×0.75/6))	1	
	= 56.25kN/m^2	1	
VII	Consider a simply supported beam of length l with a UD load w per unit length		

	 	1	
	Area of BM diagram between Cand B = $wl^2/8 \times l/2 \times 2/3 = wl^3/24$	2	
	Distance between CG of BMD between C and B to B		
	$x = 5/8 \times l/2 = 5l/16$	1	
	According to Mohr's theorem I change of slope between C and B	1	
	$\theta_B = A/EI = wl^3/24EI$ radian		
	By symmetry $\theta_A = \theta_B$		7
	According to Mohrs theorem II, intercept of tangents on C_1 and B on a B vertical line is BB_1		
	$BB_1 = Y_c = Ax/EI = wl^3/24EI \times 5l/16 = 5wl^4/384EI$	2	

VIII	$P = 200\,kW$ $N = 80\,rpm$ $\sigma_s = 60\,Mpa = 60\,N/mm^2$ $d = 0.6D$ $T = \frac{\pi}{16}\sigma_s\left[\frac{D^4 - d^4}{D}\right]$ $= \frac{\pi}{16} \times 60 \left[\frac{D^4 - (0.60)^4}{D}\right]$ $= 10.3\,D^3\,Nmm = 10.3 \times 10^{-3} D^3\,N\text{-}m$ $P = \frac{2\pi NT}{60 \times 1000}$ $200 = \frac{2\pi \times 80 \times 10.3 \times 10^{-3}\,D^3}{60 \times 1000}$ $D^3 = 2.32 \times 10^{-6}\,mm^3$ $D = 132\,mm$ $d = 0.6D = 0.6 \times 132 = 79.2\,mm$	2 1 2 2	7

IX	Assume the continuous beam ABC as two fixed beams AB and BC and the fixed end moments are calculated as follows. $M_{FAB} = -\frac{wl^2}{12} = \frac{-20\times6^2}{12} = -60 kN\text{-}m$ $M_{FBA} = \frac{wl^2}{12} = \frac{20\times6^2}{12} = 60 kN\text{-}m$ $M_{FBC} = -\frac{Wl}{8} = \frac{-120\times6}{8} = -90 kN\text{-}m$ $M_{FCB} = \frac{Wl}{8} = \frac{120\times6}{8} = 90 kN\text{-}m$ Stiffness factors at joint B $K_{BA} = \frac{4EI}{l} = \frac{4EI}{6} = \frac{2EI}{3}$ $K_{BC} = \frac{4EI}{l} = \frac{4EI}{6} = \frac{2EI}{3}$ At joint B the distribution factors are $D_{FBA} = \frac{K_{BA}}{\Sigma K_B} = \frac{2EI}{3} \times \frac{3}{4EI} = \frac{1}{2}$ $DF_{BC} = \frac{K_{BC}}{\Sigma K_B} = \frac{2EI}{3} \times \frac{3}{4EI} = \frac{1}{2}$ $D_{FBA} + DF_{BC} = 1$	2 2	

$M_B = -90 + 60 = -30$ kN-m

Distributed moment to BA

$M_{BA} = M_B \times DF_{BA} = 30 \times \frac{1}{2} = 15$ kN-m

Distributed moment to BC

$M_{BC} = M_B \times DF_{BC} = 30 \times \frac{1}{2} = 15$ kN-m

Carryover from B to A $= \frac{15}{2} = 7.5$ kN-m 2

Carryover from B to C $= \frac{15}{2} = 7.5$ kN-m

Joint	A	B	B	C
Distribution factor		$\frac{1}{2}$	$\frac{1}{2}$	
Fixed end moments	-60	60	-90	90
Distribute		15	15	
Carry over	7.5			7.5
Final end moments	-52.5	75	-75	97.5

Final end moments are 7

$M_{AB} = -52.5$ kN-m

$M_{BC} = -75$ kN-m

$M_{BA} = 75$ kN-m

$M_{CB} = 97.5$ kN-m 1

$BM_C = 97.5$ kN-m

$BM_D = 97.5 - 63.75 \times 3 = -93.75$ kN-m

$BM_B = 97.5 - 63.75 \times 6 + 120 + 3 = 75$ kN-m

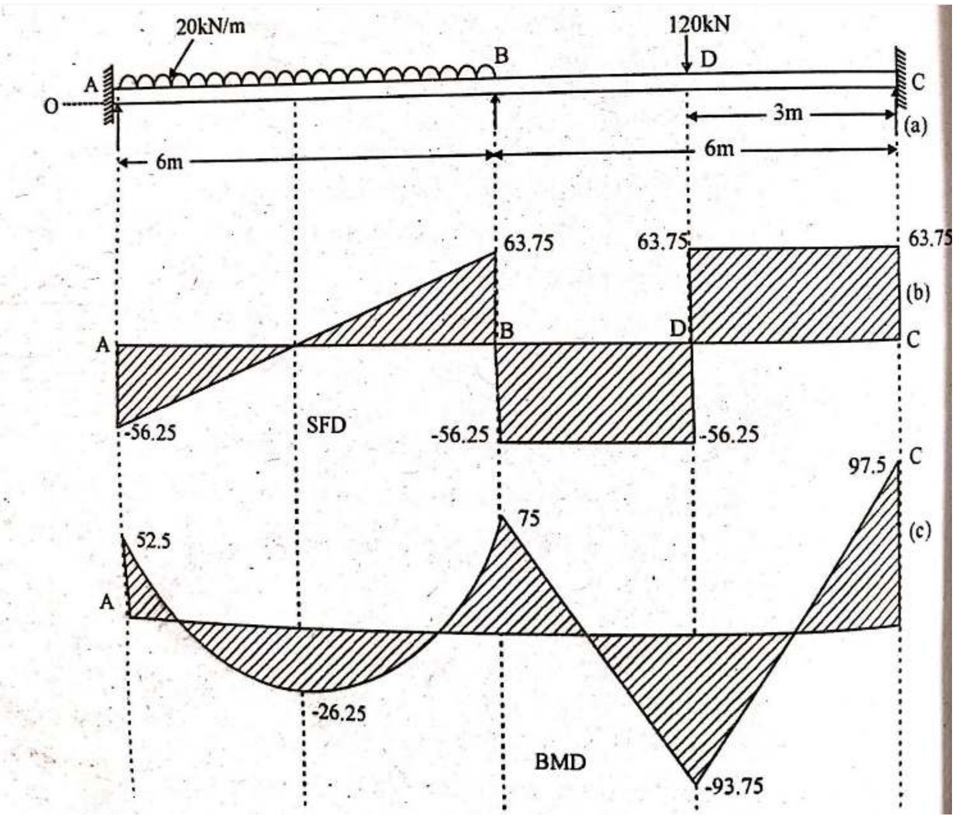
BM at midspan of AB

$= 97.5 - 63.75 \times 9 + 120 \times 6 - 120 \times 3 + 20 \times 3 \times \frac{3}{2}$

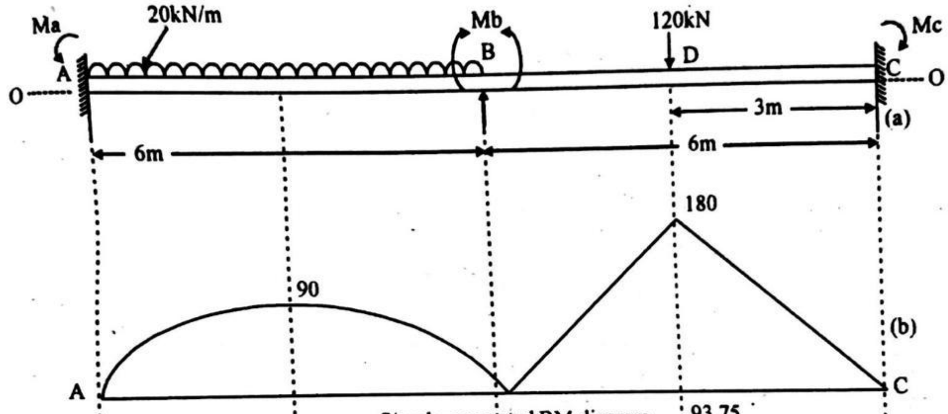
$= -26.5\ KN\text{-}m$

$BM_A = 97.5 - 63.75 \times 12 + 120 \times 9 - 120 \times 6 + 20 \times 6 \times 3$

$= 52.5\ KN\text{-}m$



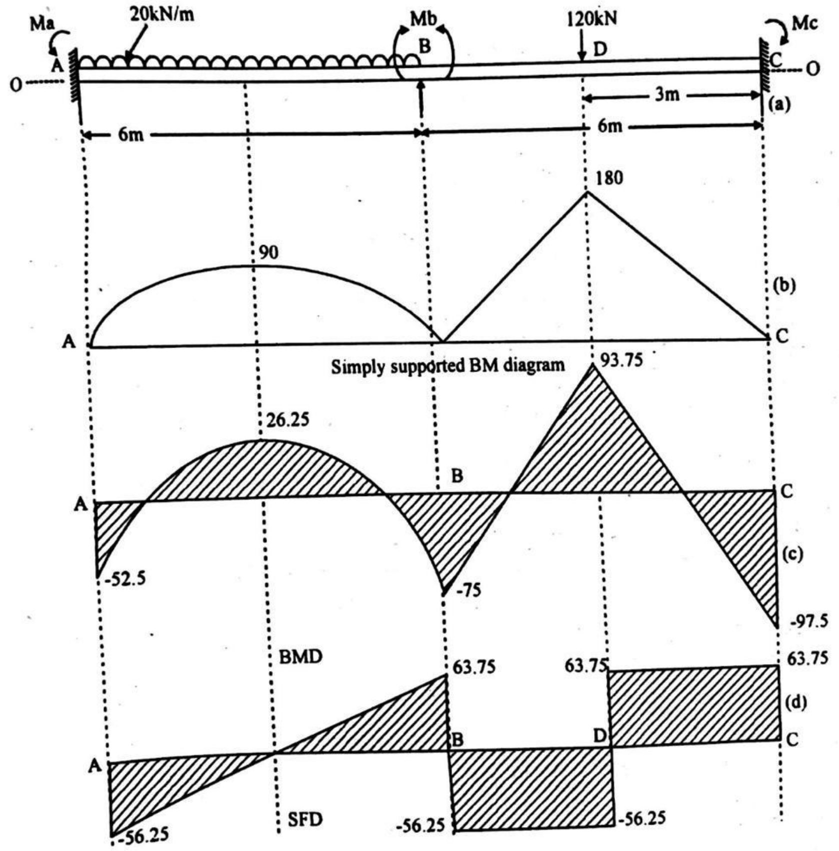
IX	Consider the beams AB, BC seperately as simply supported beams. BM at midspan of BC = $R_C \times 3 = 60 \times 30$ $= 180 \text{ kN-m}$ BM at midspan of AB = $R_A \times 3 - 20 \times 3 \times 1.5$ $= 60 \times 3 - 20 \times 3 \times 1.5$ $= 90 \text{ kN-m}$	1 1	



Simply supported BM diagram

	The beam is fixed at A and C, therefore an imaginary zero span is taken to the left of A and right of C. Using three moment theorem for the spans OA and AB $M_0 I_0 + 2M_a (0 + l_1) + M_b l_1 = \frac{6 a_0 \bar{x}_0}{I_0} + \frac{6 a_1 \bar{x}_1}{l_1}$ — (1) $M_0 = 0, \quad l_0 = 0, \quad l_1 = 6m, \quad a_0 \bar{x}_0 = 0$ $a_1 x_1 = (90 \times 6 \times 2/3 \times 3) = 1080$ Substituting values in eq (1) $12 M_a + 6 M_b = 1080$ — (2) $M_a l_1 + 2M_b (l_1 + l_2) + M_c l_2 = \frac{6 a_1 \bar{x}_1}{l_1} + \frac{6 a_2 \bar{x}_2}{l_2}$ — (3) $l_1 = 6m, \quad l_2 = 6m$	2	

	$a_1\bar{x}_1 = 90 \times 6 \times \frac{2}{3} \times 3 = 1080$ $a_2\bar{x}_2 = 180 \times 6 \times \frac{1}{2} \times 3 = 1080$ $a_2\bar{x}_2 = 180 \times 6 \times \frac{1}{2} \times 3 = 1620$ Substituting values in eq (3) $6M_a + 2M_b(6+6) + 6M_c = \frac{1080 \times 6}{6} + \frac{1620 \times 6}{6}$ $6M_a + 24M_b + 6M_c = 27000$ —— (4) Using three moment theorem for spans BC & CD $M_b l_2 + 2M_c(l_2 + l_0) + M_0 l_0 = \frac{6a_2\bar{x}_2}{l_2} + \frac{6a_0\bar{x}_0}{l_0}$ —— (5) $M_0 = 0,\ l_0 = 0,\ l_2 = 6m,\ a_0\bar{x}_0 = 0,\ a_2\bar{x}_2 = 180 \times 6 \times \frac{1}{2} \times 3 = 1620$ Substituting these values in eqn (5) $6M_b + 12M_c = 1620$ —— (6) Solving eqn (2), (4) and (6) $M_a = 52.5$ kN-m $M_b = 75$ kN-m $M_c = 97.5$ kN-m Taking moment about B and equating the same $M_c - M_b + 120 \times 3 - R_c \times 6 = 0$ $97.5 - 75 + 360 = 6R_c$ $R_c - 63.75$ kN $R_B = (20 \times 6 + 120) - (63.75 + 56.25)$ $= 120$ kN	2	

	$BM_C = -97.5\ kN\text{-}m$ BM at midspan of BC $= 63.75 \times 3 - 97.5$ $= 93.75\ kN\text{-}m$ $BM_B = 63.75 \times 6 - 97.5 - 120 \times 3$ $= -75\ kN\text{-}m$ BM at mid span of $AB = 63.75 \times 9 - 97.5 - 120 \times 6 -$ $20 \times 3 \times \frac{3}{2} + 12 \times 3$ $= 26.25\ kN\text{-}m$ $BM_A = 63.75 \times 12 + 120 \times 6 - 97.5 - 120 \times 9 - 20 \times 6 \times 3$ $= -52.5\ kN$  	1	7

X	Flange = 150 mm x 20 mm web = 10 mm x 30 mm $F = 50\ KN = 50 \times 10^3 N$ For an I section shear stress is maximum at neutral axis $q_{max} = \frac{FA\bar{y}}{Ib}$ $I = \left[2\left(\frac{150 \times 20^3}{12} + 150 \times 20 \times 160^2 \right) + \frac{10 \times 300^3}{12} \right]$ $A\bar{y} = A_1\bar{y_1} + A_2\bar{y_2}$ $= [150 \times 20\ (150+10) + 150 \times 10 \times 75]$ b. = 10mm $q_{max} = 16.8\ N/mm^2$	2 1 1 1 2	7

XI	b = 20cm, d = 15cm, P = 1000 kN, e = 5cm $f_{max} = \frac{P}{A} + \frac{My}{I}$ $f_{min} = \frac{P}{A} - \frac{My}{I}$ M = 1000X5 = 5000 kN-cm y = 10cm $I = \frac{bd^3}{12} = \frac{15\times20^3}{12}\ cm^4$, $A = (20\times15)\ cm^2$ $f_{max} = \frac{1000}{20\times15} + \frac{5000\times10}{\frac{15\times20^3}{12}} = 8.33\ kN/cm^2$ $f_{min} = \frac{1000}{20\times15} - \frac{5000\times10}{\frac{15\times20^3}{12}} = -1.67\ kN/cm^2$	2 1 2 2	7

XII	$b = 20cm$, $d = 15cm$, $P = 1000\ kN$, $e = 5cm$ $f_{max} = \frac{P}{A} + \frac{My}{I}$ $f_{min} = \frac{P}{A} - \frac{My}{I}$ $M = 1000 \times 5 = 5000\ kN\text{-}cm$ $y = 10cm$ $I = \frac{bd^3}{12} = \frac{15 \times 20^3}{12} cm^4$, $A = (20 \times 15)\ cm^2$ $f_{max} = \frac{1000}{20 \times 15} + \frac{5000 \times 10}{\frac{15 \times 20^3}{12}} = 8.33\ kN/cm^2$ $f_{min} = \frac{1000}{20 \times 15} - \frac{5000 \times 10}{\frac{15 \times 20^3}{12}} = -1.67\ kN/cm^2$	2 1 2 2	7
XIII	$L = 6m = 6000mm$ $W = 50kN = 50000N$ $I = 78 \times 10^6\ mm^4$ $E = 2.1 \times 10^5\ N/mm^2$ M_A = Fixed end moment at A, M_B = Fixed end moment at B, y_{max} = Deflection under the central point load		

	$M_A = M_B = \frac{WL}{8}$ $= \frac{50 \times 6}{8} = 37.5\ kN.m$ $y_{max} = \frac{WL^3}{192EI}$ $= \frac{50000 \times 6000^3}{192 \times 2.1 \times 10^5 \times 78 \times 10^6}$ $= 3.434\ mm$	2 1 2 1 1	7
XIV	Portal frame structures are designed to span between supports and rely on fixed joints with moment resisting capacity where vertical supports connect to horizontal beams or trusses. Portal frame structures can be constructed using a variety of materials and methods. These include steel, reinforced concrete and laminated timber. The connections between the columns and the rafters are designed to be moment-resistant, i.e. they can carry bending forces. Portal frames can be defined as two-dimensional rigid frames that have the basic characteristics of a rigid joint between column and beam. The main objective of this form of design is to reduce bending moment in the beam, which allows the frame to act as one structural unit. The transfer of stresses from the beam to the column results in rotational movement at the foundation, which can be overcome by the introduction of a pin/hinge joint. For warehouses and industrial buildings, sloping roof made of purlins and	1 1 1 1 1 1	

	ac sheet roofing between portals is provided. For assembly halls, portals with R.C slab roof cast monolithically is used. Portal frames are designed for the following loads: roof load wind load	1	7

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Course:Theory of structures

Q.No	ModuleOutcome	CognitiveLevel	Marks	Time
I.1	MO 1.01	R	1	2.4min
I.2	MO 1.02	R	1	2.4min
I.3	MO 2.03	R	1	2.4min
I.4	MO2 .04	U	1	2.4min
I.5	MO 3.01	R	1	2.4min
I.6	MO 3.03	R	1	2.4min
I.7	MO 3.04	U	1	2.4min
I.8	MO 4.01	R	1	2.4min
I.9	MO4.03	R	1	2.4min
II.1	MO1.01	U	3	7.2 min
II.2	M1.03	R	3	7.2 min
II.3	M!.03	R	3	7.2 min
II.4	MO 2.02	R	3	7.2 min
II.5	MO2.04	R	3	7.2 min
II.6	MO3.02	U	3	7.2 min
II.7	MO3.04	R	3	7.2 min
II.8	MO3.02	R	3	7.2 min
II.9	MO4.03	R	3	7.2 min
II.10	MO4.02	R	3	7.2 min
III	MO1.02	U	7	16.8 min
IV	MO1.04	A	7	16.8 min

V	MO2.02	U	7	16.8 min
VI	MO2.04	U	7	16.8 min
VII	MO3.01	U	7	16.8 min
VIII	MO3.04	U	7	16.8 min
IX	MO 4.04	A	7	16.8 min
X	MO4.02	A	7	16.8 min
XI	MO1.04	U	7	16.8 min
XII	MO2.04	U	7	16.8 min
XIII	MO3.02	U	7	16.8 min
XIV	MO4.04	R	7	16.8 min

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MarkDistribution

Module	hr/ Module	Marks/Module $(h_i/\sum H_i)*123(\pm 5\%)$	TypeofQuestions							
			PartA		Part B		PartC		Total	
			NoofQuestions	Marks	NoofQuestions	Marks	NoofQuestions	Marks	NoofQuestions	Marks
1	15	31.81	2	2	3	9	3	21	7	32
2	14	29.69	2	2	2	6	3	21	8	29
3	15	31.81	2	3	3	9	3	21	8	32
4	14	29.69	3	2	2	6	3	21	8	30
Total	58	123	9	9	10	30	12	84	31	123