SRM VALLIAMMAI ENGINEERING COLLEGE

SRM Nagar, Kattankulathur – 603 203.

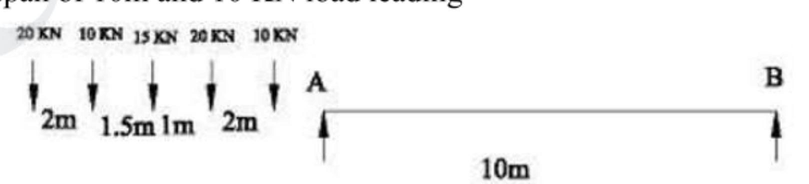
DEPARTMENT OF CIVIL ENGINEERING

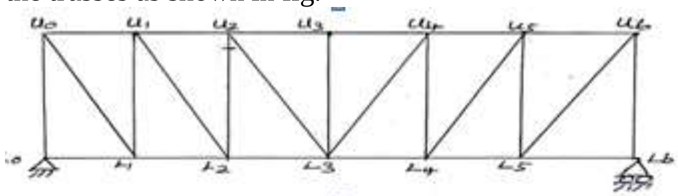
QUESTION BANK

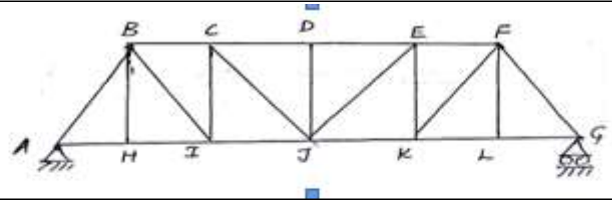
SUBJECT : STRUCTURAL ANALYSIS - II

SEM / YEAR : VI / IV

UNIT I INFLUENCE LINES FOR DETERMINATE BEAMS			
Influence lines for reactions in statically determinate beams – Influence lines for shear force and bending moment – Calculation of critical stress resultants due to concentrated and distributed moving loads – absolute maximum bending moment - influence lines for member forces in pin jointed plane frames.			
PART A			
Q.No.	**Questions**	**BT Level**	**Competence**
1.	What is meant by influence lines?	BT-1	Remembering
2.	What is meant by absolute shear force diagram?	BT-1	Remembering
3.	What will be the absolute maximum bending moment in a simply supported beam when two concentrated wheel loads cross it?	BT-1	Remembering
4.	What is the necessity of Influence line diagram?	BT-1	Remembering
5.	What will be the absolute shear force in a simply supported beam when two concentrated wheel loads cross it?	BT-1	Remembering
6.	What are the uses of influence line diagram?	BT-2	Understanding
7.	Give the condition at which maximum absolute bending moment occurs in a simply supported beam when a number of point loads are moving on it.	BT-2	Understanding
8.	What do you understand by absolute maximum bending moment?	BT-2	Understanding
9.	Name the type of rolling loads for which the absolute maximum bending moment occurs at the mid span of the beam.	BT-2	Understanding
10.	Differentiate Determinate and Indeterminate Structures.	BT-2	Understanding
11.	Write the maximum shear force for udl shorter than the span.	BT-3	Applying
12.	Write the absolute bending moment for udl shorter than the span.	BT-3	Applying
13.	Sketch the ILDs for the support reactions in a simply supported beam.	BT-3	Applying
14.	Draw the influence line diagram for shear force at a point X in a simply supported beam AB of span L.	BT-4	Analyzing
15.	What is the absolute maximum bending moment due to a moving UDL longer than the span of a simply supported beam?	BT-4	Analyzing
16.	Where do you have the absolute maximum bending moment in a simply supported beam when a series of wheel loads cross it?	BT-4	Analyzing
17.	Where do you get rolling loads in practice?	BT-5	Evaluating
18.	Evaluate the maximum shear force in a simply supported beam when series of wheel loads cross it .	BT-5	Evaluating
19.	State the location of maximum shear force in a simple beam with any kind of loading.	BT-6	Creating

20.	State the absolute maximum bending moment for moving several concentrated loads of a simply supported beam.	BT-6	Creating
	PART B		
1.	A single moving load of 10kN moves on girder of span 200m a) Construct the influence lines for shear force and bending moment for a section 50m from the left support. b) Construct the Influence lines for points at which the maximum shears and maximum bending moment also determine these maximum values.	BT-1	Remembering
2.	Draw the ILD for shear force and bending moment for a section at 50m from the left hand support of a simply supported beam, 200m long, Hence calculate the maximum bending moment and shear force at the section due to an uniformly distributed rolling load of length 80m and intensity 100kN/m.	BT-1	Remembering
3.	Two wheel loads of 12 kN and 6 kN at a fixed distance apart of 2m, cross a beam of 12m span, Draw the influence line for bending moment and shear force for a point 5m from the left support, and also determine the maximum bending moment and shear force at that point.	BT-2	Understanding
4.	Four wheel loads of 60, 40, 80 and 50 kN cross a girder of 20m span, from left to right followed by udl of 8kN/m and 2m long with the 60kN load leading. The spacing between the loads in the same order are 3m, 3m and 2m. The head of the udl is at 4m from the last 50kN load, Using influence lines calculate the S.F and B. M at a section 8m from the left support when the 40kN load is at centre of the beam.	BT-1	Remembering
5.	Construct the influence line for the reaction at support B for the beam of span 10 m. The beam structure is shown in Figure 	BT-1	Remembering
6.	The four equal loads of 150 KN ,each equally spaced at apart 2m and UDL of 60 KN/m at a distance of 1.5m from the last 150 KN loads cross a girder of 20m from span R to L.Using influence line ,calculate the S.F and BM at a section of 8m from L.H.S support when leading of 150KN 5m from L.H.S	BT-3	Applying
7.	A system of concentrated load, role beam left to right, s.s beam span of 10m and 10 KN load leading  Find 1.Absolute max +ve S.F	BT-4	Analyzing

	2. .Absolute max -ve S.F 3..Absolute max BM		
8.	Find the maximum positive live shear at point C when the simply supported beam is loaded with a concentrated moving load of 10 kN and UDL of 5 kN/m.	BT-5	Evaluating
9.	Evaluate and draw the ILD for the forces in members U_1 U_2 and L_1 L_2 of the trusses as shown in fig. 	BT-1	Remembering
10.	In the simply supported girder of span 16m, carries a uniformly distributed load of 2 KN/m, 6m long crosses a girder. 1. Determine the maximum shear forces and bending moment diagram Calculate values at 5m and 8m from the left hand support.	BT-2	Understanding
11.	Two point loads of 100kN and 200kN spaced 3m apart cross a girder of span 12 meters from left to right with the 100kN leading. 1. Draw the ILD for shear force and bending moment and find the values of maximum bending moment 2. Find the values of maximum shear force and bending moment at a section 4m from the left hand support. Evaluate the absolute maximum bending moment due to the given loading system.	BT-4	Analyzing
12.	Draw the influence line for R_A for the continuous beam ABC of span AB = BC = 4m Simply supported at A, B &C. Compute the ordinates at every 1m interval, EI= constant.	BT-2	Understanding
13.	Two point loads of 100 kN and 50 kN at a fixed distance apart of 2m, cross a beam of 24 m span, Draw the influence line for bending moment and shear force for a point 8m from the left support, and also determine the maximum bending moment and shear force at that point.	BT-4	Analyzing
14.	Four wheel loads of 60, 50, 100 and 80 kN cross a girder of 20m span, from left to right followed by udl of 10kN/m and 2m long with the 60kN load leading. The spacing between the loads in the same order are 3m, 3m and 2m. The head of the udl is at 4m from the last 80kN load, Using influence lines calculate the S.F and B. M at a section 8m from the left support when the 50kN load is at centre of the beam.	BT-1	Remembering
	PART C		
1.	Analysis the IL for force in member BC and CI for the truss shown in figure. The height of the truss is 9m and each segment is 9m long.	BT-1	Remembering

			
2.	A system of four loads 80, 160, 160 and 120 kN crosses a simply supported beam of span 25m with the 120 kN load leading. The loads are equally spaced at 1m. Determine the values of the following using influence lines. i. Maximum bending moment at a section 10m from left support and ii. Absolute maximum shear force and bending moment in the beam.	BT-1	Remembering
3.	Explain in detail about the necessity of Influence lines and elaborate its applications.	BT-3	Applying
4.	In the simply supported girder of span 16m, carries a uniformly distributed load of 4 KN/m, 5m long crosses a girder. 1. Determine the maximum shear forces and bending moment diagram Calculate values at 5m and 10m from the left hand support.	BT-6	Creating

UNIT II INFLUENCE LINES FOR INDETERMINATE BEAMS

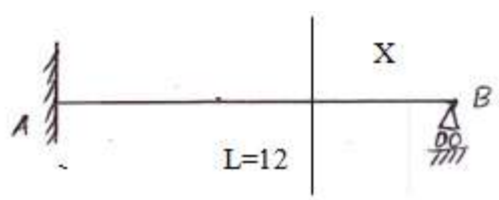
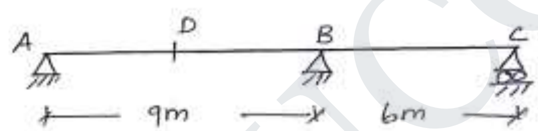
Muller Breslau's principle– Influence line for Shearing force, Bending Moment and support reaction components of propped cantilever, continuous beams (Redundancy restricted to one), and fixed beams.

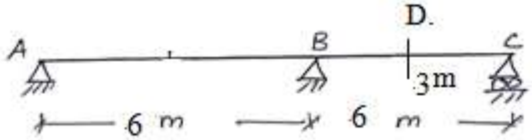
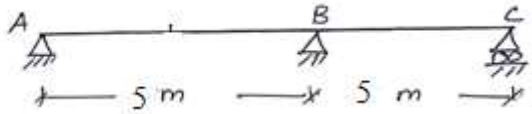
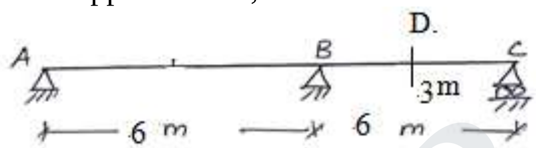
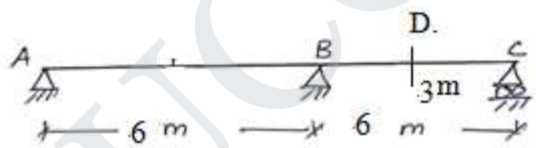
Part - A

Q. No.	Questions	BT Level	Competence
1	State the importance of Influence line diagram.	BT-1	Remembering
2	What is begg's deformeter?	BT-2	Understanding
3	Define the term reversal of stresses.	BT-2	Understanding
4	What are the three types of connections possible with the model used with Begg's deformeter?	BT-4	Analyzing
5	What do you understand by Indeterminate structures?	BT-1	Remembering
6	What is the use of a micrometer microscope in model analysis with Begg's deformeter?	BT-2	Understanding
7	What is 'dummy length' in models tested with Begg's deformeter?	BT-2	Understanding
8	State Maxwell-Bett's theorem.	BT-6	Creating
9	State the principle on which indirect model analysis is based.	BT-1	Remembering
10	Sketch the influence line diagram for the propped reaction of a propped cantilever beam.	BT-5	Evaluating
11	Illustrate the principle of dimensional similarity?	BT-5	Evaluating
12	What is the necessity of Influence lines?	BT-2	Understanding
13	What do you understand by an influence line for bending moment?	BT-2	Understanding
14	Name any four model making materials.	BT-1	Remembering

15	State the principle on which indirect model analysis is based.	BT-6	Creating
16	Write the importance of model analysis?	BT-2	Understanding
17	Briefly explain Muller Breslau principle.	BT-4	Analyzing
18	What is meant by absolute shear force diagram?	BT-3	Applying
19	What do you understand by absolute maximum bending moment?	BT-3	Applying
20	State the importance of Muller Breslau principle.	BT-3	Applying

Part – B

Q. No.	Questions	BT Level	Competence
1	Draw the IL for reaction at B and for the support moment M_A at A for the propped cantilever AB of 12m as shown in fig. Compute influence line coordinates at 1.5 m intervals. 	BT - 1	Remembering
2	Using muller breslau principle, draw the ILD for the bending moment at D. the middle ponit of span AB of a continuous beam shown in fig. compute the ordinates at 1m interval. 1. Determine the maximum hagging bending moment in the beam when two concentrated loads of 8KN each and seperately by a distance 1m passes through the beam from left to right. 	BT-6	Creating
3	Draw the ILD for the propped cantilever reaction of a propped cantilever beam having span 6m. EI is constant	BT-2	Understanding
4	Draw the influence line for M_B for the continuous beam ABC of span AB = 3m and BC = 4m Simply supported at A, B &C. Compute the ordinates at every 1m interval using Muller Breslau principle. EI= constant.	BT-1	Remembering
5	Draw the IL for reaction at B and for the support moment M_A at A for the propped cantilever AB of 10m. Compute influence line coordinates at 1 m intervals.	BT-1	Remembering
6	Explain in detail about importance of Muller Breslau principle.	BT-2	Understanding
7	Draw the influence line for M_B for the continuous beam ABC of span AB = BC = 12 m Simply supported at A, B &C. Compute the ordinates at every 1.5 m interval using Muller Breslau principle. EI= constant.	BT-3	Applying
8	What are the use of a micrometer microscope in model analysis with Begg's deformeter also explain its applications.	BT-3	Applying
9	A beam ABC is supported at A, B and C as shown in fig.	BT-4	Analyzing

	 Draw influence lines for Reactions at A, B and C		
10	Determine the influence line for the reaction at the middle support B of continuous beam shown in fig. Compute the ordinate at every 1m intervals. 	BT-2	Understanding
11	Draw the influence line for M_B for the continuous beam ABC of span AB = BC = 4m Simply supported at A, B &C. Compute the ordinates at every 1m interval, EI= constant.	BT-4	Analyzing
12	A beam ABC is supported at A, B and C as shown in fig.  Draw the ILD for Bending moment at D.	BT-5	Evaluating
13	Sketch the ILD for the propped cantilever reaction of a propped cantilever beam having span 10 m. EI is constant	BT-5	Evaluating
14	Determine the influence line for shear force at D, the midpoint of span BC of a continuous beam shown in fig. Compute the influence line ordinates at 1.5m intervals. 	BT-6	Creating
Part - C			
Q. No.	**Questions**	**BT Level**	**Competence**
1	Explain in detail about the practical considerations in Muller Breslau's Principle.	BT - 1	Remembering
2	Elaborate in detail about the indirect model analysis.	BT-2	Understanding
3	Write the Muller Breslau principle and explain in detail about the application of principle to determinate structures.	BT-1	Remembering
4	Explain in detail about the application of principle to indeterminate structures.	BT-2	Understanding
UNIT III ARCHES			
Arches - Types of arches – Analysis of three hinged, two hinged and fixed arches - Parabolic and circular arches – Settlement and temperature effects.			
PART-A (2 MARKS)			
1.	What is an arch? Explain.	BT-1	Remembering
2.	List the methods used for the analysis of fixed arches?	BT-1	Remembering
3.	Distinguish between two hinged and three hinged arches	BT-1	Remembering

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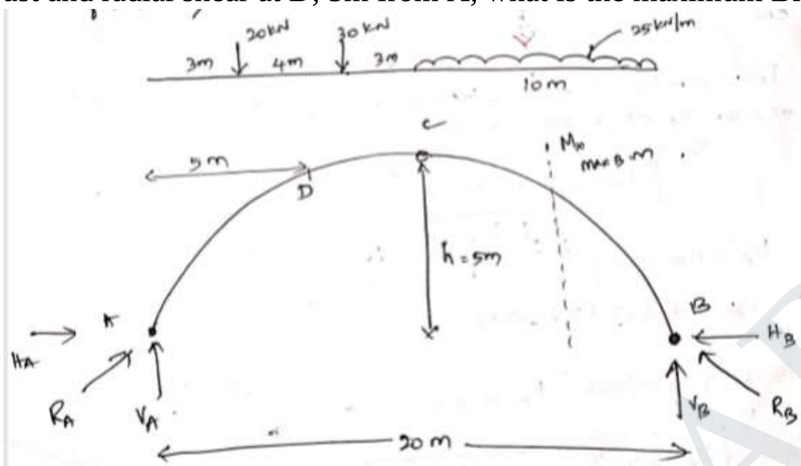
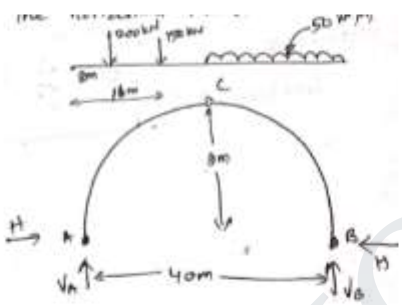
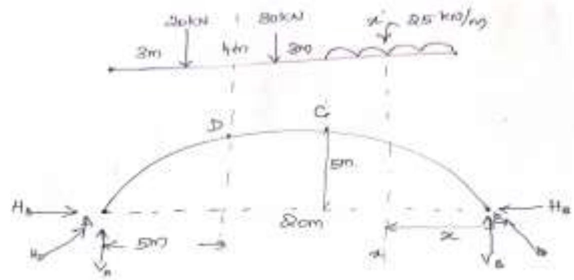
4.	Rewrite the equation for a parabolic arch whose springing is at different levels	BT 1	Remembering
5.	State Eddy's theorem for an arch.	BT-1	Remembering
6.	Write the expression for horizontal thrust in a three hinged parabolic arch carrying UDL over entire span.	BT-1	Remembering
7.	Show the positions of a moving point load for maximum negative and positive Bending moments in a three hinged arch.	BT-2	understanding
8.	Define Horizontal Thrust.	BT-2	understanding
9.	Define radial shear and normal thrust.	BT-2	understanding
10.	Mention the examples where arch action is usually encountered	BT-2	understanding
11.	Define a linear arch.	BT-2	understanding
12.	Discuss the degree of static indeterminacy of a three hinged parabolic arch	BT-3	Apply
13.	Under what conditions will the bending moment in an arch be zero throughout?	BT-3	Apply
14.	Compare the two hinged and three hinged arches	BT-3	Apply
15.	Explain how will you calculate the slope of the arch at any point in a parabolic arch with two hinges?	BT-3	Apply
16.	How you will calculate the horizontal thrust in a two hinged parabolic arch if there is a rise in temperature.	BT-4	Analyse
17.	What are the various types of hinges in arch?	BT-4	Analyse
18.	Discuss the types of arches according to their support conditions	BT-4	Analyse
19.	Write the formula to calculate the change in rise in three hinged.	BT-4	Analyse
20.	State General Cable Theorem.	BT-5	Evaluate
21	What are the types of arches according to their shapes?	BT-5	Evaluate
22	What is the static indeterminacy of a three hinged parabolic arch?	BT-5	Evaluate
23	Which of the two arches viz. circular and parabolic is preferable to carry a uniformly distributed load? Why?	BT-6	Create
24	Indicate the positions of a moving point load for maximum negative and positive bending moments in a three hinged arch.	BT-6	Create
25	What are the significant features of circular beams on equally spaced supports?	BT-6	Create
PART-B (16 MARKS)			
1.	A circular three hinged arch of span 25m with a central rise of 5m is hinged at the crown and the end supports. It carries a point load of 100kN at 6m from the left support. Examine and Calculate the reaction at the supports and Moment at 5m from the left support.	BT-1	Remembering
2.	A three hinged circular arch of span 16m and rise 4m is subjected to two point loads of 100 kN and 80 kN at the left and right quarter span points respectively. Examine and find the reaction at the supports. Find also the bending moment, radial shear and normal thrust at 6m from left support.	BT-1	Remembering
3.	A symmetrical three hinged arch has a span of 50 & rise 5m. Find and examine the maximum bending moment at a quarter point of the arch caused by a uniformly distributed load of 10kN/m which	BT-1	Remembering

	occupies any portion of the span. Indicate the position of the load for this condition.		
4.	A Parabolic three hinged arch carries loads as shown in figure. Determine the resultant reactions at support. Find the BM, Normal Thrust and radial shear at D, 5m from A, what is the maximum BM? 	BT-1	Remembering
5.	A three hinged parabolic arch has supports at different levels having span 20m and carries a UDL of 30kN/m over the left half of the span. The left support is 5m below the crown and the right support is 4m below the crown. Draw the BMD. Also analyze and find the normal thrust and radial shear at a section 4m from the left support.	BT-4	Analyse
6.	A parabolic two hinged arch has a span of 60m and a rise of 12m. A concentrated load 8kN acts at 15m from the left support. The second moment of area varies as the secant of the inclination of the arch axis. Calculate the horizontal thrust and reactions at the hinge. Also calculate maximum bending moment at the section.	BT-3	Apply
7.	Evaluate the horizontal thrust in a two hinged parabolic arch of span 10m and rise 25m carrying an UDL of 24 kN/m over the left half span, assuming secant variation of its sectional moment of area. Also calculate the Bending Moment at the crown and draw the BMD.	BT-5	Evaluate
8.	Analyse and derive the expression for horizontal thrust in a two hinged parabolic arch carrying a point load P at a distance one fourth span from left support .Assume I=Io Secθ.	BT-4	Analyse
9.	A two hinged parabolic arch of span L and rise h carries a triangular load covering a distance a from the left end ,the intensity varying uniformly from zero to W. Discuss and obtain an expression for the horizontal thrust.	BT-2	understanding
10.	A three hinged parabolic arch of 40m span has abutments at unequal levels. The highest point of the arch is 4m above left support and 9m above the right abutment. The arch is subjected to an udl of 15kN/m over its entire horizontal span. Find the horizontal thrust and bending moment at a point 8m from the left support.	BT-2	understanding
11.	A symmetrical three-hinged circular arch has a span of 13m and a rise to the central hinge of 3m. It carries a vertical load of 15kN at 3m from the left hand end. Analyze and find	BT-4	Analyse

	i) The reactions at the support (3 marks) ii) Magnitude of the thrust at the spring (3 marks) iii) Bending moment at 5m from the left hand hinge (3 marks) iv) The max. positive and negative bending moment (4 marks)		
12.	A two hinged parabolic arch of span 25m and rise 5m carries a udl of 38kN/m covering a distance of 10m from the left end. Calculate the i) Horizontal thrust (4 marks) ii) The reactions at the hinges (4 marks) iii) Maximum negative moment (5 marks)	BT-3	Apply
13.	A three hinged parabolic arch of 30m span and 5m central rise carries a point load of 10kN at a distance of 8m horizontally from the left hinge. Calculate the normal thrust, shear force at the section. Also calculate and discuss the maximum positive and negative bending moment.	BT-5	Evaluate
14.	A three hinged parabolic arch of span 40m and central rise 8m carrying concentrated loads of 200kN and 150kN at a distance of 8m and 16m from left end and an udl of 50kN/m on right half of the span. Find the horizontal thrust. 	BT-6	Create
	Part C		
Q.No	**Questions**	**BT Level**	**Competence**
1	A parabolic arch hinged at the ends has a span of 60m and a rise of 12m. A concentrated load of 8kN acts at 15m from the left hinge. The second moment of area varies as the secant of the inclination of the arch axis. Calculate the horizontal thrust and the reactions at the hinge. Also calculate the net bending moment at the section.	BT5	Evaluate
2	The three hinged circular arch of span 16m and it is subjected to two points of 100kN and at the left and right quarter span points. Find the reaction at the supports and also find the radial shear and normal thrust at 6m from left support A.	BT1	Remember
3	A parabolic 3 hinged arch carries a UDL of 30kN/m on the half of the span. It has a span of 16m and a central rise of 3m. Determine the resultant reactions at the support. Find the BM, Normal Thrust and radial shear at 2m from left support.	BT2	Understand
4	A Parabolic 3 hinged arch carries loads as shown in figure. Determine the resultant reaction at supports. Find the BM, Normal Thrust and Radial Shear at D 5m from A. What is the maximum BM?	BT 4	Analyse



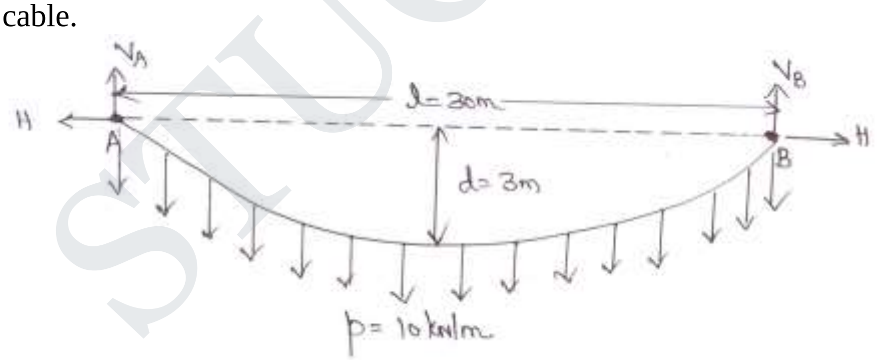
UNIT IV CABLES AND SUSPENSION BRIDGES

Equilibrium of cable – length of cable - anchorage of suspension cables – stiffening girders - cables with three hinged stiffening girders – Influence lines for three hinged stiffening girders.

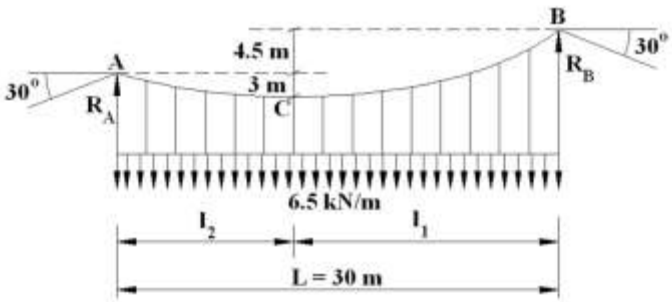
PART-A

Q.No	Questions	BT Level	Competence
1	Define cable structures. Mention its needs.	BT1	Remember
2	Examine the true shape of cable structures.	BT1	Remember
3	Demonstrate the nature of force in the cables.	BT1	Application
4	What is the difference between cable and suspension cable?	BT1	Understand
5	List out the different types of cable structures.	BT1	Remember
6	What are the two ways of arrangements for passing the cable on a supporting tower?	BT2	understanding
7	Draw the components of suspension bridge with a stiffening girder.	BT2	understanding
8	List out the main functions of stiffening girders in suspension bridges.	BT2	Remember
9	Calculate the degree of indeterminacy of a suspension bridge with two hinged stiffening girder.	BT3	Application
10	What is the BM of guide pulley support.	BT3	Understand
11	What is the maximum sag of the cable?	BT3	Understand
12	Define stiffening girder.	BT1	Remember
13	How the suspension cables have to be anchored?	BT3	Create
14	How the traffic load on the deck of the bridge is transferred to the cable?	BT2	Understand
15	Define suspenders.	BT4	Analyze
16	How the cable is flexible throughout?	BT3	Application
17	Write the temperature effect on cable.	BT4	Remember
18	Compose the expression for determining the tension in the cable.	BT4	Create
19	Determine the types of significant cable structures.	BT5	Evaluate
20	Explain suspension cable.	BT5	Evaluate
21	Why stiffening girders are necessary in the suspension bridges?	BT5	Evaluate
22	Give the expression for calculating equivalent UDL on a girder.	BT6	Create
23	Give the expression for determining the tension T in the cable.	BT6	Create
24	What are the main functions of stiffening girder in suspension bridges?	BT6	Create
25	What are the components of suspension bridge with a stiffening girder?	BT6	Create

PART – B

Q.No	Questions	BT Level	Competence
1.	A suspension cable of 130m horizontal span is supported at the same level. It is subjected to a udl of 28.5kN per horizontal metre. If the maximum tension in the cable is limited to 5000kN, calculate the minimum central dip needed.	BT1	Remember
2.	A suspension bridge is of 50m span with a 16m wide roadway. It is subjected by a pair of cables having a central dip of 4.2m. Find the cross sectional area of the cable necessary if the maximum permissible stress in the cable material is not to exceed 600N/mm^2.	BT4	Analyze
3.	A suspension cable of span 100m and dip 10m carries a udl of 8kN of horizontal span over the full span. Find the vertical and horizontal forces transmitted to the supporting pylons.	BT3	Apply
4.	A steel wire of uniform cross sectional area is supported at its ends at the same level and allowed to sag by its self weight. The central dip is restricted to 1/15 of the horizontal span. The stress in the wire is not to exceed 640N/mm2. Density of steel may be taken as 78x10^{-6} N/mm^2. Find the limiting horizontal span of the cable.	BT6	Understand
5.	A suspension cable of 75m horizontal span and central dip 6m has a stiffening girder hinged at both ends. The dead load transmitted to the cable including its own weight is 1500 kN. The girder carries a live load of 30kN/m uniformly distributed over the left half of the span. Assuming the girder to be rigid, calculate the shear force and BM in the girder at 20m from the left support. Also calculate the maximum tension in the cable.	BT4	Analyze
6.	A suspension cable having supports at the same level, has a span of 30m and a maximum dip of 3m.The cable is loaded with a udl of 10kN/m throughout its length. Evaluate the maximum tension in the cable. 	BT1	Remember
7.	A suspension bridge of 250m span has two numbers of three hinged stiffening girder supported by cables with a central dip of 25m. If 4 point load of 300kN each are placed at the centre line of the roadway at 20, 30, 40 and 50m from the left hand hinge, Estimate the shear force and bending moment in each girder at 62.5m from each end. Estimate also the maximum tension in the cable.	BT1	Remember
8.	A cable of span 100 m has its ends at heights 8m and 15 m above the lowest point of the cables. It carries a UDL of 10KN/m per horizontal	BT1	Remember

	run of the span. Determine the horizontal and vertical reactions at the supports. What is the length of the cable?		
9.	A suspension cable, having supports at the same level, has a span of 45 m and the maximum dip is 4m. The cable is loaded with the udl of 15 kN/m run over the whole span and two point loads 35kN each at middle third points. Find the maximum tension in the cable. Also calculate the length of cable required.	BT6	Create
10.	A suspension cable has a span of 120m and a central dip of10m is suspended from the same level at both towers. The bridge is stiffened by a stiffening girder hinged at the end supports. The girder carries a single concentrated load of 100kN at a point 30m from left end. Assuming equal tension in the suspension hangers. Find The horizontal tension in the cable and the maximum positive bending moment.	BT2	Understand
11.	A suspension cable of span 100m is subjected at the same level. It is subjected to a udl of 28.5kN/m. If the maximum tension in the cable is limited to 4000kN. Calculate the minimum central dip needed.	BT2	Understand
12.	A suspension bridge has a span of 60m with a 15m wide runway. It is subjected to a load 35KN/m including self-weight. The bridge is supported by a pair of cables having a central dip of 6m.Find the cross sectional area of the cable necessary, if the maximum permissible stress in the cable material is not to exceed 650 MPa	BT5	Evaluate
13.	A Suspension bridge cable of 90 m span and central dip 9 m is stiffened by three hinged girder. He dead load is 10kN/m. determine the maximum tension in the cable and the maximum BM at 30m due to concentrated load of 100kN rolling over the girder. Assume that the dead load is carried entirely by the cable.	BT3	Application
14.	A suspension cable is supported at 2 points 30m apart .The left support is 3m above the right support. The cable is loaded with a uniformly distributed load of 40kN/m throughout the span. The maximum dip in the cable from the left support is 5m. Quote the maximum and minimum tensions in the cable.	BT1	Remember
	PART – C		
Q.No	**Questions**	**BT Level**	**Competence**
1.	Figure below shows a cable structure supported by frictionless roller which is located on top of tower. Determine: (a) Maximum and minimum tensile force exerted by the cable (b) Vertical reaction force exerted by tower at A and B. Find l_1 and l_2.	BT5	Remembering

			
2.	A three hinged stiffening girder of a suspension bridge of 100 m span subjected to two point loads 10 kN each placed at 20 m and 40 m, respectively from the left hand hinge. Determine the bending moment and shear force in the girder at section 30 m from each end. Also determine the maximum tension in the cable which has a central dip of 10 m.	BT-3	Evaluate
3.	A suspension bridge has a span 50 m with a 15 m runway. It is subjected to a load of 30 kN/m including self-weight. The bridge is supported by a pair of cables having a central dip of 4m, Find the cross sectional area of the cable necessary if the maximum permissible stress in the cable material is not to exceed 600 Mpa.	BT-1	Evaluate
4.	A cable of horizontal span 21m is to be used to support six equal loads of 40kN each at 3m spacing. The central dip of the cable is limited to 2m. Find the length of the cable required and also its sectional area if the safe tensile stress is 750N/mm^2.	BT-2	Understanding

UNIT V: PLASTIC ANALYSIS

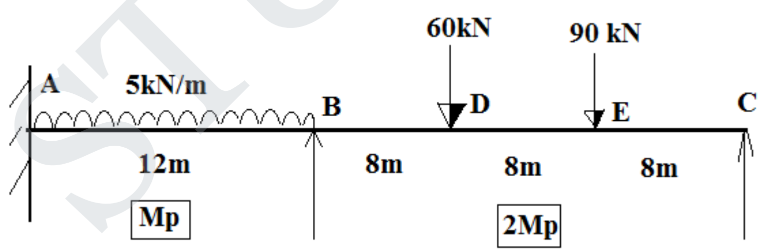
Plastic theory - Statically indeterminate structures – Plastic moment of resistance – Plastic modulus – Shape factor – Load factor – Plastic hinge and mechanism – collapse load - Static and kinematic methods –Upper and lower bound theorems - Plastic analysis of indeterminate beams and frames.

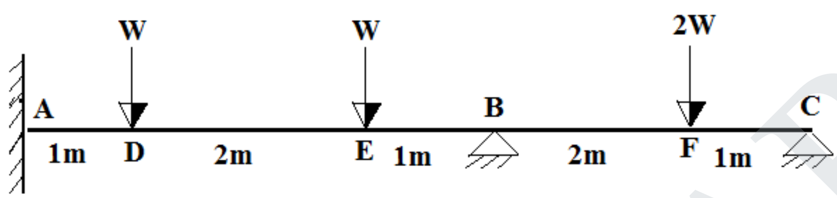
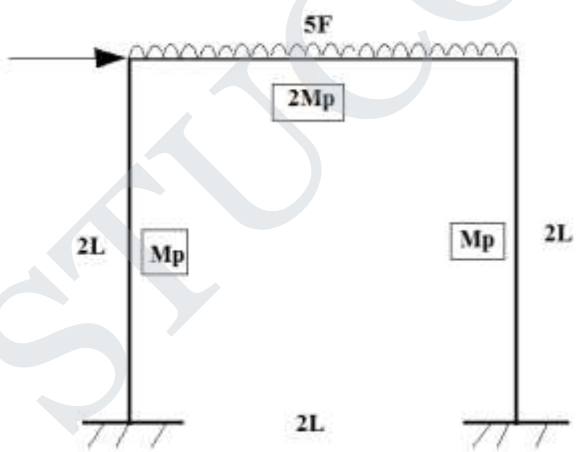
Part - A

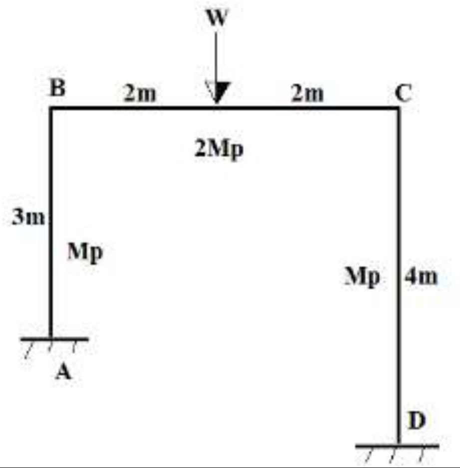
Q. No.	Questions	BT Level	Competence
1	Define load factor	BT-1	Remembering
2	Define shape factor.	BT-1	Remembering
3	Define plastic hinge.	BT-1	Remembering
4	Define mechanism.	BT-1	Remembering
5	Classify the different types of mechanisms.	BT-4	Analyzing
6	Differentiate between plastic hinge and mechanical hinge.	BT-2	Understanding
7	Define collapse load	BT-1	Remembering
8	Write the assumptions made for plastic analysis.	BT-3	Applying
9	Explain Plastic Theory in brief.	BT-5	Evaluating
10	List out the shape factors for rectangular, triangular, circular and diamond sections.	BT-1	Remembering
11	Write the section having maximum shape factor	BT-3	Applying
12	Compose upper bound theory	BT-5	Evaluating
13	Discuss lower bound theory.	BT-2	Understanding

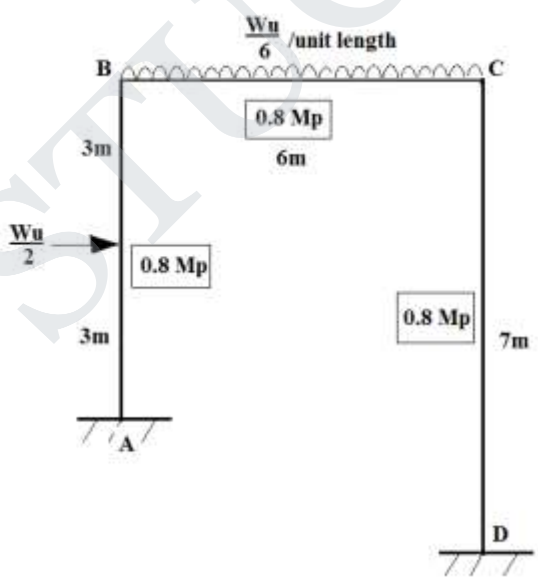
14	Classify the types of frames.	BT-4	Analyzing
15	Explain about symmetric frames and how are they analyzed.	BT-4	Analyzing
16	Explain about unsymmetrical frames and how are they analyzed.	BT-4	Analyzing
17	Formulate the shape factor of a hollow circular section in terms of the shape factor of an ordinary circular section.	BT-6	Creating
18	Formulate the governing equation for bending.	BT-6	Creating
19	Compose plastic moment of resistance.	BT-5	Evaluating
20	Describe plastic modulus of a section.	BT-2	Understanding

Part -B

Q. No.	Questions	BT Level	Competence
1	Calculate the shape factor for a i) Rectangle section of breadth 'b' and depth 'd', ii) Diamond section of breadth 'b' and depth 'd'.	BT-3	Applying
2	Calculate the shape factor for a triangle a) Centroid lying at d/3 from the base of depth'd', and breadth 'b'. b) Circular section of diameter 'D'.	BT-3	Applying
3	A mild steel I-section 200mm wide and 250mm deep has a mean flange thickness of 20mm and a web thickness of 10mm.Analyse the S.F. and the fully plastic moment if σ_y=252N/mm².	BT-4	Analyzing
4	Analyse the shape factor of the I-section with top flange 100mm wide, bottom flange 150mm wide, 20mm thick and web depth 150mm and web thickness 20mm.	BT-4	Analyzing
5	Examine the shape factor of the T-section of depth 100mm and width of flange100mm,flangethickness and web thickness 10mm.	BT-1	Remembering
6	A continuous beam ABC is loaded as shown in the Fig. Examine the required M_p if the load factor is 3.2.  	BT-1	Remembering
7	A fixed beam of span 'l' carries a uniformly distributed load 'w' on the right half portion. Find the value of collapse load W_c. The beam is of uniform moment of resistance.	BT-5	Evaluating
8	A Simply supported beam of span 5m is to be designed for a udl of 25 kN/m. Design a suitable I section using plastic theory, Assuming yield stress in steel as f_y = 250 N/mm^2	BT-2	Understanding
9	A beam fixed at both ends is subjected to three concentrated loads	BT-2	Understanding

	‘W’, each at one forth points of the span. Determine the collapse load for the beam in terms of its M_p.		
10	A three span continuous beam ABCD has the span lengths of AB= BC= CD=8m and carries an udl of 40kN/m completely covering the spans and A & D are simply supported ends. If the load factor is 1.5 and Shape factor is 1.15 for the “T” section. Find the section modulus needed. Assume the yield stress for the material as $300 N/mm^2$.	BT-4	Analyzing
11	Determine the collapse load of the beam load as shown in fig. 	BT-5	Evaluating
12	A two span continuous beam ABC has span length AB=6m and BC=6m and carries an udl of 30 kN/m completely covering the spans AB and BC. A and C are simple supports. If the load factor is 1.8 and the shape factor is 1.15 for the I-section, Evaluate the section modulus, assume yield stress for the material as $250 N/mm^2$.	BT-5	Evaluating
13	Find the collapse load for the portal frame as shown in fig. 	BT-5	Evaluating
14	Examine and find out the collapse load for the frame shown in fig.	BT-6	Creating

Part -C			
Q. No.	**Questions**	**BT Level**	**Competence**
1	Find the collapse load for the portal frame loaded as shown in fig. 	BT-5	Evaluating
2	A Rectangle portal frame of span L and height L/2 is fixed to the section through with its fully plastic moment of resistance equal to My. It is loaded with point load W at the center of span as well as a	BT-6	Creating

	horizontal force W/2 at its top right corner. Calculate the value of W at the collapse of the frame		
3	Derive the shape factor for I section and circular section	BT-4	Analyzing
4	Analyze a propped cantilever of length L and subjected to a uniformly distributed load of w/m length of entire span and also find the collapse load.	BT-4	Analyzing