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**Fourth Semester B.E./B.Tech. Degree Examination, June/July 2025.**

**Analysis of Structures**

Time: 3 hrs.

Max. Marks: 100

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.  
2. M : Marks , L: Bloom's level , C: Course outcomes.*

Module - 1		M	L	C		
<b>Q.1</b>	a.	Difference between statically determinate and indeterminate beams with example.		6	L1, L2	CO1
	b.	Define degree of freedom. What is the degree of freedom for a i) Fixed support ii) Hinged support.		4	L1, L2	CO1
	c.	Determine static and kinematic indeterminacy for the following shown in Fig.Q.1(c).		10	L3	CO1
<p style="text-align: center;">(i) (ii)</p> <p style="text-align: center;">(iii) (iv)</p> <p style="text-align: center;">(v)</p> <p style="text-align: center;">Fig.Q.1(c)</p>						
1 of 4						

OR

Q.2	a.	Difference between linear and non linear system.	3	L1, L2	CO1
	b.	What are the assumptions in the analysis of trusses?	5	L1, L2	CO1
	c.	Determine the forces in all the members of the truss shown in Fig.Q.2(c) by method of joints.	12	L3	CO1

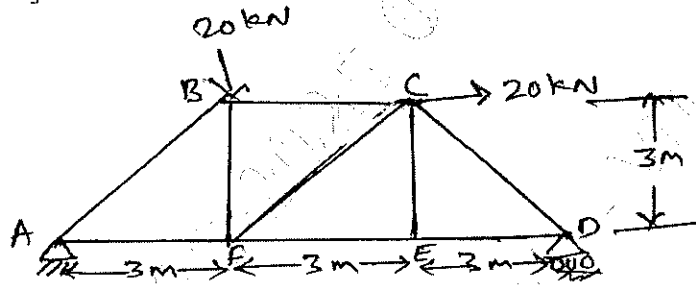


Fig.Q.2(c)

Module - 2

Q.3	a.	Derive the expression for strain energy stored in an prismatic element subjected to pure bending.	6	L3	CO2
	b.	Determine slope and deflection for the simply supported beam subjected to point load at mid span shown in Fig.Q.3(b) by moment area method.	7	L3	CO2
	c.	Determine the slope and deflection at the free end of a cantilever beam as shown in Fig.Q.3(c) by moment area method (Take $EI = 4000 \text{ kNm}^2$ ).	7	L3	CO2

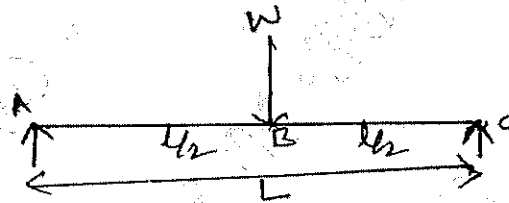


Fig.Q.3(b)

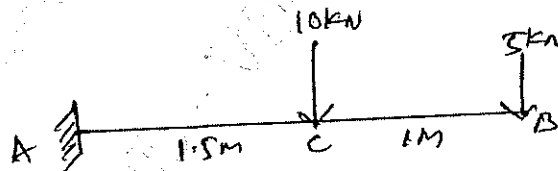
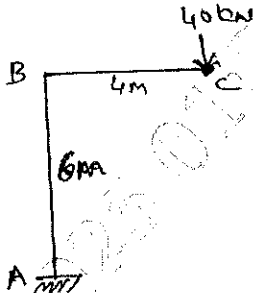
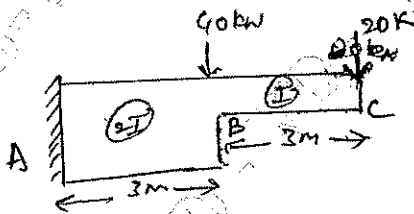


Fig.Q.3(c)

OR

Q.4	a. Derive an expression for strain energy due to shear force,	6	L3	CO2
	b. Determine the vertical deflection at point 'C' for the frame shown in Fig.Q.4(b) using Castigliano's theorem. $EI = 16 \times 10^4 \text{ kN-m}^2$ .	7	L3	CO2
				
	c. Determine slope and deflection at the free end of a cantilever beam as shown in Fig.Q.4(c) $EI = 4 \times 10^5 \text{ kN-m}^2$ . Use moment area method.	7	L3	CO2
				

Module - 3

Q.5	a. Show that the bending moment at any section as a three hinged parabolic arch of span 'l' and rise 'h' carrying udl of w/m over the entire span is zero.	6	L3	CO3
	b. A three hinged parabolic arch of 20 m span and rise 5 m, carries a UDL of 40 kN/m on the entire span and a point load of 200 kN at 5 m from right end. Determine reaction, also determine BM, normal thrust and radial shear at 5 m from left support.	14	L3	CO3

OR

Q.6	a. A cable of span 20 m and dip 4 m carries a UDL of 20 kN/m over the entire span. Find: i) Maximum tension in the cable ii) Minimum tension in the cable iii) Length of cable.	10	L3	CO3
	b. A three hinged parabolic arch of span 20 m and rise 4 m carries a UDL of 20 kN/m over the left half of span. Find the maximum BM for the arch and also determine normal thrust and radial shear at a point 5 m from left support.	10	L3	CO3

Module - 4

<p><b>Q.7</b></p>	<p>Analyze the continuous beam shown in Fig.Q.7 by using slope deflection method. Draw BMD, SFD and elastic curve.</p>	<p>20</p>	<p>L4</p>	<p>CO4</p>
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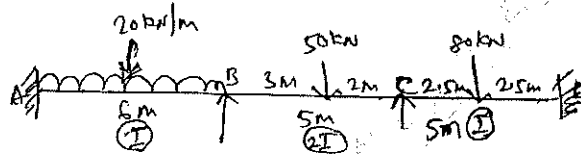


Fig.Q.7

OR

<p><b>Q.8</b></p>	<p>Analyze the portal frame shown in Fig.Q.8 by slope deflection method, draw BMD and elastic curve:</p>	<p>20</p>	<p>L4</p>	<p>CO4</p>
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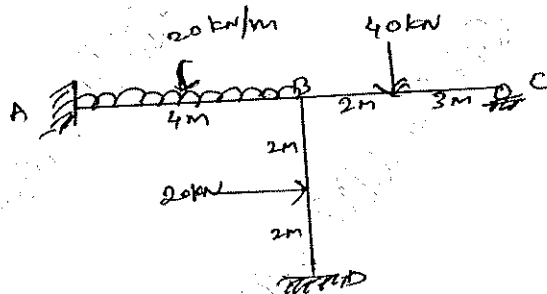


Fig.Q.8

Module - 5

<p><b>Q.9</b></p>	<p>Analyze the continuous beam shown in Fig.Q.9 by moment distribution method. Draw BMD and elastic curve.</p>	<p>20</p>	<p>L4</p>	<p>CO5</p>
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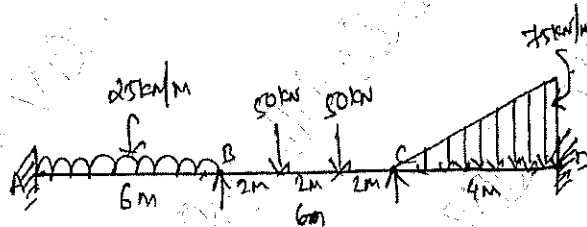


Fig.Q.9

OR

<p><b>Q.10</b></p>	<p>Analyze the portal frame as shown in Fig.Q.10 by moment distribution method and draw BMD.</p>	<p>20</p>	<p>L4</p>	<p>CO5</p>
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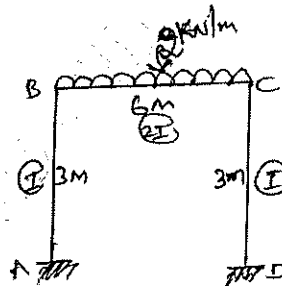


Fig.Q.10

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## Fourth Semester B.E./B.Tech. Degree Examination, June/July 2025 Fluid Mechanics and Hydraulics

Time: 3 hrs.

Max. Marks: 100

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.  
2. M : Marks, L: Bloom's level, C: Course outcomes.*

		Module – 1	M	L	C
<b>Q.1</b>	<b>a.</b>	Define the following and mention their units: i) Capillarity    ii) Surface tension    (iii) Viscosity	06	L2	CO1
	<b>b.</b>	Calculate the density, specific weight and weight of one litre of petrol of specific gravity = 0.7	06	L3	CO1
	<b>c.</b>	The space between two square flat parallel plates is filled with oil. Each side of the plate is 60 cm. The thickness of the oil film is 12.5 mm. The upper plate, which moves at 2.5 meter per sec requires a force of 98.1 N to maintain the speed. Determine (i) The dynamic viscosity of the oil in poise (ii) The kinematic viscosity of the oil in stokes if the specific gravity of the oil is 0.95.	08	L3	CO1
<b>OR</b>					
<b>Q.2</b>	<b>a.</b>	State and prove Pascal's law.	06	L2	CO1
	<b>b.</b>	An open tank contains water upto a depth of 2 m and above if an oil of sp. gr. 0.9 for a depth of 1 m. Find the pressure intensity (i) at the interface of the two liquids (ii) at the bottom of the tank.	06	L3	CO1
	<b>c.</b>	A differential manometer is connected the two points A and B of two pipes as shown in Fig.Q2(c). The pipe A contains a liquid of sp.gr. = 1.5. While pipe B contains a liquid of sp. gr. = 0.9. The pressure at A and B are 1 kgf/cm <sup>2</sup> and 1.80 kgf/cm <sup>2</sup> respectively. Find the difference in mercury level in the differential manometer.  <div style="text-align: center;"> <p style="text-align: center;">Fig.Q2(c)</p> </div>	08	L3	CO1
1 of 3					

## Module – 2

<b>Q.3</b>	<b>a.</b>	Derive the expression for Euler's equation of motion.	<b>08</b>	<b>L2</b>	<b>CO2</b>
	<b>b.</b>	Water is flowing through a pipe having diameter 300 mm and 200 mm at the bottom and upper end respectively. The intensity of pressure at the bottom end is 24.525 N/cm <sup>2</sup> and pressure at the upper end is 9.81 N/cm <sup>2</sup> . Determine the difference in datum head if the rate of flow through pipe is 40 lt/s.	<b>08</b>	<b>L4</b>	<b>CO2</b>
	<b>c.</b>	List the assumption made in the derivation of Bernoulli's equation.	<b>04</b>	<b>L2</b>	<b>CO2</b>

## OR

<b>Q.4</b>	<b>a.</b>	Derive the equation for discharge through venturimeter. Explain with neat sketch.	<b>08</b>	<b>L2</b>	<b>CO2</b>
	<b>b.</b>	An orifice meter with orifice diameter 10 cm is inserted in a pipe of 20 cm diameter. The pressure gauge fitted upstream and downstream of the orifice meter gives reading of 19.62 N/cm <sup>2</sup> and 9.81 N/cm <sup>2</sup> respectively. Coefficient of discharge for the meter is given as 0.6. Find the discharge of water through pipe.	<b>06</b>	<b>L4</b>	<b>CO2</b>
	<b>c.</b>	A pitot-static tube placed in the centre of a 300 mm pipeline has one orifice pointing upstream and other perpendicular to it. The mean velocity in the pipe is 0.80 of the central velocity. Find the discharge through the pipe if the pressure difference between the two orifices is 60 mm of water. Take the coefficient of pitot tube as $C_v = 0.98$ .	<b>06</b>	<b>L4</b>	<b>CO2</b>

## Module – 3

<b>Q.5</b>	<b>a.</b>	Define hydraulic coefficients for an orifice and give the relation between them.	<b>06</b>	<b>L2</b>	<b>CO3</b>
	<b>b.</b>	Find the discharge from a 100 mm diameter external mouth piece, fitted to a side of a large vessel if the head over the mouth piece is 4 meters.	<b>06</b>	<b>L4</b>	<b>CO3</b>
	<b>c.</b>	Derive the expression for discharge through a triangular notch.	<b>08</b>	<b>L2</b>	<b>CO3</b>

## OR

<b>Q.6</b>	<b>a.</b>	Derive Darcy – Weisbach equation for head loss due to friction in a pipe.	<b>08</b>	<b>L2</b>	<b>CO3</b>
	<b>b.</b>	List the any four minor losses in a pipe flow with expression.	<b>06</b>	<b>L2</b>	<b>CO3</b>
	<b>c.</b>	Write the short notes on the following : i) Pipes in series ii) Equivalent pipe iii) Pipes in parallel	<b>06</b>	<b>L2</b>	<b>CO3</b>

## Module – 4

<b>Q.7</b>	<b>a.</b>	Distinguish between (i) Gradually varied flow and rapidly varied flow (ii) Total energy and specific energy (iii) Subcritical and super critical flow	<b>06</b>	<b>L2</b>	<b>CO4</b>
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<b>Q.7</b>	<b>b.</b>	A rectangular channel is 2.5 m wide and has a uniform bed slope of 1 in 500. If the depth of flow is constant 1.7 m. Calculate (i) The hydraulic mean depth (ii) The velocity of flow (iii) The volume rate of flow Assume that the value of the coefficient C in Chezy's formula is 50.	<b>06</b>	<b>L3</b>	<b>CO4</b>
	<b>c.</b>	Determine the most efficient section of a trapezoidal channel with side slope of 1 vertical to 2 horizontal. The channel carries a discharge of 11.25 m <sup>3</sup> /s with a velocity of 0.75 m/s. What should be the bed slope of the channel? Take Mannings n = 0.025 .	<b>08</b>	<b>L3</b>	<b>CO4</b>

OR

<b>Q.8</b>	<b>a.</b>	Derive Chezy's equation for uniform rate of flow in a channel.	<b>08</b>	<b>L2</b>	<b>CO4</b>
	<b>b.</b>	For most economical rectangular channel prove that half of the width equal to depth of flow in channel.	<b>06</b>	<b>L3</b>	<b>CO4</b>
	<b>c.</b>	Explain critical depth and critical velocity.	<b>06</b>	<b>L2</b>	<b>CO4</b>

Module – 5

<b>Q.9</b>	<b>a.</b>	State Impulse - Momentum equation. Give its application.	<b>06</b>	<b>L2</b>	<b>CO5</b>
	<b>b.</b>	A 75 mm diameter water jet having a velocity of 30 m/s strikes a flat plate, the normal of which is inclined at 45° to the axis of the jet. Find the normal pressure on the plate, when the plate is moving with a velocity of 15 m/s and away from the jet, the normal force on the plate.	<b>06</b>	<b>L4</b>	<b>CO5</b>
	<b>c.</b>	A jet of water of diameter 7.5 cm strikes a curved plate at its centre with a velocity of 20 m/s. The curved plate is moving with a velocity of 8 m/s in the direction of jet. The jet is deflected through an angle of 165°. Assuming the plate smooth find: (i) Force exerted on the plate in the direction of jet. (ii) Power of the jet (iii) Efficiency of the jet	<b>08</b>	<b>L4</b>	<b>CO5</b>

OR

<b>Q.10</b>	<b>a.</b>	Explain various efficiency of centrifugal pump.	<b>06</b>	<b>L2</b>	<b>CO5</b>
	<b>b.</b>	List the difference between Impulse and Reaction turbine.	<b>06</b>	<b>L2</b>	<b>CO5</b>
	<b>c.</b>	Explain classification and types of turbines.	<b>08</b>	<b>L2</b>	<b>CO5</b>

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15/7/2025

**CBCS SCHEME**

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BCV405B

**Fourth Semester B.E./B.Tech. Degree Examination, June/July 2025**  
**Construction Equipment, Plants and Machinery**

Time: 3 hrs.

Max. Marks: 100

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.  
 2. M : Marks , L: Bloom's level , C: Course outcomes.*

Module - 1			M	L	C
Q.1	a.	Draw and explain four and two stroke engine.	10	L2	CO1
	b.	Explain components of automobiles with neat diagram.	10	L2	CO1
<b>OR</b>					
Q.2	a.	Explain basic layout of hydraulic system with neat sketch.	10	L2	CO1
	b.	Explain Strand Jack Operation and write the application of Hydraulics.	10	L2	CO1
<b>Module - 2</b>					
Q.3	a.	Explain concreting and road making.	10	L2	CO2
	b.	Draw line diagram of bulldozer and write its components.	10	L2	CO2
<b>OR</b>					
Q.4	a.	Explain Excavator with line diagram.	10	L2	CO2
	b.	Explain Motor Grader and classification of Motor grader.	10	L2	CO2
<b>Module - 3</b>					
Q.5	a.	Explain equipment life cycle management.	10	L2	CO3
	b.	Explain equipment performance parameter.	10	L2	CO3
<b>OR</b>					
Q.6	a.	Explain types of Maintenance.	10	L2	CO3
	b.	Explain Maintenance Practices.	10	L2	CO3
<b>Module - 4</b>					
Q.7	a.	Explain the operation of hard rock.	10	L2	CO4
	b.	Explain earth pressure balance.	10	L2	CO4
<b>OR</b>					
Q.8	a.	Explain operation of slurry by TBM.	10	L2	CO4
	b.	Explain Hydraulic grabs and piling Rig.	10	L2	CO4
<b>Module - 5</b>					
Q.9	a.	Explain importance of digital analytic.	10	L2	CO5
	b.	Explain railway track construction.	10	L2	CO5
<b>OR</b>					
Q.10	a.	Explain 3D concrete printer in construction field.	10	L2	CO5
	b.	Explain safety of men and machines at work.	10	L2	CO5

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# CBCS SCHEME

USN

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BCV403

## Fourth Semester B.E./B.Tech. Degree Examination, June/July 2025 Transportation Engineering

Time: 3 hrs.

Max. Marks: 100

- Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.  
2. M : Marks, L: Bloom's level, C: Course outcomes.

Module – 1			M	L	C
Q.1	a.	Explain the role of transportation in social and economic development of country.	10	L2	CO1
	b.	Enumerate the steps for practical design of super elevation considering mixed traffic as per IRC guidelines.	10	L2	CO1
OR					
Q.2	a.	Explain the factor affecting geometric design of highways.	10	L2	CO1
	b.	Calculate the safe stopping sight distance for design speed of 50 Kmph for i) Two way traffic on two lane road ii) Two way traffic on a single lane road Assume $f = 0.37$ and reaction time $t = 2.5$ Sec.	10	L3	CO1
Module – 2					
Q.3	a.	Explain the desirable properties of road aggregates. List the various tests to access these properties.	10	L2	CO2
	b.	Explain the factors controlling design of flexible highway pavement.	10	L2	CO2
OR					
Q.4	a.	With neat sketches, explain the following types of joints in CC pavement. i) Expansion Joint ii) Contraction Joint	10	L2	CO2
	b.	With neat sketches, explain the different methods of providing subsurface drainage system.	10	L2	CO2
Module – 3					
Q.5	a.	What are the various road user characteristics? Explain any two characteristics.	10	L2	CO3
	b.	What are the different traffic engineering studies carried out for collecting traffic data? Explain any two methods.	10	L2	CO3

OR																													
Q.6	a.	What are the various methods of conducting speed and delay survey? Explain the floating car method of survey.	10	L2	CO3																								
	b.	Spot speed studies are carried out at a certain stretch of a highway with mixed flow and the consolidated data collected are given below : <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Speed rang Kmph</th> <th>No. of vehicles observed</th> <th>Speed range Kmph</th> <th>No. of vehicles observed.</th> </tr> </thead> <tbody> <tr> <td>0 to 10</td> <td>12</td> <td>50 to 60</td> <td>255</td> </tr> <tr> <td>10 to 20</td> <td>18</td> <td>60 to 70</td> <td>119</td> </tr> <tr> <td>20 to 30</td> <td>68</td> <td>70 to 80</td> <td>43</td> </tr> <tr> <td>30 to 40</td> <td>89</td> <td>80 to 90</td> <td>33</td> </tr> <tr> <td>40 to 50</td> <td>204</td> <td>90 to 100</td> <td>9</td> </tr> </tbody> </table> <p>Determine :</p> <p>i) Upper and lower speed limits for regulations. ii) Design speed for checking the geometric design elements of the highway.</p>	Speed rang Kmph	No. of vehicles observed	Speed range Kmph	No. of vehicles observed.	0 to 10	12	50 to 60	255	10 to 20	18	60 to 70	119	20 to 30	68	70 to 80	43	30 to 40	89	80 to 90	33	40 to 50	204	90 to 100	9	10	L3	CO3
Speed rang Kmph	No. of vehicles observed	Speed range Kmph	No. of vehicles observed.																										
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30 to 40	89	80 to 90	33																										
40 to 50	204	90 to 100	9																										
Module – 4																													
Q.7	a.	What do you understand by a permanent way? Mention the requirement of an ideal permanent way.	10	L2	CO4																								
	b.	What are the functions and requirements of rails?	10	L2	CO4																								
OR																													
Q.8	a.	What are the functions and requirements of sleepers?	10	L2	CO4																								
	b.	What are the functions and requirements of ballast?	10	L2	CO4																								
Module – 5																													
Q.9	a.	What are the various factors considered in the selection of suitable site for airport?	10	L2	CO5																								
	b.	An airport is planned at an elevation of 380 m above MSL. The monthly mean of maximum and average daily temperature for the hottest month at the site are 40°C and 28°C respectively. The effective gradient is 0.18 percent. Determine the length of runway required at the proposed site if the basic runway length is 1900 m.	10	L3	CO5																								
OR																													
Q.10	a.	List and explain aircraft characteristics which affect planning and design of airport.	10	L2	CO5																								
	b.	What is wind rose diagram? Explain any one method of orientation of runway with wind rose diagram.	10	L2	CO5																								

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