

**FEBRUARY 2023 EXAMINATION
I.B.E. (4YDC) EXAM**

CE 10013 / CE-10003: FUNDAMENTALS OF CIVIL ENGINEERING & APPLIED MECHANICS
Time: 3 Hrs.] **Max. Marks : 70**

TOTAL NO. OF QUESTIONS IN THIS PAPER : 6

Note: All questions are compulsory. Use internal choice wherever given. Assume suitable data if missing.

Q.No	Part	Description	CO	BL	PI	Marks
Q.1	(a)	Answer any two questions				
	(i)	Differentiate between concurrent and collinear forces.	CO1	2	1.1.1	02
	(ii)	State Varignon theorem and theorem of resolved parts	CO1	2	1.1.1	02
	(iii)	State Perpendicular and parallel axis theorem	CO1	2	1.1.1	02
	(b)	Answer any two questions				
	(i)	Discuss Hypotenusal Allowance.	CO4	2	1.1.1	02
	(ii)	Differentiate between Cumulative and Compensating Errors	CO4	2	1.1.1	02
	(iii)	Discuss Reciprocal Ranging.	CO4	2	1.1.1	02
Q.2	(a)	A man of mass 75 kg starts descending from the top of a spherical dome of 20 m diameter. If the coefficient of friction between the dome surface and the shoes of the man is 0.3, determine how far he can reach without slipping.	CO1	4	1.2.1	04
OR						
		For the part of a truss obtained by passing a section is shown in Fig.1. Using the equation of moment alone determine the unknown forces f_1 , f_2 and f_3 . Verify the results using remaining equations				
	(b)	Analyze the truss shown in Fig. 2. Tabulate the results.	CO1	4	1.2.1	10
Q.3	(a)	Derive an expression for centre of gravity of right circular cone.	CO2	3	1.2.1	04
	(b)	For the plane lamina shown in Fig. 3 determine the product of inertia.	CO2	3	1.2.1	06
OR						
		For the plane lamina shown in Fig. 4, determine the moment of inertia about the axes passing through the centroid.				
	(c)	Derive an expression for moment of inertia for a triangle.	CO2	3	1.2.1	04
Q.4	(a)	For the beam shown in Fig. 5 determine the support reactions.	CO3	3	1.2.1	04
	(b)	For the beam shown in Fig. 6, draw the SFD & BMD.	CO3	4	1.2.1	06
OR						
		Determine the support reactions for the truss shown in Fig. 7				
	(c)	Prove that $T_1/T_2 = e^{\mu\theta}$ with usual notations.	CO2	3	1.2.1	04
Q.5	(a)	A 30 m chain was found to be 12 cm too long after chaining a distance of 2500 m. It was found to be 18 cm too long at the end of day's work after chaining a total distance of 6000 m. Find the true distance if the chain was correct before the commencement of the work	CO4	3	1.1.1	02
	(b)	To find the width of a building lying on either side of a river, the bearings were taken at each corner (A&B) of building from a point P	CO4	3	1.2.1	04

lying on other side and were found to be 30 and 70. The bearing at another point Q lying on the same side as P was found to be 110. The bearings taken at each corners (A&B) from point Q were found to be 310 and 40. The bearing at P was observed to be 290. Determine the width of building if the horizontal distance between P & Q is 30m.

- (c) The fore bearings of a quadrilateral ABCD are tabulated below. CO4 3 1.2.1 04
Determine the included angles.

Lines	Fore Bearing
AB	50°
BC	120°
CD	230°
DA	290°

OR

A regular pentagon of 10m side has the fore bearing of a line AB as 105°15'. Determine the bearings of all other lines.

- Q.6 (a) List various methods of leveling. Discuss barometric leveling in brief CO5 1 1.1.1 04
(b) The following staff readings were taken successively with a level of CO5 4 1.2.1 06
4.0 m on a continuously sloping ground at a common interval of 25 m. The RL of last point is 552.25. Enter the readings in a level book and determine the reduced level of all points. Use Rise & Fall method for computations.
0.605, 1.235, 1.86, 2.575, 0.240, 0.915, 1.935, 2.87, 0.565, 1.825, 2.725.

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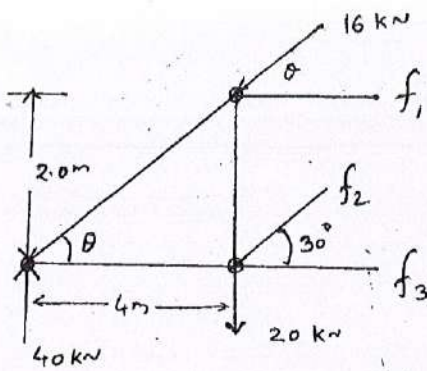


Fig. 1

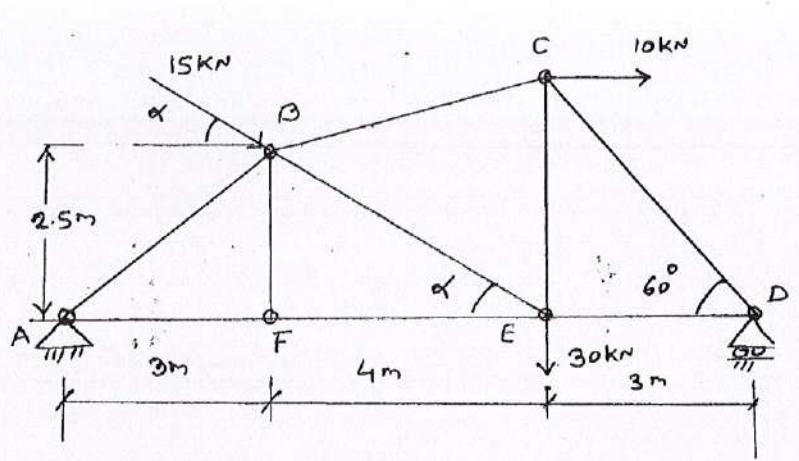


Fig. 2

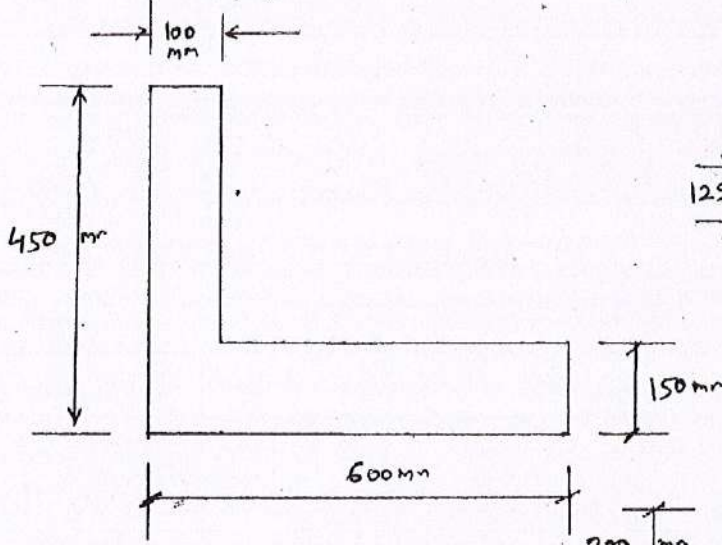


Fig. 3

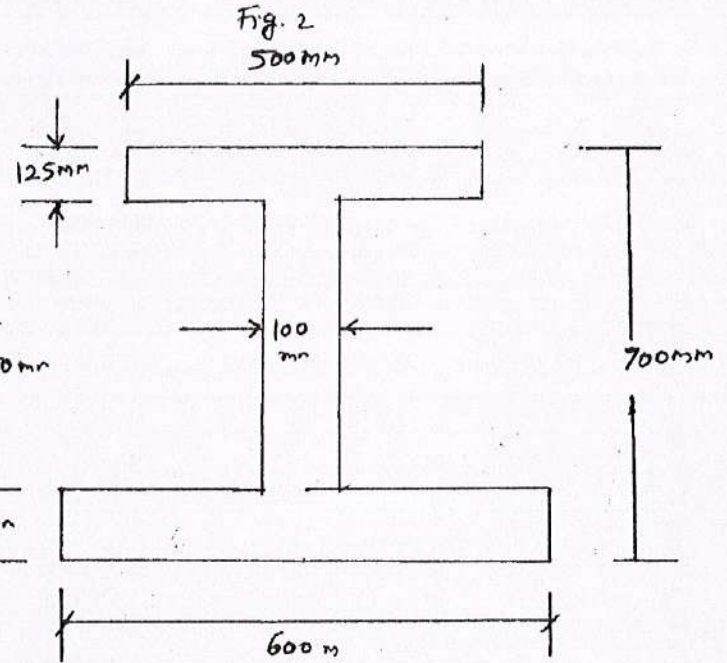


Fig. 4

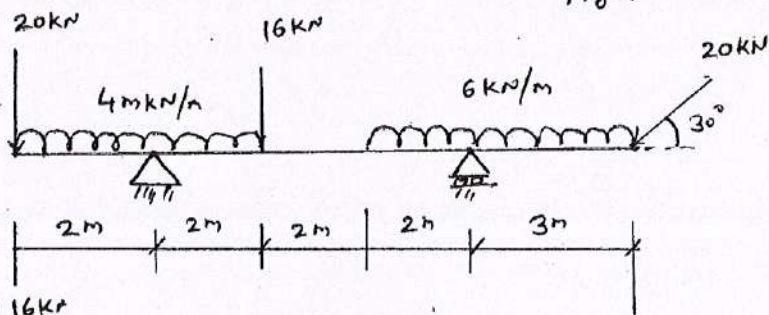


Fig. 5

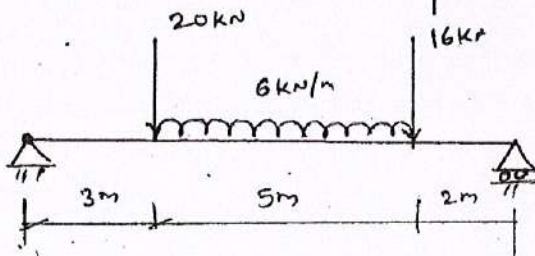


Fig. 6

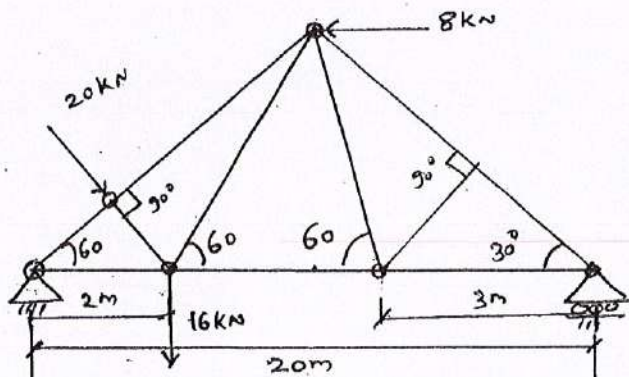


Fig. 7

JUNE – JULY 2022 EXAMINATION
I B. TECH. (4YDC) EXAM
CE-10003: FUNDAMENTALS OF CIVIL ENGINEERING
& APPLIED MECHANICS

Time: 3 Hrs.]

Max. Marks : 70

TOTAL NO. OF QUESTIONS IN THIS PAPER : 6

Note: All questions are compulsory. Use **internal choice** wherever given. Assume **suitable data if missing**.

- Q.1 (a) Answer any three questions
- | | | |
|-------|---|----|
| (i) | Define force and list various force systems | 02 |
| (ii) | Two forces P & Q are acting over a particle at an angle of 60° , the resultant of the forces is 25 kN making an angle of 45° with the horizontal. Determine forces P & Q. | 02 |
| (iii) | Draw neat diagrams of open & cross belt pulley system of power transmission. | 02 |
| (iv) | State perpendicular & parallel axis theorem. | 02 |
- (b) Answer any two questions
- | | | |
|-------|--|----|
| (i) | Differentiate between error and blunder. | 02 |
| (ii) | List different types of chains | 02 |
| (iii) | Differentiate between prismatic and surveyor's compass (any two) | 02 |
- Q.2 (a) State and prove Lami's theorem. 04
- (b) Analyze the truss shown in Fig.1 and tabulate the results. 08

OR

A ladder 5 m long is supported on wall and floor making an angle of 30° with the floor. The coefficient of friction between the ladder and wall is 0.30 while that between ladder and floor is 0.18. Evaluate how far a person of weight 60 kg can ascend without slippage. If he want to climb the top of ladder what horizontal push is required at the bottom of ladder?

- Q.3 (a) A right circular cone of base width 80 cm and height 240 cm is resting over a hemisphere of 40 cm radius. The density of cone is 1.6 times the density of hemisphere. Determine the centre of gravity. 04
- (b) For the plane lamina shown in Fig.2, determine the moment of inertia about the horizontal axis passing through centroid. 08

OR

For the channel section shown in Fig. 3, determine the product of inertia about the axes passing through the centroid.

- Q.4 (a) Determine the support reactions for the truss shown in Fig. 4. The centre to centre distance between the supports is 30 m. 08
- (b) Two parallel shafts 10 m apart are provided with 800 mm and 300 mm diameter pulleys and are connected by means of a cross belt. The direction of the rotation of the follower pulley is to be reversed by changing over to an open belt drive. How much length of the belt has to be reduced? 04

- Q.5 (a) The initial and final readings of a planimeter used for traversing a circle of 10 cm radius were found to be respectively 5.305 & 8.445. The anchor point was kept outside the figure, and $N = 0$. The figure was traversed again by placing anchor point inside the figure. The initial and final readings were found to be 4.925 & 6.105 respectively, $N = -2$. Now using the same planimeter, the periphery of an unknown figure drawn to a scale of 1:2000 was traced by keeping the anchor point inside the figure. The initial and final readings of the planimeter are 3.255 and 6.250 with $N = -2$. Determine the actual area of the unknown figure in hectares. 04
- (b) The following bearings were observed with a compass in a closed traverse: 08

Line	Fore Bearing	Back Bearing
AB	$16^{\circ}45'$	$198^{\circ}00'$
BC	$224^{\circ}30'$	$47^{\circ}30'$
CD	$207^{\circ}15'$	$25^{\circ}30'$
DE	$67^{\circ}45'$	$247^{\circ}15'$
EA	$155^{\circ}15'$	$332^{\circ}45'$

Determine (i) Included Angles and (ii) Adjust for local attraction

OR

The included angles of pentagon ABCDE are tabulated below. Determine the bearings of all other lines if the bearing of line AB = $242^{\circ}30'$

Included Angle	Magnitude ($^{\circ}$)
A	80
B	70
C	105
D	125
E	160

- Q.6 (a) Discuss profile leveling and cross sectioning. 04
- (b) In order to determine the width of a building lying on the other side of a river, the bearings of the two extreme corners of the building taken from a point P on the side of river are $310^{\circ}30'$ and $40^{\circ}45'$ respectively. Another point Q is taken on the same side of the river and is 50 m away from P. The bearings of the two extreme corners of the building taken from Q are respectively $285^{\circ}15'$ and $54^{\circ}30'$. Determine the width of building. 08

OR

The following readings were taken on a continuously sloping ground by a staff of 3.0 m length. Enter the readings in a page of survey field book. The first reading was taken on a bench mark of RL 300.515 m. Determine the RL of all points. Show all the necessary calculations

0.605, 1.235, 1.86, 2.125, 2.575, 0.235, 0.915, 1.540, 2.135, 2.905, 0.56, 1.525, 2.170 and 2.725.

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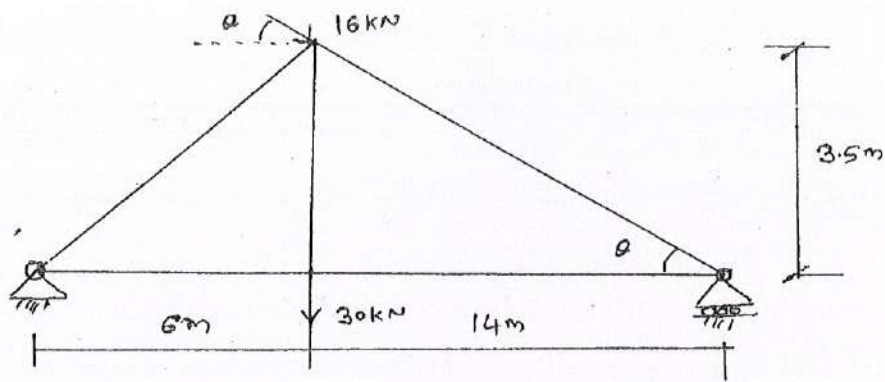


Fig. 1

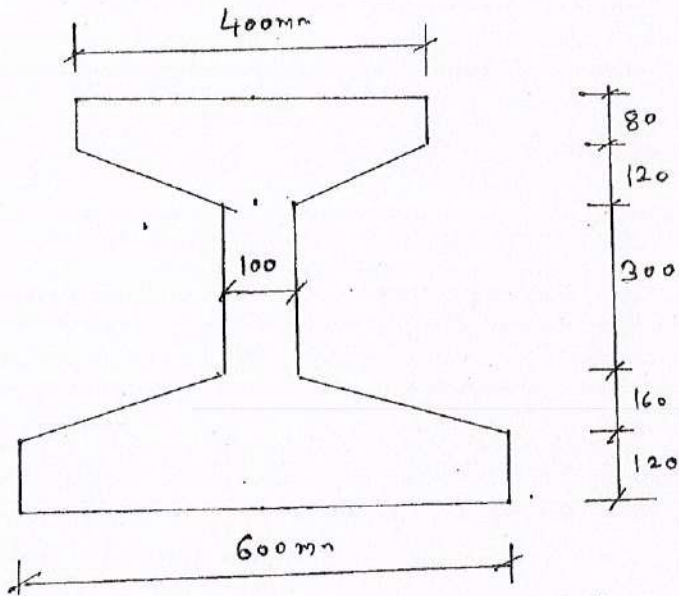


Fig. 2

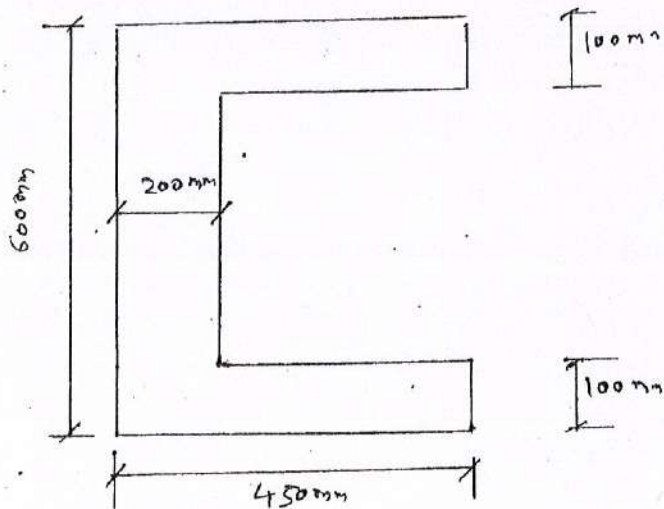


Fig. 3

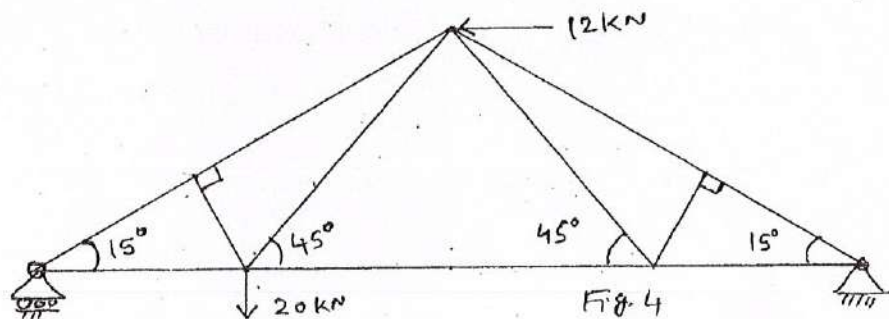
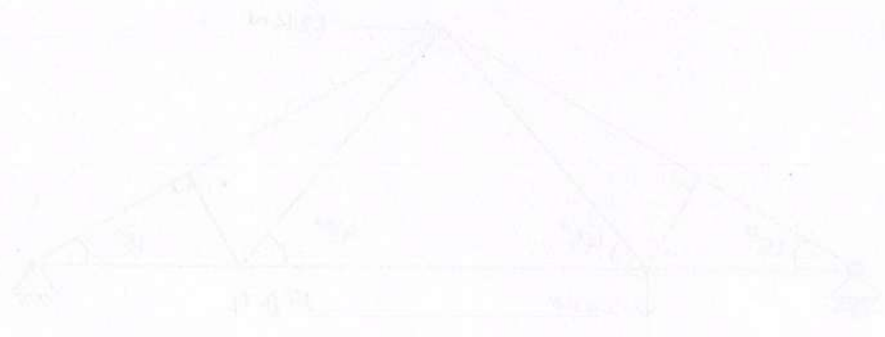
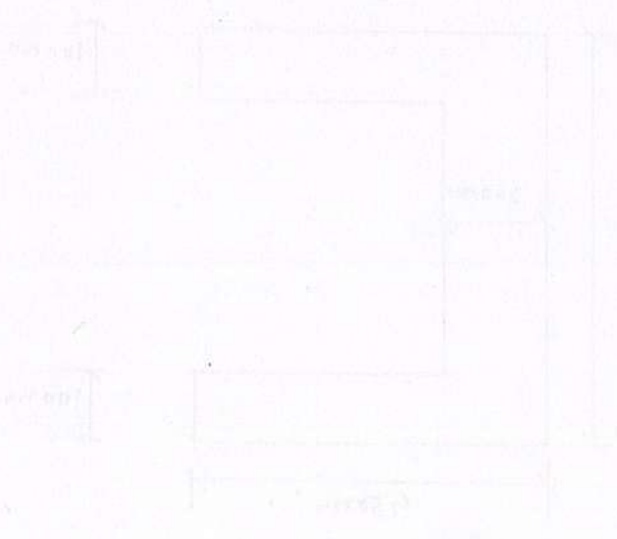
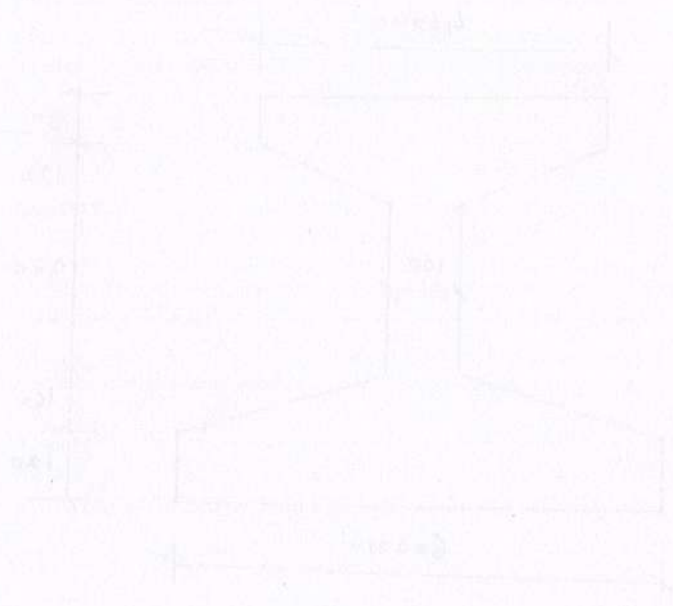


Fig. 4



FEBRUARY 2022 EXAMINATION

I YEAR I SEM B.E/ B.TECH

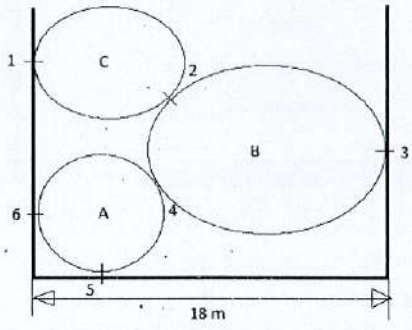
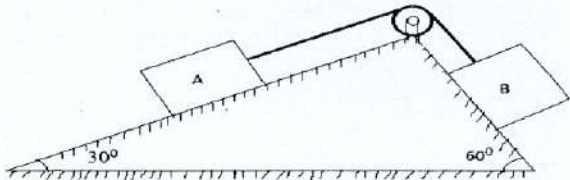
CE-10003: FUNDAMENTALS OF CIVIL ENGG.AND APPLIED MECHANICS
PART B

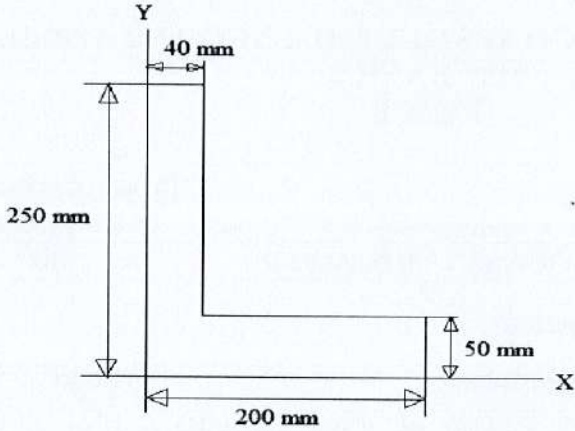
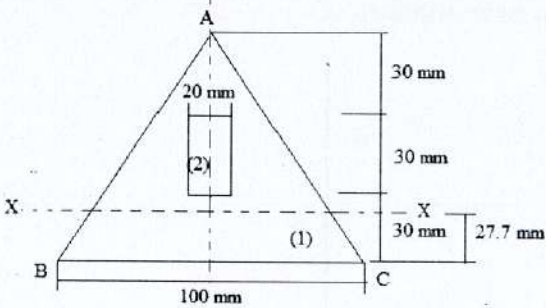
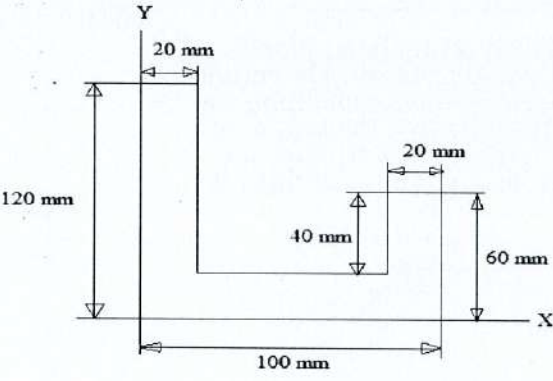
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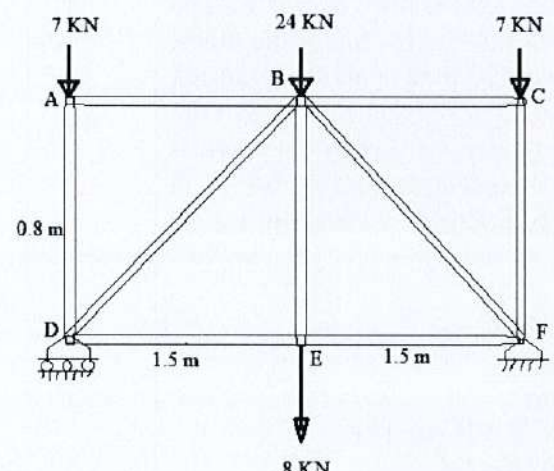
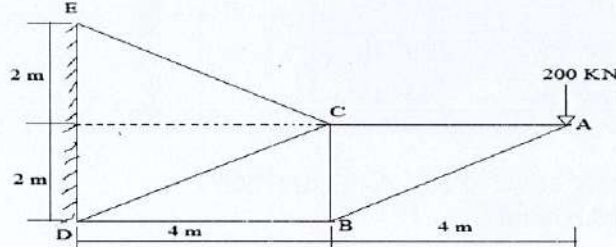
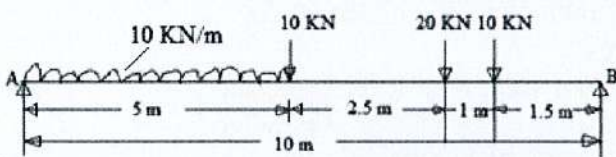
[Max. Marks: 40

TOTAL NUMBER OF QUESTIONS IN THIS PAPER = 05

NOTE: Answer all the five questions.

S.No	Questions	Marks	CO	BL	PI
Q.1	(a) What do you mean by system of force? Discuss coplanar concurrent and coplanar non- current system	(02)	CO1	L1	1.3.1
	(b) Define the Polygon law of forces.	(02)	CO1	L2	1.3.1
	(c) The cylinders are piled up in a rectangular channel as shown in fig. (a) Determine the reactions at point 6 between the cylinder A and the vertical wall of the channel. Cylinder A: radius = 4m, weight = 150 N Cylinder B: radius = 6m, weight = 400 N Cylinder C: radius = 4m, weight = 200 N	(04)	CO1	L5	2.2.3
	 <p style="text-align: center;">Fig. 1</p>				
	OR				
(d)	Two blocks A and B are placed on inclined planes as shown in fig. The block A weight 500 N. Determine minimum weight of the block B for maintaining the equilibrium of the system. Assume that the blocks are connected by an pulley. Coefficient of friction $\mu_A = 0.25$ (between the block A and plane). Assume the same value for $\mu_B = 0.25$.	(04)	CO1	L5	2.2.3
	 <p style="text-align: center;">Fig.2</p>				

Q.2	(a) Differentiates between centre of gravity and centroid.	(02)	CO2	L1	2.2.4
	(b) Find centroid of L- Section as shown in fig.  <p style="text-align: center;">Fig.3</p>	(02)	CO2	L4	2.2.3
	(c) A rectangular hole is made in a triangular section as shown in figure. All dimensions are in mm. Determine the moment of inertia of the section about centroidal x-x axis passing through its centroid.  <p style="text-align: center;">Fig. 4</p> <p style="text-align: center;">OR</p>	(04)	CO2	L4	2.2.3
	(d) Find the moment of inertia about x-axis.  <p style="text-align: center;">Fig.5</p>	(04)	CO2	L4	2.2.3

Q.3	<p>(a) Find the forces in the member AB, DB, DE of the truss as shown in fig. by method of section.</p>  <p style="text-align: center;">Fig.6</p>	(03)	CO3	L5	2.4.1						
OR											
<p>(b) Explain calculation of two reactions on a simply supported beam with uniformly distributed load is equal to 10 kN/m and span length is 10 m.</p>						(03)	CO3	L4	2.4.1		
<p>(c) Determine the support reactions and nature magnitude of forces in members of truss shown in figure.</p>						(05)	CO3	L5	2.4.1		
 <p style="text-align: center;">Fig.7</p>						OR					
<p>(d) Determine the reaction and draw shear force and bending moment for simple supported beam loaded as shown in fig.</p>						(05)	CO3	L5	2.4.1		
 <p style="text-align: center;">Fig.8</p>											
Q.4	(a) Explain different types of chain in survey.	(02)	CO4	L1	1.3.1						
	(b) Difference between Prismatic Compass and Surveyor's compass.	(02)	CO4	L2	2.2.4						
	(c) A Nominal distance of 3 Metres was set out with a 30 m	(04)	CO4	L5	2.2.3						

	<p>steel tape from a mark on the top of the one peg to a mark on the top of another, the tape being in catenary under a pull of 10 Kg and at a mean temperature of 70° F. The Top of one peg was 0.25 metre below the top of the other. The top of the higher peg was 460 metres above mean sea level. Calculate the exact horizontal distance between the marks on the two pegs and reduce it to mean sea level, if the tape was standardized at a temperature of 60° F in catenary, Under a pull of (a) 8 Kg (b) 12 Kg and (c) 10 Kg.</p> <p>Take radius of earth = 6370 Km Density of Tape = 7.86 g/cm³ Section of Tape = 0.08 sq.cm Coefficient of expansion = 6 X 10⁻⁶ per 1° F Young's Modulus = 2 X 10⁶ Kg/cm²</p>																			
	OR																			
	<p>(d) The Following bearings were observed while traversing with a compass:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Line</th> <th>F.B</th> <th>B.B</th> </tr> </thead> <tbody> <tr> <td>AB</td> <td>45° 45'</td> <td>226° 10'</td> </tr> <tr> <td>BC</td> <td>96° 55'</td> <td>277° 5'</td> </tr> <tr> <td>CD</td> <td>29° 45'</td> <td>209° 10'</td> </tr> <tr> <td>DE</td> <td>324° 48'</td> <td>144° 48'</td> </tr> </tbody> </table> <p>Mention which stations were affected by Local attraction and determine the corrected bearings.</p>	Line	F.B	B.B	AB	45° 45'	226° 10'	BC	96° 55'	277° 5'	CD	29° 45'	209° 10'	DE	324° 48'	144° 48'	(04)	CO4	L5	2.2.3
Line	F.B	B.B																		
AB	45° 45'	226° 10'																		
BC	96° 55'	277° 5'																		
CD	29° 45'	209° 10'																		
DE	324° 48'	144° 48'																		
Q.5	<p>(a) What is Levelling? Define Reduced level and Bench mark.</p>	(02)	CO5	L1	1.3.1															
	<p>(b) Describe various methods of contouring.</p>	(02)	CO5	L1	1.3.1															
	<p>(c) The following staff readings were observed successively with a level, the instrument having been moved after third, sixth and eighth readings : 2.228 ; 1.606 ; 0.988 ; 2.090 ; 2.864 ; 1.262 ; 0.602 ; 1.982 ; 1.044 ; 2.684 metres. Enter the above readings in a page of a level book and calculate the R.L. of point if the first reading was taken with a staff held on a bench mark of 432.384 m.</p>	(04)	CO5	L5	2.1.2															
	OR																			
	<p>(d) During a construction work, the bottom of a R.C Chhajja A was taken as a temporary B.M (R.L. 63.120). The following notes were recorded:</p> <p>Reading on inverted staff on B.M, No, A :2.232</p>	(04)	CO5	L5	2.1.2															

	Reading on peg P on ground change of instrument : 1.034 Reading on peg P on ground : 1.328 Reading on inverted staff on bottom of cornice B : 4.124 Enter the readings in a level book page and calculate the R.L, of Cornice B.				
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