R-17

Code: 7G512

I B.Tech. I Semester Supplementary Examinations February 2022

Engineering Mehanics-Statics

(Common to CE & ME)
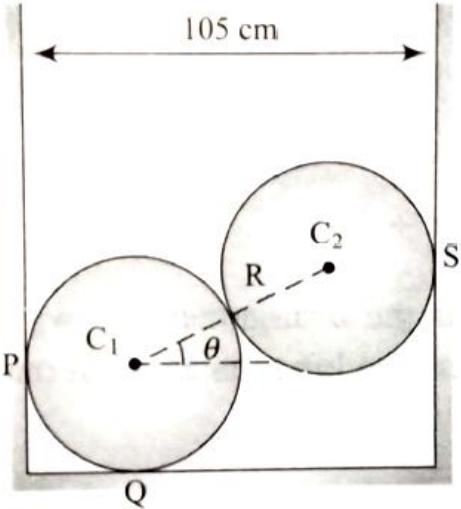
Max. Marks: 70

Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

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Marks

UNIT–I

1. Two identical spheres are kept in a horizontal channel of width 105cm as shown in fig. Determine the reactions at all contact surfaces. Consider the radius of the spheres as 27cm and the weight 540N.
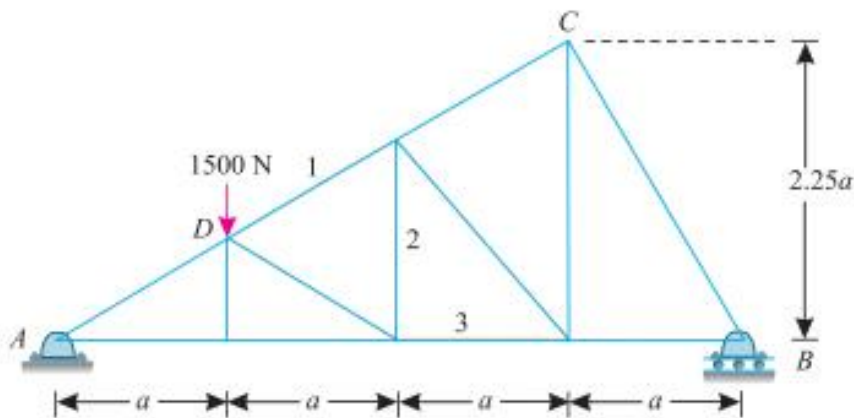
14M

OR

2. Two identical prismatic bars *PQ* and *RS* each weighing 75 N are welded together to form a Tee and are suspended in a vertical plane as shown in Fig. Calculate the value of , that the bar *PQ* will make with vertical when a load of 100 N is applied at S.
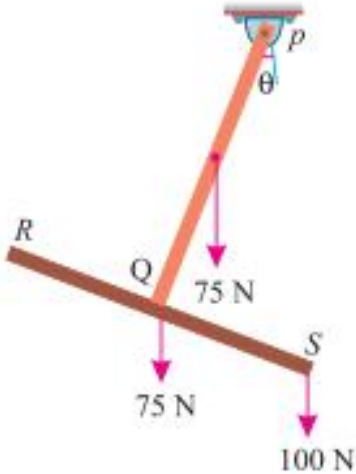
14M

UNIT–II

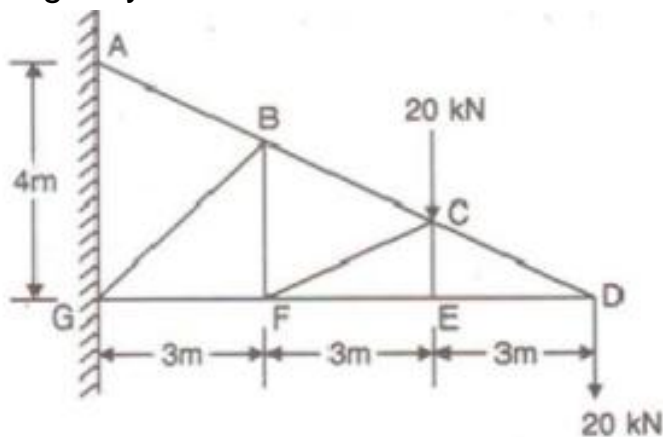3. A plane is loaded and supported as shown in Fig

Determine the nature and magnitude of the forces in the members 1,2 and 3. by method of sections. 14M

OR

4. Determine the forces in the members BC, BF and FG of the frame shown in fig.3 by method of sections.. Indicate the nature of force also

14M

UNIT–III

5. A block of weight W1= 200 N rests on a horizontal surface and supports on top of it another block of weight W2= 50 N. The block W2 is attached to a vertical wall by the inclined string AB. Find the magnitude of the horizontal force P, applied to the lower block as shown that will be necessary to cause slipping to impend. The coefficient of static friction for all contact surfaces is μ=0.3 as shown in figure.

14M
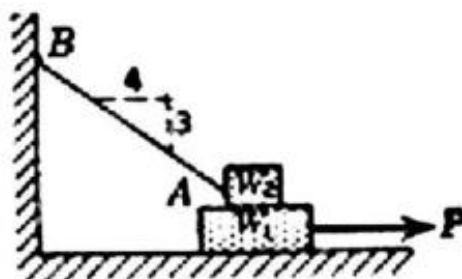
OR

6. A ladder of length 4 m, weighing 200 N is placed against a vertical wall as shown in Fig. The coefficient of friction between the wall and the ladder is 0.2 and that between floor and the ladder is 0.3. The ladder, in addition to its own weight, has to support a man weighing 600 N at a distance of 3 m from A. Calculate the minimum horizontal force to be applied at A to prevent slipping.
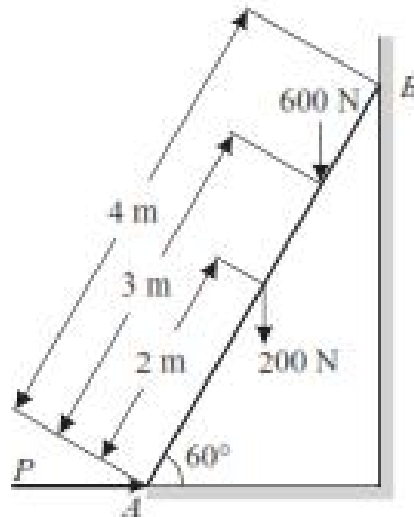
14M

UNIT–IV

7. A semicircle of 90 mm radius is cut out from a trapezium as shown in Fig.
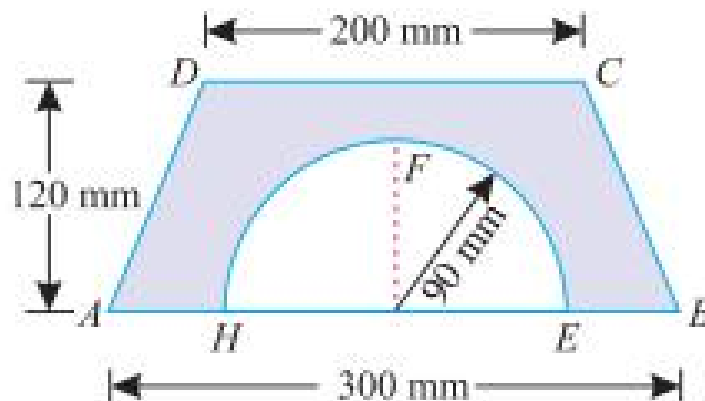
Find the position of the centre of gravity of the figure. 14M

OR

8. In a steel cylinder with a 20 cm base diameter and 30 cm height, a vertical hole of 4 cm is drilled up to half the depth and the portion is filled with lead, whose density is 11370 kg/m^3. Determine the centre of gravity of the composite body. Take the density of steel as 7850 kg/m^3. 14M

UNIT–V

9. Find the moment of inertia for the in the figure. 4 Find the moment of inertia for the hatched area parallel to centroidal x – axis.

20cm

10

←20cm —*—20cm→
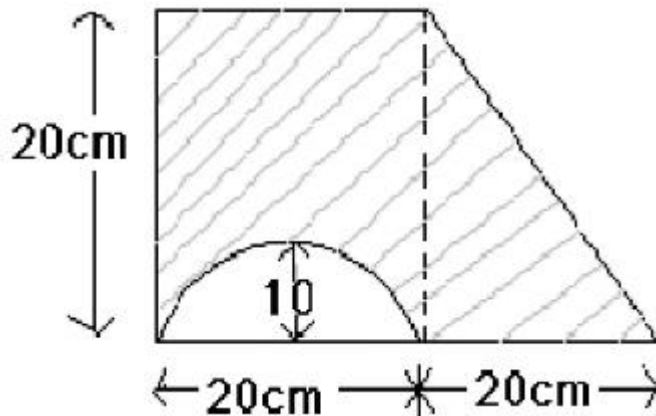
14M

OR

10. Find the moments of inertia of the cut section shown in Fig. about the centroidal axes, two semi circular portions are cut from a rectangular plate.
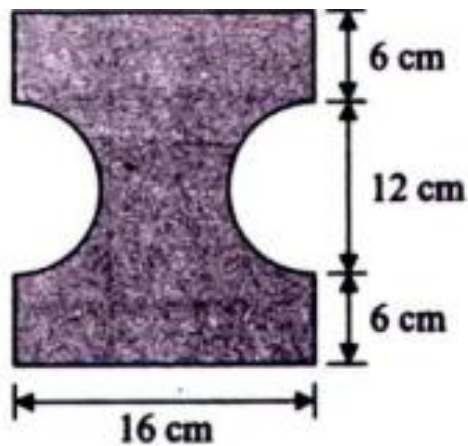
6 cm

12 cm

6 cm

16 cm

14M

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I B.Tech. I Semester Supplementary Examinations February 2022
Engineering Chemistry
(Common to CE, ME & CSE)

Max. Marks: 70   Time: 3 Hours
Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)
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Marks

UNIT–I

1. a) Explain the process of a phosphate, carbonate and sodium aluminate conditioning of boiler feed water   7M
   b) Give detailed procedure for the determination of dissolved oxygen in water.   7M

OR

2. a) With the help of neat diagram, describe the reverse osmosis method for the desalination of brackish water.   7M
   b) What is hardness of water? How do you classify and express hardness?   7M

UNIT–II

3. a) Write a note on the mechanism of hydrogen evolution type of wet corrosion.   7M
   b) Explain rusting of iron with the help of electrochemical theory of corrosion   7M

OR

4. a) On what factors does the conductance of a solution depend? How would you proceed to determine the conductivity of a solution?   7M
   b) Explain passivity of metals. How it affects rate of corrosion   7M

UNIT–III

5. a) What is vulcanization of rubber? Explain why natural rubber needs vulcanization. How is it carried out?   7M
   b) Write a note on the classification of polymers with examples   7M

OR

6. a) Write the characteristics of co-polymerization   7M
   b) Write a note on polydispersive index   7M

UNIT–IV

7. a) Write short note on octane number and cetane number.   7M
   b) Compare the liquid fuels with gaseous fuels.   7M

OR

8. a) With a neat diagram describe the Orsat's gas analysis method. What are the special precautions to be taken in the measurement?   7M
   b) Describe the determination of calorific value of a solid fuel using bomb calorimeter. 7M

UNIT–V

9. a) Describe the analysis of cement   7M
   b) Write a note on the classification of refractories with examples.   7M

OR

10. a) Define refractory? Discuss the criteria of good refractory materials   7M
    b) Explain the hardening and setting of cement using the chemical equations   7M

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R-17

Code: 7GC14

I B.Tech. I Semester Supplementary Examinations February 2022
Engineering Mathematics-I
(Common to All Branches)

Max. Marks: 70   Time: 3 Hours
Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)
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Marks

UNIT–I

1. a) Define the rank of the matrix. Find the rank of the matrix

$$A = \begin{bmatrix} -2 & -1 & -3 & -1 \\ 1 & 2 & 3 & -1 \\ 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & -1 \end{bmatrix}$$

7M

   b) Find the values of ' k ' for which the system of equations
       (3k-8)x +3y +3z = 0, 3x+ (3k-8)y + 3z = 0, 3x +3y +(3k-8)z = 0 has a
       non-trivial solution.   7M

OR

2. a) Find the eigen values and eigen vectors of

$$\begin{bmatrix} 5 & 4 \\ 1 & 2 \end{bmatrix}$$

7M

   b) Test for consistency and solve 5x+3y+7z=4, 3x+26y+2z=9,
       7x+2y+10z=5   7M

UNIT–II

3. a) Show that the matrix $\begin{bmatrix} i & 0 & 0 \\ 0 & 0 & i \\ 0 & i & 0 \end{bmatrix}$ is Skew-Hermitian and hence find

       eigen values   7M

   b) Reduce the quadratic form $10x^2 + 2y^2 + 5z^2 - 4yz - 10zx + 5xy$
       to the canonical form by linear transformation.   7M

OR

4. a) Diagonalize the matrix A= $\begin{bmatrix} 8 & -8 & -2 \\ 4 & -3 & -2 \\ 3 & -4 & 1 \end{bmatrix}$

7M

   b) Find the Eigen values and Eigen vectors $A = \begin{bmatrix} 4 & 1-3i \\ 1+3i & 7 \end{bmatrix}$

7M

UNIT–III

5. a) Solve $x\dfrac{dy}{dx} + y = x^3 y^6$

7M

   b) Prove that the system of parabolas $y^2 = 4a(x+a)$ is self orthogonal.

7M

OR

6. a) A body is kept in air with temperature 25^0c cools from 140^0c to 80^0c in 20 minutes. Find the when the body cools down to 35^0c

7M

   b) Find the orthogonal Trajectories of the family of curves $r^n = a^n \cos n_{\prime\prime}$

7M

UNIT–IV

7. a) Solve $\dfrac{d^3y}{dx^3} - y = e^x + \sin 3x + 2$

7M

   b) Solve $(D^2 + 1)y = \sin x \sin 2x + e^x x^2$

7M

OR

8. a) Solve $(D+2)(D-1)^2 y = e^{-2x} + 2\sinh x$

7M

   b) Solve $\dfrac{d^2y}{dx^2} - 3\dfrac{dy}{dx} + 2y = xe^{3x} + \sin 2x$

7M

UNIT–V

9. a) If $x+y+z = u, y+z = uv, z = uvw, then\ evaluate \dfrac{\partial(x,y,z)}{\partial(u,v,w)}$

7M

   b) Verify lagrange's mean value theorem for

   $f(x) = (x-1)(x-2)(x-3)$ in $[0, 4]$

7M

OR

10. a) Let $r^2 = x^2 + y^2 + z^2$ and $V = r^m$ then prove that

   $V_{xx} + V_{yy} + V_{zz} = m(m+1)r^{m-2}$

7M

   b) Find the maxima and minima of $z = x^3 + 3xy^2 - 3x^2 - 3y^2 + 4$

7M

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Code: 7G111

I B.Tech. I Semester Supplementary Examinations February 2022

Problem Solving Techniques and C Programming

(Common to All Branches)

Max. Marks: 70   Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

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Marks

		UNIT–I	
1.	a)	What is a flow chart? How it is different from an Algorithm	7M
	b)	Illustrate different phases of Software Development Life Cycle (SDLC) with a neat diagram.	7M
		OR	
2.	a)	What is Programming Language? What is the generation of programming Language? Describe it briefly.	7M
	b)	Give short notes on computer environments.	7M
		UNIT–II	
3.	a)	What is a variable? What are the rules for declaring variables? Give examples of valid and invalid variables	7M
	b)	Describe Structure of C program with an example.	7M
		OR	
4.	a)	Explain about the basic data types in C language with examples	7M
	b)	Explain with examples, any two types of operators in c programming language.	7M
		UNIT–III	
5.	a)	Explain for loop and nested for loop in c programming language.	7M
	b)	Write a program to print sum of odd numbers between 1 and 100 using for loops.	7M
		OR	
6.	a)	Explain with examples, if…else and nested if….else statements.	7M
	b)	Write a program to find the largest among three numbers.	7M
		UNIT–IV	
7.	a)	How single dimensional arrays and multidimensional arrays are declared and initialized? Explain with suitable examples.	7M
	b)	How to declare and initialization of strings? Explain them with examples.	7M
		OR	
8.	a)	Explain any five string handling functions with suitable examples,	7M
	b)	Write a C program for addition of two matrices.	7M
		UNIT–V	
9.	a)	Discuss in details about local variables and global variables with respect to their scope and extent.	7M
	b)	Explain about the actual arguments and formal argument in functions. What is the difference between these arguments?	7M
		OR	
10.	a)	What are the different ways of passing parameters to the function? Explain.	7M
	b)	Write a c program to find the factorial of a number using recursive function.	7M

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Code: 7G511

I B.Tech. I Semester Supplementary Examinations February 2022
Engineering Graphics-I
(Common to CE & ME)

Max. Marks: 70   Time: 3 Hours
Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)
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		Marks	CO	Blooms Level

UNIT–I

1.	a)	Divide a straight line AB of length 50 mm, into 9 equal parts.	07M	CO1	L6
	b)	Construct a regular Pentagon and Hexagon given the length of its side is 50mm.	07M	CO1	L6

OR

2.	The major and minor axes of an ellipse are 120mm and 80mm. Draw an ellipse by Arcs of circles method.	14M	CO1	L3

UNIT–II

3.	Draw epicycloid of a circle of 40mm diameter, which rolls outside on another circle of 120mm diameter for one revolution clockwise. Draw a tangent and a normal to it at a point 95mm from the center of the directing circle.	14M	CO2	L3

OR

4.	Draw the curve traced out by an end of a thin wire unwound from a regular hexagon of side 15mmm the wire being kept tight. Draw a tangent & a normal to the curve at a point 80mm from the center of the hexagon.	14M	CO2	L3

UNIT–III

5.	A line AB has its end A 20mm above H.P. & 20mm in front of V.P. It is inclined at 40° to V.P and parallel to H.P. Draw its projections by taking the distance between the end projectors to be 50mm. Also find the true length of the line.	14M	CO3	L3

OR

6.	One end A of a line AB, 75mm long is 20mm above the H.P. and 25mm in front of the V.P. The line is inclined at 30° to the H.P. and the top view makes 45° with the V.P. Draw the projections of the line and find the true inclinations with the vertical plane.	14M	CO3	L3

UNIT–IV

7.	Draw the projections of a circle of 50mm diameter, having its plane vertical and inclined at 30° to the VP. Its center is 30mm above the HP and 20mm in front of the VP.	14M	CO4	L3

OR

8.	A semi-circular lamina of 64mm diameter has its straight edge in VP and inclined at an angle of 45° to HP. The surface of the lamina makes an angle of 30° with VP. Draw the projections.	14M	CO4	L3

UNIT–V

9.	A line AB 60mm length has its end A at 20mm above the HP and 25mm in front of VP. The line is inclined at 30° to HP and 45° to VP. Draw its projections by auxiliary plane method.	14M	CO5	L3

OR

10.	A pentagonal plate of 40mm side has an edge on the HP. The surface of the plane is inclined at 45° to HP and perpendicular to VP. Draw its projections by auxiliary plane method.	14M	CO5	L3

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