R-19

Code: 19A322T

I B.Tech. II Semester Supplementary Examinations November 2023
Engineering Mechanics
(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	BL

UNIT–I

1. a) State and prove Varignon's theorem. — 7M 1 1

   b) Differentiate between:
   (i) Concurrent and non-concurrent forces and
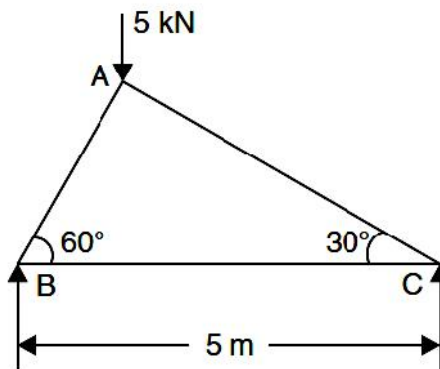   (ii) Coplanar and non-coplanar forces — 7M 1 4

OR

2. A sphere of weight 100 N is tied to a smooth wall by a string as shown in Fig. Find the tension T in the string and reaction R of the wall.
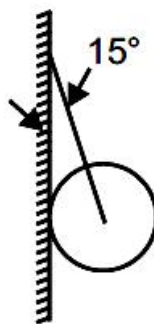
— 14M 1 3

UNIT–II

3. a) Find the forces in the members *AB, AC* and *BC* of the truss shown in Fig

   . — 14M 2 3

OR

4. a) State the laws of friction. — 7M 2 1

   b) A body of weight 100 Newtons is placed on a rough horizontal plane. Determine the co-efficient of friction if a horizontal force of 60 Newtons just causes the body to slide over the horizontal plane. — 7M 2 3
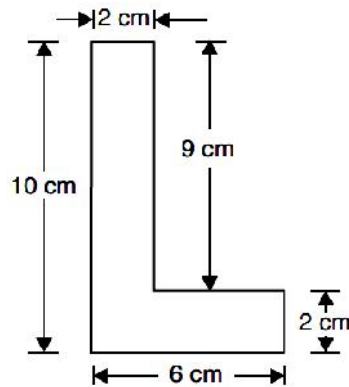
UNIT–III

5. State and prove the theorem of parallel axis. — 14M 3 1

OR

Important Note: 1. On completing your answers. Compulsorily draw diagonal cross line on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg. 32+8=40, will be treated as malpractice.

6. Find the centre of gravity of the *L*-section shown in Fig.

| | 14M | 3 | 3 |

UNIT–IV

7. A particle moves along a straight line so that its displacement is metre from a fixed point is given by, $S = 2t^3 + 4t^2 - 6t + 8$ Find :
(*i*) velocity at start, (*ii*) velocity after 5 seconds, (*iii*) acceleration at start and (*iv*) acceleration after 5 seconds.

| | 14M | 4 | 3 |

OR

8. A car moving at a constant speed of 60kmph enters a curved path of radius of curvature measuring 100 m. Determine its total acceleration.

| | 14M | 4 | 3 |

UNIT–V

9. A tangential force of 1800 N is acting on a shaft of diameter 10 mm. Find the work done by the force for one revolution of the shaft.

| | 14M | 5 | 3 |

OR

10. A uniform homogeneous cylinder rolls without slip along a horizontal level surface with a translational velocity of 20 cm/s. If its weight is 0.1 N and its radius is 10 cm, what is its total kinetic energy?

| | 14M | 5 | 4 |

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Code: 19AC23T

I B.Tech. II Semester Supplementary Examinations November 2023

Engineering Physics

(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	BL
		UNIT–I			
1.	a)	State Kepler's laws of gravitation	7M	CO1	L2
	b)	Describe Focault's pendulum in detail	7M	CO1	L2
		OR			
2.	a)	Define centre of mass and explain it for a system	7M	CO1	L1
	b)	Define vector and write basic laws of vectors	7M	CO1	L1
		UNIT–II			
3.	a)	Mention the factors influence reverberation time	9M	CO2	L2
	b)	What is ultrasonic and write properties	5M	CO2	L1
		OR			
4.	a)	State and explain Sabine's formula	8M	CO2	L2
	b)	Brief the inverse Piezo-electric effect	6M	CO2	L2
		UNIT–III			
5.	a)	Describe the various types of dielectric polarization	8M	CO3	L2
	b)	How the Ferro magnetics are separated as soft and hard magnets	6M	CO3	L1
		OR			
6.	a)	Mention applications of dielectrics	4M	CO3	L2
	b)	Derive magnetic moment of material through origin of magnetic moment	10M	CO3	L3
		UNIT–IV			
7.	a)	Write the application of optical fiber in communication system	8M	CO4	L1
	b)	Discuss the construction and working of He-Ne laser	6M	CO4	L2
		OR			
8.	a)	Brief the working principle of optical fiber in propagation of signal	7M	CO4	L2
	b)	Distinguish spontaneous and stimulated emissions	7M	CO4	L2
		UNIT–V			
9.		Write a detailed note on various types of sensors	14M	CO5	L2
		OR			
10.	a)	Describe Piezo electric sensor in brief	8M	CO5	L2
	b)	Mention how pyroelectric sensors are useful	6M	CO5	L2

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Code: 19AC21T

I B.Tech. II Semester Supplementary Examinations November 2023

Differential Equations and Vector Calculus

(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	CO	BL

UNIT–I

1. a) Solve $(D^2 + 4)y = \cos x$ 7M   CO1   L3

   b) Solve $(D^2 + 6D + 9)y = e^{-3x}$ 7M   CO1   L3

OR

2. Solve $\dfrac{d^2 y}{dx^2} - 3\dfrac{dy}{dx} + 2y = xe^{3x} + \sin 2x$ 14M   CO1   L3

UNIT–II

3. Solve $x^2 \dfrac{d^2 y}{dx^2} - 4x\dfrac{dy}{dx} + 6y = x^2$ 14M   CO2   L3

OR

4. Solve $(1+x)^2 \dfrac{d^2 y}{dx^2} + (1+x)\dfrac{dy}{dx} + y = 2\sin[\log(1+x)]$ 14M   CO2   L3

UNIT–III

5. a) Form the partial differential equations by eliminating arbitrary functions from $f(x^2 + y^2, z - xy) = 0$ 7M   CO3   L3

   b) Form the partial differential equation by eliminating arbitrary constants a and b from $z = a\log\left\{\dfrac{b(y-1)}{1-x}\right\}$ 7M   CO3   L3

OR

6. a) Form the partial differential equation by eliminating arbitrary function from $z = f(x^2 + y^2)$ 7M   CO3   L3

   b) Solve $pyz + qzx = xy$ 7M   CO3   L3

UNIT–IV

7. a) Find $div\ \bar{f}$ where $\bar{f} = grad(x^3 + y^3 + z^3 - 3xyz)$ 7M   CO4   L2

   b) Find $grad\ f$ where $f = x^3 + y^3 + 3xyz$ 7M   CO4   L2

OR

8. Prove that $r^n \bar{r}$ is solenoidal if $n = -3$.   14M   CO4   L2

UNIT–V

9. Verify stokes theorem for the function $\bar{F} = x^2 \bar{i} + xy\ \bar{j}$ integrated around the square in the plane z=0 whose sides are along the lines x=0,y=0,x=a,y=a.   14M   CO5   L3

OR

10. Using Green's theorem evaluate $\oint_C (2xy - x^2)dx + (x^2 + y^2)dy$, where C is the closed curve of the region bounded by $y = x^2$ and $y^2 = x.$ 14M   CO5   L3

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I B.Tech. II Semester Supplementary Examinations November 2023

Engineering Graphics – II

(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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UNIT–I

1. A cone, base 75 mm diameter and axis 80 mm long is resting on its base on the HP. It is cut by a section plane perpendicular to the V.P inclined at 45^0 to the H.P and cutting the axis at a point 35 mm from the apex. Draw its front view, sectional top view, sectional side view and the true shape of the section.

OR

2. A pentagonal pyramid, base 30 mm side and axis 50 mm long has one of triangular faces in V.P. and the edge of the base contained by that face makes an angle of 30 degrees with the H.P. Draw its projections.

UNIT–II

3. A cube of side 40 mm is resting on ground on one of its faces. All the vertical faces of the cube are equally inclined to VP. It is cut by a section plane perpendicular to VP and inclined to HP, so that the true shape of the section is a regular hexagon. Draw the projections, sectional top view and true shape of the section.

OR

4. A pentagonal pyramid with a 55 mm base and a 90 mm slant height, has its base on the HP with a side of base perpendicular to the VP. It is cut by a section plane whose VT is inclined at 60° to XY and intersecting the axis at 40 mm from its base. Draw the Front View, Sectional Top View, Sectional Side View, and the true shape of the section.

UNIT–III

5. A triangular prism, having base with a 60 mm side and a 100 mm long axis, is resting on its base on the H.P. with a nearer face parallel to the V.P. It is penetrated by a cylinder with a 50 mm diameter and a 90 mm long axis. The axis of the cylinder is parallel to both the reference planes, and 15 mm away from the axis of the prism towards the observer. Draw the projections of the combination and show the curves of intersection.

OR

6. A pentagonal prism having a base with 30 mm side and 65 mm long axis, is resting on its base in the H.P. with a rectangular face parallel to the V.P. It is cut by a section plane perpendicular to the V.P., inclined at 30^0 with the H.P., and passing through a point on the axis, 25 mm from one of the bases. Draw the development of its lateral surface.

UNIT–IV

7. Draw the isometric view of a frustum of the cone with base diameter 60mm and top diameter 40mm with the axis height of 70mm.
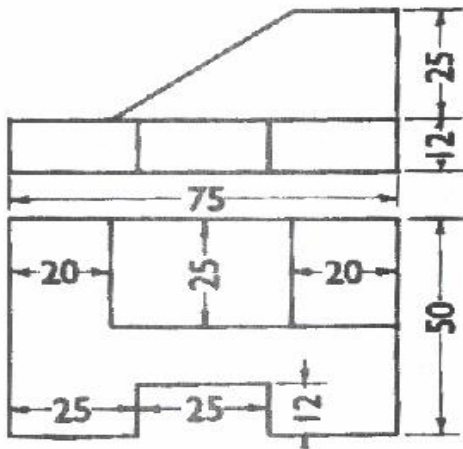
OR

8. A hexagonal prism with a 30 mm base and 45 mm axis has an axial hole with a 30 mm diameter. Draw its isometric projection.
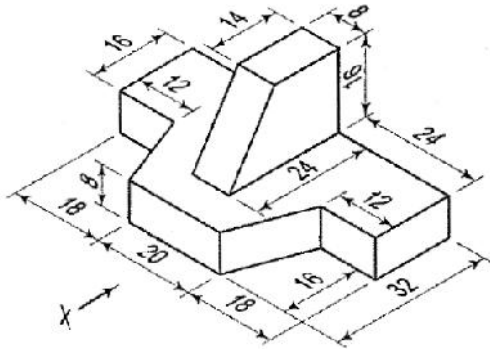
UNIT–V

9.   Draw isometric view for the following orthographic projection.

OR

10.   Draw the front view, top view and side view of the solid object given below:

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