Hall Ticket Number :										

R-23

Code: 23AHS21T

B.Tech. II Semester Regular Examinations July 2024

Differential Equations and Vector Calculus

(Common to All Branches)

Max. Marks: 70 Time: 3 Hours

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Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**

2. In Part-A, each question carries **Two marks.**

3. Answer **ALL** the questions in **Part-A** and **Part-B**

PART-A

(Compulsory question)

		CO	BL
1.	Answer ***all*** the following short answer questions **(** 10 X 2 = 20M)		
a)	Solve $(2x+y+1)dx+(x+2y+1)dy=0$.	CO1	L3
b)	State Newton's Law of Cooling.	CO1	L1
c)	Solve $(D^2+4D+4)y=0$.	CO2	L3
d)	Find PI of $(D^2+5D+6)y=e^{3x}$.	CO2	L3
e)	Form the partial differential equation by eliminating arbitrary constants a,b from $z=ax+by+a^2+b^2$.	CO3	L3
f)	Solve $p\sqrt{x}+q\sqrt{y}=\sqrt{z}$.	CO3	L3
g)	Find *grad f,* where $f=x^2yz+xy^2z+xyz^2$.	CO4	L1
h)	Show that $\vec{f}$ is solenoidal, where $\vec{f}=3y^2z\,\hat{i}+3x^2z\,\hat{j}+3x^2y\,\hat{k}$	CO4	L1
i)	Evaluate the line integral $\int_C (x^2+xy)dx+(x^2+y^2)dy$, where C is the square formed by the lines $x=\pm1$ and $y=\pm1$.	CO5	L3
j)	State Green's theorem	CO5	L1

PART-B

Answer *five* questions by choosing one question from each unit (5 x 10 = 50 Marks)

		Marks	CO	BL
	UNIT-I			
2. a)	Solve $\frac{dy}{dx}+y\tan x=y^3\sec x$.	5M	CO1	L3
b)	Solve $(4xy+3y^2-x^2)dx+x(x+2y)dy=0$.	5M	CO1	L3
	OR			
3. a)	Solve $(4xy+3y^2)\frac{dy}{dx}=1$	5M	CO1	L3
b)	If the temperature of the air is 30^oC and the substance cools from 100^oC to 70^oC in 15 minutes. Find when the temperature will be 40^oC.	5M	CO1	L3

UNIT-II

4. Solve $(D-2)^2y = e^{2x}(\sin 2x + x)$ 10M CO2 L3

OR

5. Solve the simultaneous equations $\frac{dx}{dt} + 2y + \sin t = 0$, $\frac{dy}{dt} - 2x - \cos t = 0$, given that $x = 0$ and $y = 1$ when $t = 0$. 10M CO2 L3

UNIT-III

6. a) Form the partial differential equation by eliminating arbitrary constants *a*, *b* and *c* from $(x-a)^2 + (y-b)^2 + z^2 = c^2$ 5M CO3 L3

   b) Form the partial differential equation by eliminating arbitrary functions *f* and *g* from $z = f(y+2x) + g(y-3x)$. 5M CO3 L3

OR

7. Solve $(x^2 - yz)p + (y^2 - zx) = z^2 - xy$. 10M CO3 L3

UNIT-IV

8. a) If $\vec{F} = \nabla(x^3 + y^3 + z^3 - 3xyz)$ find curl$(\vec{F})$. 5M CO4 L3

   b) Find the directional derivative of div$(\vec{F})$. $\phi = x^2yz + 4xz^2$ at (1,-2,-1) in the direction of the vector $2i-j-2k$. 5M CO4 L3

OR

9. a) Find the angle between the surfaces $x^2 + y^2 - z^2 = 6$ and $z = x^2 + y^2 - 13$ at (2,1,2). 5M CO4 L3

   b) Find the values of *a,b,c* if $\vec{F}=(x+y+az)\hat{i} + (bx+2y-z)\hat{j} + (x+cy+2z)\hat{k}$ is irrotational 5M CO4 L3

UNIT-V

10. Find the work down by a force $\vec{F} = 3x\hat{i} + (2xz - y)\hat{j} + z\hat{k}$ along the straight line from $(0, 0, 0)$ to $(2, 1, 3)$. 10M CO5 L3

OR

11. Verify Green's theorem for $\int_C (xy + y^2)dx + x^2dy$, where C is bounded by $y = x$ and $y = x^2$. 10M CO5 L3

*** End ***

Hall Ticket Number :										

R-23

Code: 23A0323T

B.Tech. II Semester Regular Examinations July 2024

Engineering Mechanics

(Common to CE & ME)

Max. Marks: 70 Time: 3 Hours

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Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. In Part-A, each question carries **Two marks.**
3. Answer **ALL** the questions in **Part-A** and **Part-B**

PART-A

(Compulsory question)

1. Answer ***all*** the following short answer questions (10 X 2 = 20M)	CO	BL
a) What are the characteristics of a force?	1	L1
b) What do you mean by free body diagram and redundant support?	1	L1
c) Define angle of friction and cone of friction.	2	L1
d) What are the assumptions in the analysis of plane trusses?	2	L2
e) Differentiate centroid and center of gravity.	3	L2
f) State perpendicular axis theorem applicable to area moment of inertia.	3	L1
g) What is the difference between rectilinear and curvilinear translations?	4	L2
h) Define range and maximum height of a projectile.	4	L1
i) Define impulse and momentum.	5	L1
j) What is virtual work? State virtual work principle.	5	L1

PART-B

Answer *five* questions by choosing one question from each unit (5 x 10 = 50 Marks)

Marks CO BL

UNIT-I

2. Two identical rollers, each of weight Q = 100 N, are supported by an inclined plane and a vertical wall as shown in Figure 1. Assuming smooth surfaces, find the reactions induced at the points of support A, B and C.

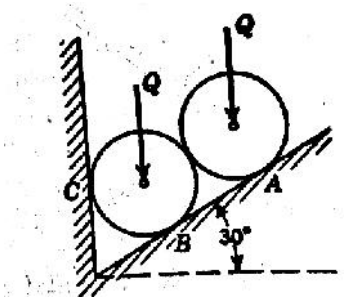


Figure 1 10M 1 L3

OR

3. Two forces of magnitude 250 N and 190 N are acting at a point O as shown in figure. If the angle between the forces is 60^0, determine the magnitude of the resultant force. Also determine the angle β and γ as shown in figure.1.

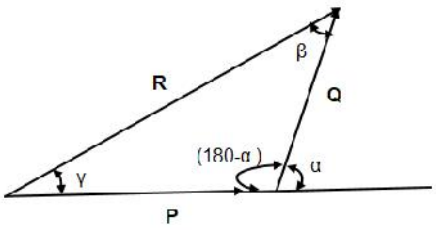


Fig.1 10 1 L3

UNIT-II

4. Find the forces in all the 8 members of the truss shown in Figure 3.

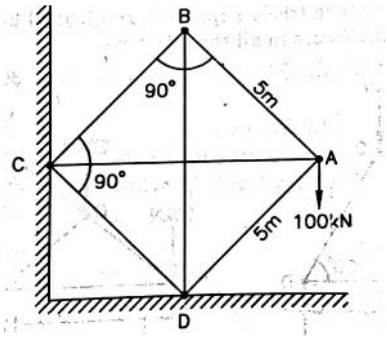


Figure 3 10M 2 L3

OR

5. Two blocks of weights W_1 and W_2 rest on a rough inclined plane and are connected by a short piece of string as shown in Figure 4. If the coefficients of friction are $\mu_1 = 0.2$ and $\mu_2=0.3$, respectively, find the angle of inclination of the plane for which sliding will impend. Assume $W_1 = W_2 = 20$ N.

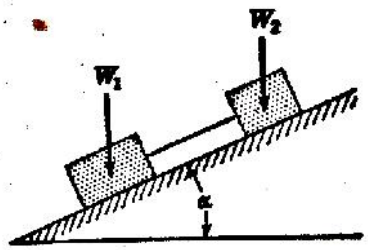
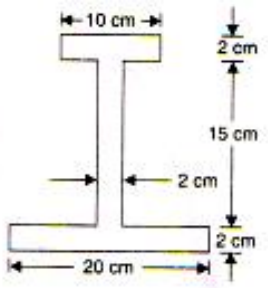


Figure 4 10M 2 L3

UNIT-III

6. Find the center of gravity of I-Section show in.



10M 3 L3

OR

7.		Derive an expression for the moment of inertia of a right circular cone of uniform density, radius of base *a*, and altitude *h*, with respect to its geometric axis.	10M	3	L2

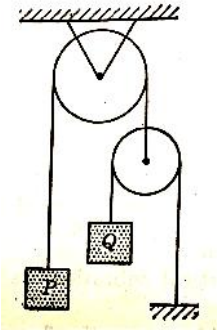
UNIT-IV

8.	a)	Explain about kinematics of rectilinear translation.	4M	4	L2
	b)	A ship while being launched slips down the skids with uniform acceleration. If 10 sec is required to traverse the first 4.9 m, what time will be required to slide the total distance of 122 m? With what velocity will the ship strike the water?	6M	4	L3

OR

9.	a)	Explain about kinematics of plane motion.	4M	4	L2
	b)	The armature of an electric motor has angular speed N=1800rpm at the instant when the power is cut off. If it comes to rest in 6 seconds, (i) Calculate the angular deceleration α assuming that it is constant. **(ii)** How many complete revolutions does the armature make during this period?	6M	4	L3

UNIT-V

10.		Neglecting friction and inertia of the two pulleys shown in Figure 6 find the acceleration a of the weight Q, assuming that P = Q.  **Figure 6**	10M	5	L3

OR

11.		A body of weight 8 N is suspended by a light rope wound round a pulley of weight 60 N and radius 30 cm. The other end of rope is fixed to the periphery of the pulley. If the weight is moving downwards, calculate for the acceleration of 8 N weight and tension in the string.	10M	5	L3

*** End ***

Hall Ticket Number :										

R-23

Code: 23A0322T-C

B.Tech. II Semester Regular Examinations July 2024

Engineering Graphics

(Common to CE, ME and AI&ML)

Max. Marks: 70 Time: 3 Hours

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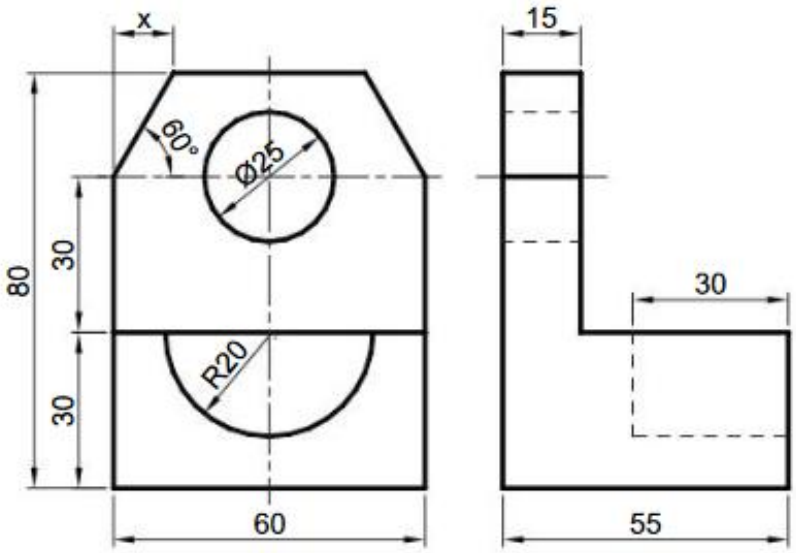
Answer *five* questions by choosing one question from each unit (5 x 14 = 70 Marks)

		Marks	CO	BL
	UNIT-I			
1.	Draw an involute of a hexagon of side 25 mm. Draw the tangent and normal at any point on the involute.	14M	1	3
	OR			
2.	A line of 1 centimeter represents an actual length of 4 dm. Draw a plain scale and mark a distance of 6.7 m on it.	14M	1	3
	UNIT-II			
3.	Draw the projections of the following points on a common reference line keeping the distance between their projectors 30mm apart. (a) Point P is 35 mm below the H.P. and in the V.P. (b) Point Q is 40 mm in front of the V.P. and 25 mm below the H.P. (c) Point R is 45 mm above the H.P. and 20 mm behind the V.P. (d) Point S is 30 mm below the H.P. and 45 mm behind the V.P. (e) Point T is both in H.P. and V.P. (f) Point U is 40 mm above the H.P. and on V.P. (g) Point V is 20 mm behind the V.P. and on H.P.	14M	2	3
	OR			
4.	A 70 mm long line PQ, has its end P 20 mm above the H.P. and 30 mm in front of the V.P. The line is inclined at 45° to the H.P. and 30° to the V.P. Draw its projections.	14M	2	3
	UNIT-III			
5.	A hexagonal plane of side 30 mm has an edge on the H.P. Its surface is inclined at 45° to the H.P. and the edge on which the plane rests is inclined at 30° to the V.P. Draw its projections.	14M	3	3
	OR			
6.	A cylinder of base diameter 50 mm and axis 70 mm has a generator in the V.P. and inclined at 45° to the H.P. Draw its projections.	14M	3	3
	UNIT-IV			
7.	A pentagonal pyramid of base side 30 mm and axis 60 mm is resting on its base in the H.P. with an edge of the base parallel to the V.P. A horizontal section plane cuts the pyramid bisecting the axis. Draw its front view and sectional top view.	14M	4	3
	OR			

8. A cone of base diameter 50 mm and axis 60 mm is resting on its base on the H.P. A section plane perpendicular to V.P. and inclined at 45° to H.P., bisects the axis of the cone. Draw the development of its lateral surface. 14M 4 3

UNIT-V

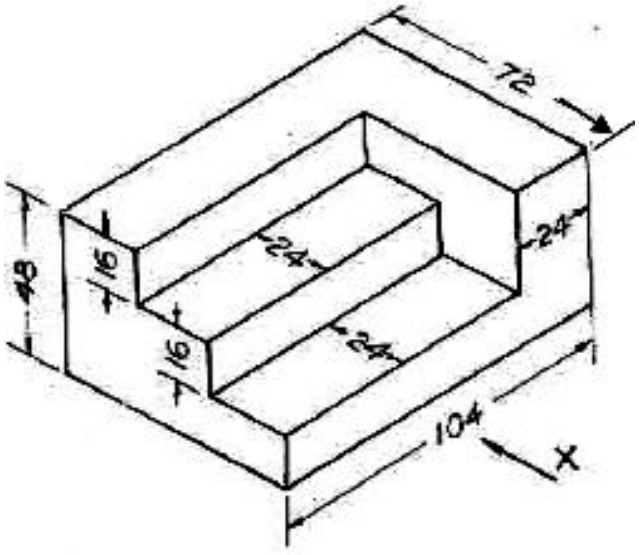
9. The front and side views of an object are shown in Fig. Draw its isometric view.



14M 5 3

OR

10. Draw the front view, top view and side view to the following isometric view



14M CO5 L3

*** End ***

Hall Ticket Number :										

R-23

Code: 23AHS25T

B.Tech. II Semester Regular Examinations July 2024

Engineering Physics

(Common to CE, ME, CSE, CSE(DS) and AI&ML)

Max. Marks: 70 Time: 3 Hours

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Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. In Part-A, each question carries **Two marks.**
3. Answer **ALL** the questions in **Part-A** and **Part-B**

PART-A

(Compulsory question)

			CO	BL
1.	Answer ***all*** the following short answer questions (10 X 2 = 20M)			
	a)	Define interference and diffraction.	CO1	L1
	b)	What is resolving power of grating?	CO1	L2
	c)	Define the terms lattice and basis.	CO2	L1
	d)	What are miller indices?	CO2	L2
	e)	Write the relation between relative permittivity and susceptibility.	CO3	L4
	f)	Define the terms Magnetic permeability and susceptibility.	CO3	L1
	g)	What are matter waves?	CO4	L1
	h)	State Heisenberg uncertainity principle.	CO4	L1
	i)	What is Hall effect?	CO5	L2
	j)	What is n type semiconductor.	CO5	L2

PART-B

Answer *five* questions by choosing one question from each unit (5 x 10 = 50 Marks)

			Marks	CO	BL
		UNIT–I			
2.	a)	Explain interference in thin film due to reflected light and derive the bright and dark fringe conditions.	6M	CO1	L2
	b)	Describe colors in thin film and write examples.	4M	CO1	L2
		OR			
3.	a)	Explain construction and working of Nicol's prism to produce polarized light.	6M	CO1	L4
	b)	Describe polarization of light by reflection.	4M	CO1	L2
		UNIT–II			
4.	a)	Calculate coordination number and packing fractions for SC, BCC and FCC.	6M	CO2	L2
	b)	Derive the equation for interplanar spacing.	4M	CO2	L2

OR

5.	a)	Explain the crystal structure determination by powder method.	6M	CO2	L4
	b)	Derive Bragg's law of X-ray diffraction.	4M	CO2	L2

UNIT–III

6.		Define types of polarizations in dielectrics and derive the expression for electronic polarizability.	10M	CO3	L1

OR

7.	a)	Distinguish among dia, para and ferro magnetic materials.	6M	CO3	L4
	b)	Explain briefly about Hysterisis concept in ferromagnetism.	4M	CO3	L2

UNIT–IV

8.	a)	Derive the equation for eigen values of a particle in one dimensional potential box.	6M	CO4	L4
	b)	Calculate the energies of first and second quantum states of a particle confined to a potential box of length $2A^0$.	4M	CO4	L3

OR

9.	a)	Derive the expression for electrical conductivity according to quantum free electron theory.	6M	CO4	L5
	b)	Write the differences between classical and quantum free electron theory.	4M	CO4	L4

UNIT–V

10.	a)	Derive the concentration of electrons in the conduction band of intrinsic semiconductors.	6M	CO5	L5
	b)	Write the expression for electrical conductivity in intrinsic semiconductors.	4M	CO5	L5

OR

11.	a)	Derive drift and diffusion currents?	6M	CO5	L2
	b)	Deduce Einstein' equation.	4M	CO5	L2

*** End ***

Hall Ticket Number :										

R-23

Code: 23A0221T

B.Tech. II Semester Regular Examinations July 2024

Basic Electrical & Electronics Engineering

(Common to CE, ME, CSE, CSE(DS) and AI&ML)

Max. Marks: 70 Time: 3 Hours

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Note: 1. Question Paper consists of two parts (**Part-1** and **Part-2)**
2. Use separate Answer booklets for **Part-1 and Part-2**
3. Part-1 & Part-2 of question paper consists of Part-A & Part-B
4. In Part-A, each question carries **One mark.**
5. Answer **ALL** the questions in **Part-A** and **Part-B**

PART-1

PART-A

(Compulsory question)

			CO	BL
1.	Answer ***all*** the following short answer questions	(5 X 1 = 5M)		
	a) State the Kirchhoff's current law?		1	1
	b) Define the term RMS value?		1	1
	c) What is the basic principle of three phase induction motor?		2	1
	d) Which type of instruments is used for measuring DC voltages and DC currents?		2	1
	e) What is the working principle of fuse?		3	1

PART-B

Answer *any three* questions by choosing one question from each unit (3x10=30 Marks)

			Marks	CO	BL
		UNIT–I			
2.		State and explain the Superposition theorem with an example?	10M	1	2
		OR			
3.		Explain the following terms with respect to alternating quantities with the help of neat diagram i) Phase and Phase difference ii) Frequency and period iii) Resistance and impedance	10M	1	2
		UNIT–II			
4.		Explain the operating principle of DC generator and single phase transformer with neat diagram?	10M	2	2
		OR			
5.		Describe the construction and working of Moving coil instruments?	10M	2	2
		UNIT–III			
6.		Briefly explain the operation of nuclear power station with a neat sketch?	10M	3	2
		OR			
7.	a)	Explain the safety precautions to avoid electric shock?	5M	3	2
	b)	Discuss the calculation of electricity bill for domestic consumers?	5M	3	2

Code: 23A0221T

B.Tech. II Semester Regular Examinations July 2024

Basic Electrical & Electronics Engineering

(Common to CE, ME, CSE, CSE(DS) and AI&ML)

PART-2

PART-A
(Compulsory question)

			CO	BL
1.	Answer ***all*** the following short answer questions	(5 X 1 = 5M)		
a)	Draw the forward characteristics of p-n junction diode.		CO1	2
b)	Define the Zener effect in Zener diodes.		CO1	1
c)	Describe the difference between intrinsic and extrinsic semiconductors.		CO2	1
d)	Sketch the circuit diagram of Full wave rectifier circuits.		CO2	1
e)	Convert $(1001)_2$ into a decimal number.		CO2	3

PART-B
Answer *any three* questions by choosing one question from each unit (3x10=30 Marks)

			Marks	CO	BL
		UNIT–I			
2.		Sketch the input and output characteristics of common emitter transistor configuration and explain briefly.	10M	CO3	
		OR			
3.		Explain the VI characteristics of PN junction diode.	10M	CO3	
		UNIT–II			
4.		Describe the working principle of a Zener diode. How is it used for voltage regulation? Provide a circuit diagram and explain its operation under different load conditions.	10M	CO4	
		OR			
5.		With a neat circuit diagram and waveforms explain the working of full wave bridge rectifier with C filter	10M	CO4	
		UNIT–III			
6.	a)	Design a full adder with two half adders	5M	CO5	
	b)	Describe the working of JK flip flop with help of its truth table	5M	CO5	
		OR			
7.	a)	Verify the truth tables of various logic gates	5M	CO5	
	b)	Write a short notes on i) Resistors ii) Counters	5M	CO5	

*** End ***