Hall Ticket Number :										

R-20

Code: 20AC21T

I B.Tech. II Semester Regular & Supplementary Examinations July 2023

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)

1. Answer ALL the following short answer questions (5 X 2 = 10M) CO BL

a) Find the particular integral of $(D^2 - 2D + 1)y = e^{2x}$ 1 2

b) Write the second order Legendre's Linear Equation form 2 3

c) Find the partial differential equations of Z=ax+by 3 2

d) Find div F if F= $(x^3 + y^3 + z^3 - 3xyz)$ 4 3

e) State Stoke's Thorem 5 3

PART-B

Answer *five* questions by choosing one question from each unit (5 x 12 = 60 Marks)

		Marks	CO	BL
	UNIT–I			
2.	Solve $(D-2)^2 y = e^{2x} + \sin 2x + x^2$	12M	1	3
	OR			
3.	Using variation of parameter to solve $\frac{d^2y}{dx^2} + a^2 y = \sec ax$	12M	1	3
	UNIT–II			
4.	Solve $(1+x)^2 \frac{d^2y}{dx^2} + (1+x)\frac{dy}{dx} + y = \sin[\log(1+x)]$	12M	2	3
	OR			
5.	An uncharged condenser of capacity C is charged by applying an e. m.f $\frac{E\sin t}{\sqrt{LC}}$ through leads of self-inductance L and negligible resistance, prove that at any time t, the charge on one of the plates is $\frac{EC}{2}\left\{\sin\frac{t}{\sqrt{LC}} - \frac{t}{\sqrt{LC}}\cos\frac{t}{\sqrt{LC}}\right\}$	12M	2	3
	UNIT–III			
6. a)	Form the partial differential equation by eliminating arbitrary functions f and g from $z = f(x+at) + g(x-at)$	6M	3	3
b)	Solve $x^2(y-z)p + y^2(z-x)q = z^2(x-y)$	6M	3	3

OR

7.	Using the method of separation of variables, solve $\frac{\partial u}{\partial x} = 2\frac{\partial u}{\partial t} + u$ where $u(x,0) = 6e^{-3x}$	12M	3	3

UNIT–IV

8. a)	Find the directional derivative of $f(x,y,z) = xy^2 + yz^3$ at the point (2,-1,1) in the direction of vector $\bar{i} + \bar{j} + \bar{k}$.	6M	4	3
b)	Find the angle between the surfaces $x^2 + y^2 + z^2 = 9$ and $z = x^2 + y^2 - 3$ at the point (2,-1, 2).	6M	4	3

OR

9.	Find constants a,b,c so that the vector $A = (x + 2y + az)\bar{i} + (bx - 3y - z)\bar{j} + (4x + cy + 2z)\bar{k}$ is irrotational. Also find ϕ such that $\bar{A} = \nabla\phi$	12M	4	3

UNIT–V

10.	Verify Green's theorem for $\int_C [(xy + y^2)dx + x^2 dy]$ where C is bounded by y=x and $y = x^2$	12M	5	3

OR

11.	Verify Stoke's theorem for $F = (x^2 + y^2)\bar{i} - 2xy\bar{j}$ taken around the rectangle bounded by the lines $x = \pm a, y = 0, y = b$	12M	5	3

*** End ***

Hall Ticket Number :										

R-20

Code: 20A323T

I B.Tech. II Semester Regular & Supplementary Examinations July 2023

Engineering Mechanics

(Common to CE and 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)

			CO	BL
1.	**Answer ALL the following short answer questions**	(5 X 2 = 10M)		
a)	State the Parallelogram law of forces.		1	2
b)	Define the terms angle of friction and angle of repose**.**		2	1
c)	Distinguish between Centroid and Centre of gravity.		3	4
d)	Define the terms Angular velocity and Angular acceleration		4	1
e)	State the principle of conservation of energy.		5	2

PART-B

Answer *five* questions by choosing one question from each unit (5 x 12 = 60 Marks)

			Marks	CO	BL
		UNIT–I			
2. a)	Classify the system of forces with neat sketches		5M	1	2
b)	Determine the resultant of four forces concurrent at the origin as shown in Fig. 1.				

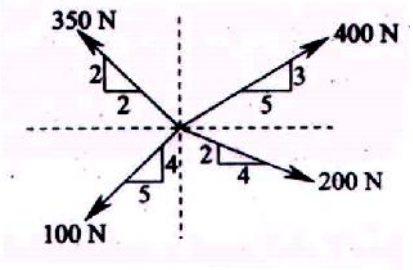

Fig.1

7M 1 3

OR

3. a)	State and prove Varignon's theorem.		5M	1	2
b)	Two smooth spheres P,Q each of radius 25 cm and weighing 500N, rest in a horizontal channel having vertical walls as shown in Fig.2. If the distance between the walls is 90cm. Calculate the reactions at points of contact A,B and C.				

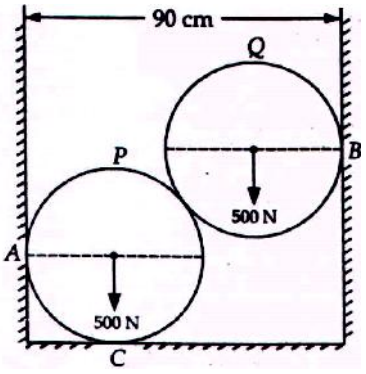

Fig.2

7M 1 3

UNIT–II

4. A truss of span 10 metres is loaded as shown in Fig.3. Find the reactions and forces in the members of the truss.

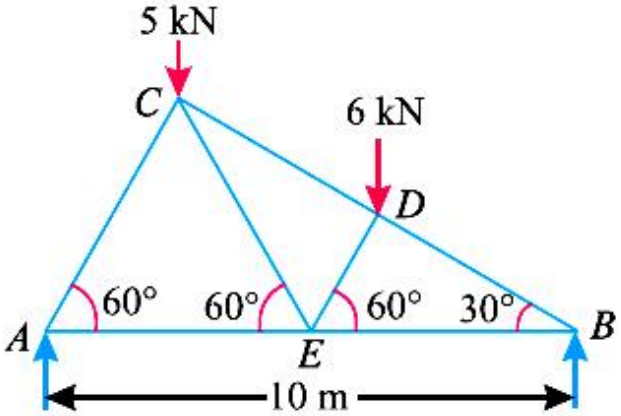

Fig.3 12M 2 3

OR

5. a) Explain briefly about Wedge friction 4M 2 2

   b) Two identical blocks A and B are connected by a rod and rest respectively against vertical wall and horizontal floor as shown in Fig.4. The sliding motion of the block impends when rod makes an angle of 45^0 with the horizontal. Calculate the coefficient of friction assuming it to be same both at the floor and wall.

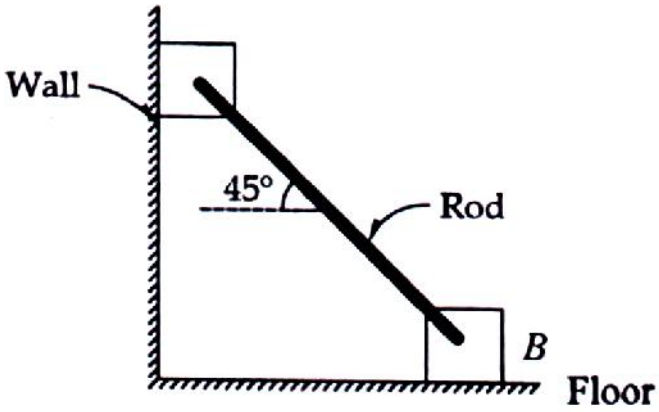

Fig.4 8M 2 3

UNIT–III

6. Find the Centroid of the shaded area bounded by a straight line and a parabola as shown in Fig.5.

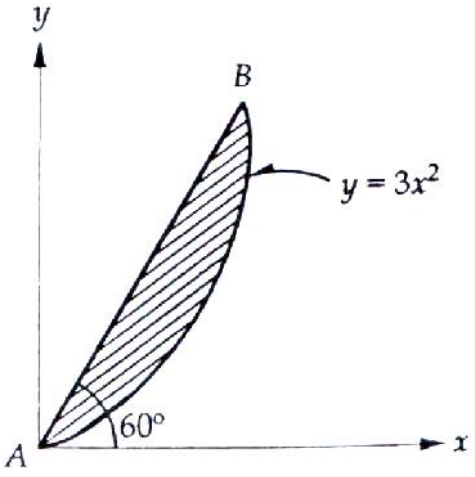

Fig.5 12M 3 3

OR

7. Find the moments of inertia of the I-Section shown in Fig.6 about the centroidal axes.

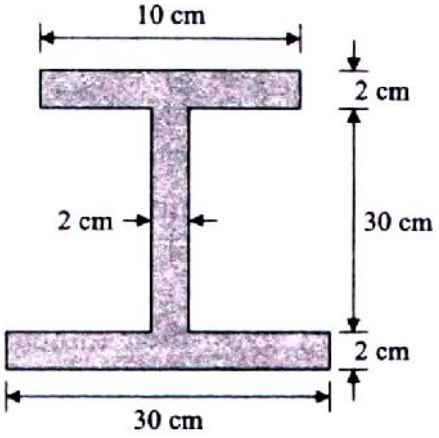

Fig.6 — 12M — 3 — 3

UNIT–IV

8. A particle moves along a straight line so that its displacement is metre from a fixed point is given by, $S = 2t^3+4t^2-6t+8$. Determine: (*i*) velocity at start, (*ii*) velocity after 5 seconds, (*iii*) acceleration at start and (*iv*) acceleration after 5 seconds. — 12M — 4 — 3

OR

9. a) A wheel, rotating about a fixed axis at 20 rpm, is uniformly accelerated for 70 seconds, during which time it makes 50 revolutions. Determine: (i) Angular velocity at the end of this interval, and (ii) time required for the speed to reach 100 revolutions per minute. — 8M — 4 — 4

   b) Explain briefly about Plane motion. — 4M — 4 — 2

UNIT–V

10. A train of weight 2000 kN moves down a slope of 1in 150 at 18 km/hr and engine develops a power of 35 kW. If the train is pulled up at the same speed, Calculate power required to pull the train. — 12M — 5 — 3

OR

11. Two blocks weighing 100 N and 40 N are supported at the ends of a rope of negligible weight which is passing over the rough surface of a pulley mounted on a horizontal axle. The pulley may be assumed as a solid disc with a weight of 50N.Friction in bearings of the pulley may be neglected. Find the tension on the two parts of the two ropes and the linear acceleration of the blocks. — 12M — 5 — 3

*** End ***

Hall Ticket Number :										

R-20

Code: 20AC24T

I B.Tech. II Semester Regular & Supplementary Examinations July 2023

Engineering Physics

(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)

			CO	BL
1.	Answer ALL the following short answer questions	(5 X 2 = 10M)		
	a) What is center of mass?		CO1	L2
	b) What are Ultrasonics?		CO2	L1
	c) Write any two applications of Dielectrics.		CO3	L3
	d) What is Population Inversion?		CO4	L2
	e) What is the use of a Pyro electric detector?		CO5	L3

PART-B

Answer *five* questions by choosing one question from each unit (5 x 12 = 60 Marks)

			Marks	CO	BL
		UNIT–I			
2.	a)	Explain conservative force and prove that conservative force is divergence of potential energy.	10M	CO1	L2
	b)	Define torque.	2M	CO1	L1
		OR			
3.		Explain the non-inertial frame of reference with constant angular velocity.	12M	CO1	L2
		UNIT–II			
4.		Derive Sabine's law by growth and decay method.	12M	CO2	L3
		OR			
5.	a)	Explain the production of Ultrasonics by Piezo electric method.	6M	CO2	L2
	b)	Write a note on Non Destructive Testing.	6M	CO2	L3
		UNIT–III			
6.	a)	Derive Clausius-Mossotti equation.	8M	CO3	L3
	b)	Define ionic polarizability and write its equation	4M	CO3	L1

OR

7.	a)	Classify the different types of Magnetic materials and mention any three properties.	9M	CO3	L2
	b)	Explain the Hysteresis loop.	3M	CO3	L2

UNIT–IV

8.	a)	List the applications of laser.	4M	CO4	L2
	b)	Describe the Construction and Working of He-Ne gas Laser.	8M	CO4	L2

OR

9.	a)	Explain the construction of optical fibre.	4M	CO4	L1
	b)	Classify the types of Optical Fibres.	8M	CO4	L2

UNIT–V

10.		Explain Piezo electric and magneto strictive sensors.	12M	CO5	L2

OR

11.	a)	What is a sensor? Explain.	4M	CO5	L2
	b)	Explain the working of thermal sensors.	8M	CO5	L2

*** End ***

Hall Ticket Number :										

R-20

Code: 20A223T

I B.Tech. II Semester Regular & Supplementary Examinations July 2023

Basic Electrical and Electronics Engineering

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

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**	(5 X 2 = 10M)		
a)	State and explain Kirchoff's Voltage Law.		1	2
b)	Write the necessity of commutator for operation of a D.C machine?		2	3
c)	Write the principle of operation of transformer?		3	2
d)	Draw the circuit diagram symbols for p-n-p and n-p-n transistors		4	1
e)	How are moving coil instruments classified?		5	1

PART-B

Answer *five* questions by choosing one question from each unit (5 x 12 = 60 Marks)

			Marks	CO	BL
		UNIT–I			
2. a)	Two resistances when they are in series have an equivalent resistance of 9ohms and when connected in parallel have an equivalent resistance of 2ohms. Find the two resistances?		6M	1	2
b)	What is the potential difference between X and Y in the network shown in Fig.1.				

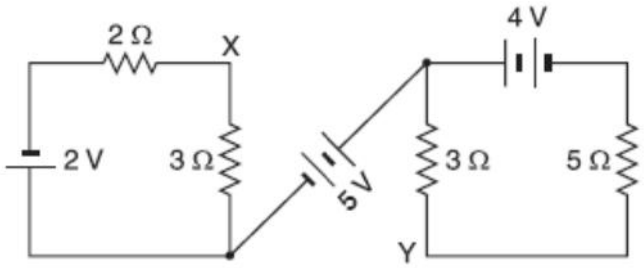

Fig.1 6M 1 3

OR

3. a)	Two resistors 4 ohms and 6 ohms are connected in parallel. If the current supplied by source is 30 A. Find the equivalent resistance and current through each branch.		6M	1	2
b)	A 35 V d.c supply is connected across a resistance of 600ohms in series with an unknown resistance R. A voltmeter having a resistance 1200 ohms is connected across 600ohms and shows a reading of 5V. Calculate the value of resistance R.		6M	1	3

UNIT–II

4.	a)	Derive the torque equation of a DC motor?	6M	2	3
	b)	A 1500 kW, 550V, 10 pole generator runs at 150 r.p.m. There are 2500 lap connected conductors and the full load copper losses are 25KW. The air gap flux density has a uniform value of 0.9wb/m2. Calculate the no load terminal voltage and the area of the pole shoe?	6M	2	3

OR

5.	a)	Draw the circuit diagram of DC series generator and write the relations between voltages and currents? Write its applications.	6M	2	2
	b)	Explain the Swinburne's test to determine the efficiency of a DC machine.	6M	2	1

UNIT–III

6.	a)	Explain principle of operation of a 1 phase transformer?	6M	3	2
	b)	Derive the expression for the regulation of a 1 phase transformer and discuss whether its value should be low or high to get the better efficiency?	6M	3	4

OR

7.	a)	Explain in detail about the constructional features and operation of an alternator?	6M	3	1
	b)	Draw and explain about the torque slip characteristics of an induction motor?	6M	3	2

UNIT–IV

8.	a)	Explain about the principle of operation of a full wave rectifier with the help of circuit diagram?	6M	4	2
	b)	Explain in detail about the differences between PNP and NPN transistors?	6M	4	3

OR

9.	a)	Discuss about the differences between half wave rectifier and full wave rectifier by using the output waveforms?	6M	4	4
	b)	Draw and explain the input and output characteristics for transistor CE configuration?	6M	4	3

UNIT–V

10.		Draw the block diagram of a general purpose CRO and explain the functions of various blocks	12M	5	1

OR

11.		Explain the working of MCB with neat diagram.	12M	5	3

*** End ***

Hall Ticket Number :										

R-20

Code: 20A326T

I B.Tech. II Semester Regular & Supplementary Examinations July 2023

Basic Mechanical Engineering

(Civil Engineering)

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 (5 X 2 = 10M)		
a)	What is meant by Welding operation?	CO1	L1,L2
b)	What are the basic machining operations?	CO2	L1,L2
c)	What are the two types of IC engines?	CO3	L1,L2
d)	State the basic laws of thermodynamics.	CO4	L1,L2
e)	What are the disadvantages of belt drives?	CO5	L1,L2

PART-B

Answer *five* questions by choosing one question from each unit (5 x 12 = 60 Marks)

		Marks	CO	BL
	UNIT–I			
2.	Explain the process of TIG welding with the help of a neat sketch.	12M	1	1,2
	OR			
3.	What are Soldering and Brazing operations? Explain them with suitable applications.	12M	1	1,2
	UNIT–II			
4.	Describe the working of a Lathe machine with a neat sketch.	12M	2	1,2
	OR			
5.	Explain the operation of Milling with a neat sketch.	12M	2	1,2
	UNIT–III			
6.	State the differences between two stroke and four stroke engines and explain their applications.	12M	3	1,2
	OR			
7.	What are Reciprocating Air compressors? Explain their working with a neat sketch.	12M	3	1,2
	UNIT–IV			
8.	Explain with the help of a neat sketch the working of a Vapour absorption refrigerator system.	12M	4	1,2
	OR			
9.	What is the basic principle of air-conditioning? Explain the working of room air-conditioning systems.	12M	4	1,2
	UNIT–V			
10.	Explain as how chain drives are used for power transmission.	12M	5	1,2
	OR			
11.	Explain the working of any one type of Mechanical handling equipment.	12M	5	1,2

*** End ***