Code: 20AC21T

I B.Tech. II Semester Supplementary Examinations June 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)

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

a) Solve $(D^2 + 5D + 6)y = 0$ CO1   L3

b) Solve $(x^2 D^2 + 4xD + 3)y = 0$ CO2   L3

c) Form the partial differential equation by eliminating the arbitrary constants from $z = ax + by$ CO3   L2

d) Find $curl\ \bar{f}$ for $\bar{f} = z\bar{i} + x\bar{j} + y\bar{k}$ CO4   L1

e) State Green's theorem.   CO5   L2

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

Marks   CO   BL

UNIT-I

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

   b) Solve $(D^2 + 1)y = x$ 6M   CO1   L3

OR

3.   Solve $\dfrac{d^2 y}{dx^2} + 4y = \tan 2x$ by using method of variation of parameters.   12M   CO1   L3

UNIT-II

4.   Solve

$$(1+x)^2 \frac{d^2 y}{dx^2} + (1+x)\frac{dy}{dx} + y = 2\sin[\log(1+x)]$$

12M   CO2   L3

OR

5.   Solve $(x^2 D^2 - 3xD + 4)y = (1+x)^2$ 12M   CO2   L3

UNIT-III

6. Form the partial differential equation by eliminating the arbitrary constants a, b from $(x-a)^2+(y-b)^2=z^2\cot^2 r$ 12M CO3 L2

OR

7. Solve $x^2(y-z)p+y^2(z-x)q=z^2(x-y)$ 12M CO3 L3

UNIT-IV

8. Find the directional derivative of $W = x^2 - 2y^2 + 4z^2$ at (1,1,-1) in the direction of $2\bar{i}+\bar{j}-\bar{k}$. 12M CO4 L2

OR

9. Find $curl\,\bar{f}$ where $\bar{f}=grad(x^3+y^3+z^3-3xyz)$ 12M CO4 L2

UNIT-V

10. Evaluate the line integral

$$\int_c [(x^2+xy)dx+(x^2+y^2)dy]$$

where c is the square formed by the lines

$x=\pm1\,and\,\,y=\pm1.$ 12M CO5 L2

OR

11. Verify Stoke's theorem for the function $\bar{F}=x^2\bar{i}+xy\,\bar{j}$ integrated round the square in the plane z=0 whose sides are along the lines $x=0, y=0, x=a, y=a.$ 12M CO5 L2

*** End ***

Code: 20A323T

R-20

I B.Tech. II Semester Supplementary Examinations June 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   (5 X 2 = 10M)   CO   BL

   a) State the Parallelogram law of forces.   1   1

   b) Differentiate perfect truss with imperfect truss.   2   2

   c) State the Parallel axis theorem.   3   1

   d) What are the applications of projectiles?   4   1

   e) What are the various types of impact?   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) Classify the system of forces with neat sketches   5M   1   2

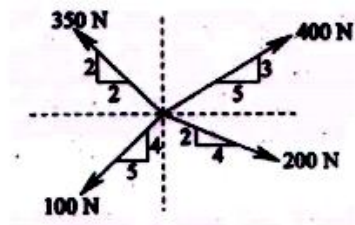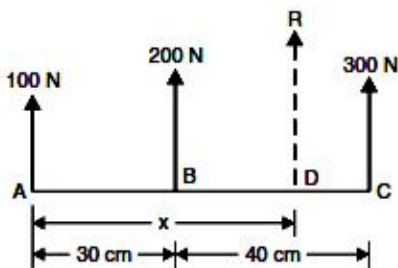   b) Determine the resultant of four forces concurrent at the origin as shown in Fig. 1.

Fig.1

7M   1   3

OR

3. a) State and prove Varignon's theorem.   6M   1   2

    b) Three like parallel forces 100 N, 200 N and 300 N are acting at points A, B and C respectively on a straight line ABC as shown in Figure. The distances are AB = 30 cm and BC = 40 cm. Find the resultant and also the distance of the resultant from point A on line ABC.

6M   1   3

UNIT-II

4.   A block weighing 1500 N, overlying a 10° wedge on a horizontal floor and leaning against a vertical wall, is to be raised by applying a horizontal force to the wedge. Assuming the coefficient of friction between all the surface in contact to be 0.3, determine the minimum horizontal force required to raise the block.   12M   2   3

OR

5. Determine the forces in all the members of the truss shown in Fig. and indicate the magnitude and nature of the forces on the diagram of the truss. All inclined members are 60^0 to horizontal and length of each member is 2m.
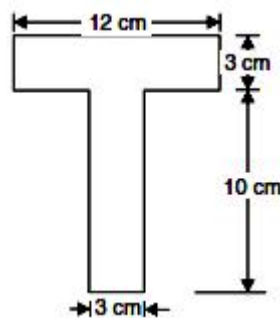

| | | | 12 | 2 |
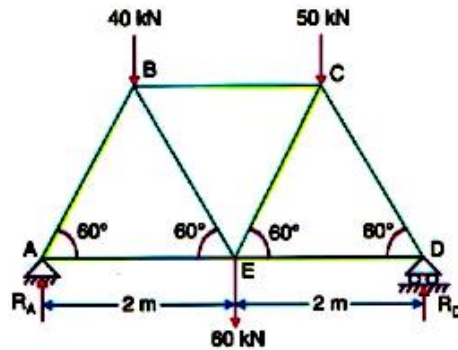
6. a) Find the location the centroid of a semicircular disk of radius r.   6M   3   3

b) Find the centre of gravity of the T-section shown in Fig.

     6M   3   3

OR

7. a) Explain Pappus and Guldinus theorems.   6M   3   2

b) Find the centroid of volume of a solid formed by a right circular cone of 100 mm base radius and a height of 150 mm placed over a cylinder having the same radius and a 75 mm height.   6M   3   3

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.   12   4   3

OR

9. a) Derive the equations of motion for a body moving in a straight line.   6M   4   2

b) Two balls are projected from the same point in directions inclined at 60^0 and 30^0 to the horizontal. If they attain the same maximum height, what is the ratio of their velocities of projection?   6M   4   4

10. a) Explain the concept of D'Alembert's Principle.   4M   5   2

b) 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 the 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.   8M   5   3

OR

11. a) Explain the conservation of momentum with a neat sketch   6M   5   2

b) A body of 10 kg mass moving towards right with a speed of 8m/s strikes with another body of 20 kg mass moving towards left with 25 m/s. Determine:

(i) final velocity of the two bodies
(ii) loss in kinetic energy due to impact, and
(iii) impulse acting on either body during impact.
Take coefficient of restitution between the bodies as 0.65.   6M   5   3

*** End ***

Code: 20AC24T

I B.Tech. II Semester Supplementary Examinations June 2024

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 a conservative force and give its expression?	CO1	L1
b)	Why inverse piezo-electric method is used to produce ultrasonics?	CO2	L3
c)	Define dielectric constant?	CO3	L1
d)	Explain the principle of an optical fiber.	CO4	L2
e)	List the temperature sensors.	CO5	L1

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

			Marks	CO	BL
		UNIT-I			
2.	a)	Give the physical significance of the terms Gradient of a scalar, divergence and curl of a vector.	6M	CO1	L3
	b)	What are three laws of Kepler and explain them.	6M	CO1	L1
		OR			
3.		Derive an equation for angular velocity of rigid body.	12M	CO1	L3
		UNIT-II			
4.	a)	Suggest the remedies to build acoustically a good hall.	5M	CO2	L5
	b)	Explain a piezo electric method of ultrasonic wave production.	7M	CO2	L2
		OR			
5.		Describe acoustic grating and show it can be used to determine the velocity of ultrasonic wave.	12M	CO2	L2
		UNIT-III			
6.		Derive the equation for electronic and ionic polarizability of dielectrics.	12M	CO3	L3
		OR			
7.	a)	Explain the hysteresis of ferromagnetic materials.	6M	CO3	L2
	b)	Distinguish the soft and hard magnetic materials.	6M	CO3	L2
		UNIT-IV			
8.	a)	Explain the characteristics of lasers with diagrams.	6M	CO4	L2
	b)	What are Einstein's coefficients? Derive the relation between Einstein's coefficients.	6M	CO4	L3
		OR			
9.		Explain various types of optical fibers based on refractive index profile, materials and modes of propagation.	12M	CO4	L2
		UNIT-V			
10.	a)	What are the various types of sensors?	8M	CO5	L1
	b)	List the applications of sensors.	4M	CO5	L1
		OR			
11.		Summarize the Magnetostriction Sensor, Noncontact Magnetostrictive Sensor and Magnetostrictive Fiber Optic Sensor.	12M	CO5	L2

*** End ***

R-20

Code: 20A223T

I B.Tech. II Semester Supplementary Examinations June 2024

Basic Electrical and Electronics Engineering

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

1. Answer *all* the following short answer questions   (5 X 2 = 10M)

		CO	BL
a)	State and explain Kirchhoff's Current Law.	CO1	L1
b)	What is the expression of back emf?	CO2	L2
c)	Define regulation and efficiency of a transformer.	CO3	L1
d)	What is a PN Junction diode and how this is to be operated.	CO4	L2
e)	What are the essential components of indicating instrument?	CO5	L1

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

		Marks	CO	BL

UNIT-I

2.	a)	A color TV has a current of 1.99 A when connected to a 230V household circuit. What is the resistance in ohms of the TV set?	4M	CO1	L3
	b)	Discuss Faraday's laws of electromagnetic induction?	8M	CO1	L2

OR

3.	a)	Define the following terms with an example: (i) Unilateral elements (ii) Distributed elements (iii) Linear elements (iv) active elements	6M	CO1	L1
	b)	A circuit consists of three resistances of 12, 18 and 36ohms respectively by joined in parallel and the combination is connected in series with a resistance of 12ohms. The whole circuit is connected to 60V supply. Calculate current in each branch, total current drawn and power dissipated in each resistor.	6M	CO1	L3

UNIT-II

4.	a)	What is the operating principle of a DC motor? Explain in detail	6M	CO2	L2
	b)	A long shunt compound generator delivers a load current of 30A at 400V and has armature, series field and shunt field resistances of 0.04 ohms, 0.02 ohms and 180 ohms respectively. Calculate the generated voltage and the armature current. Allow 1V per brush for contact drop.	6M	CO2	L3

OR

5. a) Draw and explain the different types of generators?   8M   CO2   L2

   b) Explain the principle of operation of DC generator?   4M   CO2   L2

UNIT-III

6. a) Explain the transformer on no-load with phasor diagram. 6M 3 4   6M   CO3   L4

   b) A single phase core type 50Hz transformer has a square having 25cm side, the maximum flux density in the core 1.2 wb/m2 .Calculate the number of turns per limb on H.V. side and L.V side for a 3400V/240V ratio.   6M   CO3   L3

OR

7. Explain the OC and SC test of transformer with necessary diagrams?   12M   CO3   L2

UNIT-IV

8. Draw and explain the circuit diagram of a common emitter amplifier and draw its characteristics?   12M   CO4   L2

OR

9. a) Explain the operation of diode half-wave rectifier?   6M   CO4   L2

   b) Describe the diffusion process that takes place at the p-n junction, and explain the presence of depletion region?   6M   CO4   L2

UNIT-V

10. Explain How frequency is measured by using CRO.   12M   CO5   L2

OR

11. a) Explain the principle of cathode ray tube?   6M   CO5   L2

   b) Explain about different types of Fuses?   6M   CO5   L2

*** End ***

Code: 20A326T

I B.Tech. II Semester Supplementary Examinations June 2024
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)	Distinguish consumable and non-consumable electrodes.	1	L2
b)	List the types of lathe and different operations performed on a lathe	2	L1
c)	Compare single stage and multi stage compression	3	L2
d)	Define conduction and convection	4	L1
e)	What is an excavator	5	L1

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

		Marks	CO	BL
	UNIT-I			
2.	Discuss in detail about arc welding process and write its disadvantages.	12M	1	L2
	OR			
3.	Explain the process of MIG welding process with the help of a neat sketch	12M	1	L2
	UNIT-II			
4.	Explain the method employed for making metal sheets/plates in manufacturing process and also discuss their types	12M	2	L2
	OR			
5.	Describe the working principle of a grinding machine with principle parts?	12M	2	L2
	UNIT-III			
6.	With the help of a neat diagram explain the working of 2 stroke cycle petrol engine.	12M	3	L2
	OR			
7.	Explain the working of an Air compressor with a neat sketch	12M	3	L2
	UNIT-IV			
8. a)	Define Radiation and illustrate with a suitable example how the heat transfer occurs through radiation	6M	4	L2
b)	Briefly elaborate on convection mode of heat transfer with a suitable example	6M	4	L2
	OR			
9.	Explain with neat sketch about the working principle of central air conditioning systems.	12M	4	L2
	UNIT-V			
10.	Explain the working of a gear drive with the help of a neat sketch	12M	5	L2
	OR			
11.	With simple diagram explain excavator construction and working	12M	5	L2

*** End ***