

Hall Ticket Number :										
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R-20

Code: 20A223T

I B.Tech. II Semester Regular & Supplementary Examinations September 2022

Basic Electrical and Electronics Engineering

(Common to CE, CSE and AI&DS)

Max. Marks: 70

Time: 3 Hours

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

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

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	Blooms Level
a) State Fleming's left hand rule?	1	1
b) Write the applications of DC generators?	2	1
c) Does the transformer draw any current when its secondary is open circuited?	3	1
d) Write the symbol of PNP transistor.	4	2
e) What is the importance of earthing?	5	2

PART-B

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

	Marks	CO	Blooms Level
UNIT-I			
2. a) What is Fleming's right hand rule and how it used to determine the direction of force in DC Generator.	6M	1	3
b) State Kirchhoff's laws and explain with an example?	6M	1	1

OR

3. 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	1	3
b) Discuss Faraday's laws of electromagnetic induction?	8M	1	2

UNIT-II

4. a) Draw and explain the different types of generators?	8M	2	2
b) Explain the principle of operation of DC generator?	4M	2	2

OR

5. a) Derive the Torque equation of DC motor?	6M	2	2
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- b) A DC generator supplies a load of 9kW at 220V. Calculate the induced e.m.f if the armature resistance is 0.8 ohms and the field resistance is 70 ohms? 6M 2 3

UNIT-III

6. a) Derive the EMF equation of transformer? 8M 3 2
 b) Explain the principle of operation of Alternator? 4M 3 2

OR

7. Explain the OC and SC test of transformer with necessary diagrams? 12M 3 2

UNIT-IV

8. a) Draw and explain V-I characteristics of diode? 6M 4 2
 b) Explain the operation of diode half-wave rectifier? 6M 4 2

OR

9. Explain the input and output characteristics of PN junction diode in Common Emitter configuration 12M 4 2

UNIT-V

10. a) Discuss the types of wires and cables? 6M 5 2
 b) Draw and explain the block diagram of CRO? 6M 5 2

OR

11. a) Discuss the operation of MCB? 6M 5 2
 b) Explain the operation of function generator? 6M 5 2

*** End ***

Hall Ticket Number :

R-20

Code: 20A326T

I B.Tech. II Semester Regular & Supplementary Examinations September 2022

Basic Mechanical Engineering

(Civil Engineering)

Max. Marks: 70

Time: 3 Hours

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

PART-A

(Compulsory question)

- | | CO | Blooms Level |
|---|------|--------------|
| 1. Answer ALL the following short answer questions (5 X 2 = 10M) | | |
| a) Distinguish soldering and brazing. | CO 1 | L2 |
| b) Define casting. | CO 2 | L1 |
| c) Name different components of an IC Engine. | CO 3 | L1 |
| d) Distinguish conduction and convection. | CO 4 | L2 |
| e) Distinguish chain and gear drive. | CO 5 | L2 |

PART-B

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

- | | Marks | CO | Blooms Level |
|--|-------|-----|--------------|
| UNIT-I | | | |
| 2. Discuss in detail about arc welding process and write its disadvantages. | 12M | CO1 | L2 |
| OR | | | |
| 3. Illustrate brazing process and write its applications. | 12M | CO1 | L3 |
| UNIT-II | | | |
| 4. Discuss the sand casting process and write its merits and demerits. | 12M | CO2 | L2 |
| OR | | | |
| 5. Explain the following processes connected with forging:
(i) Upsetting (ii) Drawing down (iii) Swaging. | 12M | CO2 | L3 |
| UNIT-III | | | |
| 6. Classify the IC Engines and draw the constructional details of an IC engine. | 12M | CO3 | L4 |
| OR | | | |
| 7. Explain working of single and multi-stage air compressors. | 12M | CO3 | L2 |
| UNIT-IV | | | |
| 8. Explain the vapor compression refrigeration system. | 12M | CO4 | L2 |
| OR | | | |
| 9. Explain summer air-conditioning system with neat sketch. | 12M | CO4 | L2 |
| UNIT-V | | | |
| 10. Name different type of transmission systems and briefly discuss any two. | 12M | CO5 | L2 |
| OR | | | |
| 11. With simple diagram explain excavator construction and working. | 12M | CO5 | L2 |

*** End ***

Hall Ticket Number :									
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R-20

Code: 20AC21T

I B.Tech. II Semester Regular & Supplementary Examinations September 2022

Differential Equations and Vector Calculus

(Common to all Branches)

Max. Marks: 70

Time: 3 Hours

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
 2. In Part-A, each question carries **Two mark**.
 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)

- | | | |
|--|-----|----|
| a) Solve $\frac{d^4x}{dt^4} + 4x = 0$ | CO1 | L3 |
| b) Write the second order Legendre's Linear equation form. | CO2 | L3 |
| c) Form the differential equation by eliminating a and b from $\log(az - 1) = x + ay + b$. | CO3 | L2 |
| d) Find the greatest value of the directional derivative of the function $f = x^2yz^3$ at $(2, 1, -1)$. | CO4 | L2 |
| e) State stokes theorem. | CO5 | L3 |

PART-B

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

	Marks	CO	Blooms Level
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UNIT-I

2. Solve $(D - 2)^2 = 8(e^{2x} + \sin 2x + x^2)$	12M	CO1	L3
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OR

3. Solve the differential equation $(D^2 + 4)y = \sec 2x$ by the method of variation of parameters.	12M	CO1	L3
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UNIT-II

4. A condenser of capacity C discharged through an inductance L and resistance R in series and the charge q at time t satisfies the equation $L \frac{d^2q}{dt^2} + R \frac{dq}{dt} + \frac{q}{C} = 0$. Given that L= 0.25 henries, R = 250 ohms, C=2×10 ⁻⁶ farads, and that when t = 0, charge q is 0.002 coulombs and the current dq/dt = 0, obtain the value of q in terms of t.	12M	CO2	L3
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OR

5. Solve $x^2 \frac{d^2y}{dx^2} + x \frac{dy}{dx} + y = \log x \cdot \sin(\log x)$ 12M CO2 L1

UNIT-III

6. a) Form a partial differential equation by eliminating the arbitrary functions $f(x)$ and $g(y)$ from $z = yf(x) + xg(y)$. 6M CO3 L2
- b) Solve $x^2(y-z)p + y^2(z-x)q = z^2(x-y)$. 6M CO3 L3

OR

7. Solve by the method of separation of variables
 $3u_x + 2u_y = 0$ where $u(x,0) = 4e^{-x}$. 12M CO3 L3

UNIT-IV

8. a) Find the directional derivative of $\phi = x^2yz + 4xz^2$
 at $(1, -2, -1)$ in the direction of the vector $2\bar{i} - \bar{j} - 2\bar{k}$. 6M CO4 L2
- b) Show that $\nabla^2(r^n) = n(n+1)r^{n-2}$. 6M CO4 L3

OR

9. a) 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 CO4 L2
- b) Find whether the function
 $\bar{F} = (x^2 - y^3)\bar{i} + (y^2 - 3x)\bar{j} + (z^2 - xy)\bar{k}$
 is irrotational and hence find scalar potential function
 corresponding to it. 6M CO4 L2

UNIT-V

10. a) Find the work done in moving a particle in the force field
 $\bar{F} = 3x^2\bar{i} + (2xz - y)\bar{j} + z\bar{k}$ along the straight line from
 $(0,0,0)$ to $(2,1,3)$ 6M CO5 L2
- b) Apply Divergence theorem to evaluate
 $\iiint_s (x+z)dydz + (y+z)dzdx + (x+y)dx dy$
 where s is the surface of the sphere $x^2 + y^2 + z^2 = 4$. 6M CO5 L3

OR

11. Verify Green's theorem in the plane for
 $\int_c (x^2 - xy^3) dx + (y^2 - 2xy) dy$ where c is a square with
 vertices $(0, 0), (2, 0), (2, 2), (0, 2)$. 12M CO5 L5

*** End ***

Code: 20A323T

I B.Tech. II Semester Regular & Supplementary Examinations September 2022

Engineering Mechanics
(Common to CE & ME)

Max. Marks: 70

Time: 3 Hours

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

PART-A
(Compulsory question)

	CO	Blooms Level
1. Answer ALL the following short answer questions (5 X 2 = 10M)		
a) What is a force? State parallelogram law of forces.	1	1
b) What are the assumptions in the analysis of plane trusses?	2	2
c) Differentiate centroid and center of gravity.	3	2
d) What is the difference between rectilinear and curvilinear translations?	4	2
e) What is D'Alembert's principle in translation?	5	1

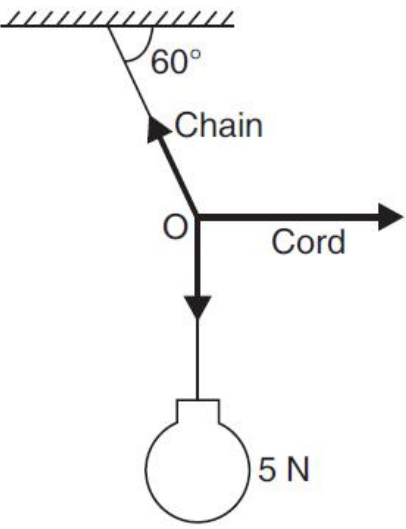
PART-B

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

Marks	CO	Blooms Level
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UNIT-I

2. A lamp weighing 5 N is suspended from the ceiling by a chain. It is pulled aside by a horizontal cord until the chain makes an angle of 60° with the ceiling as shown in Fig. Find the tensions in the chain and the cord by applying Lami's theorem.

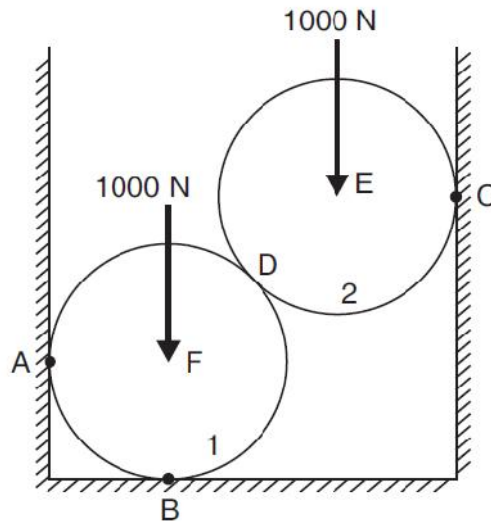


12M	1	3
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OR

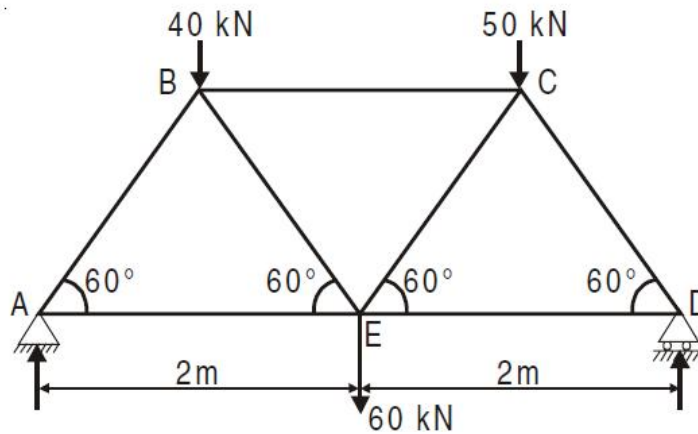
3. Two spheres, each of weight 1000 N and of radius 25 cm rest in a horizontal channel of width 90 cm as shown in Fig. Find the reactions on the points of contact A, B and C.

12M	1	3
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UNIT-II

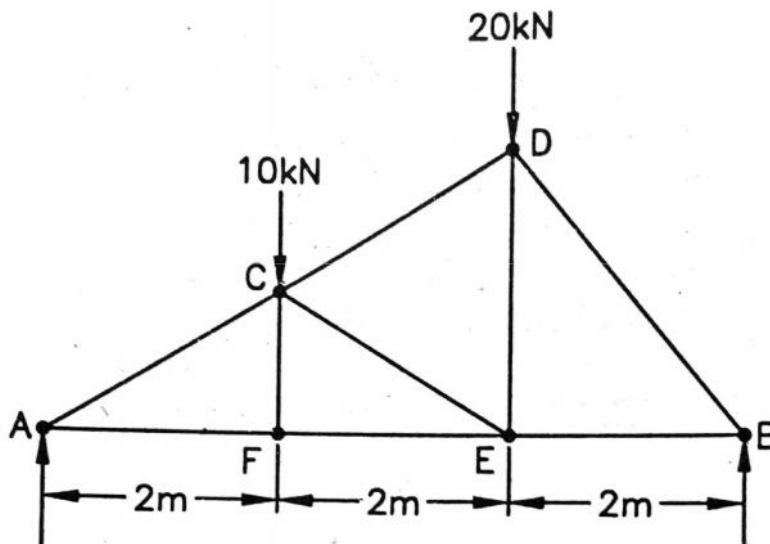
4. Determine the forces in all the members of the truss shown in Fig. and indicate the magnitude and nature of forces on the diagram of the truss. All inclined members are at 60° to horizontal and length of each member is 2 m.



12M 2 3

OR

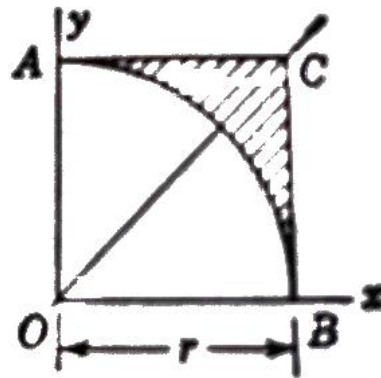
5. Find by method of sections the forces in members CD, CE, CF and EF of the freely supported planar truss shown in Fig.



12M 2 3

UNIT-III

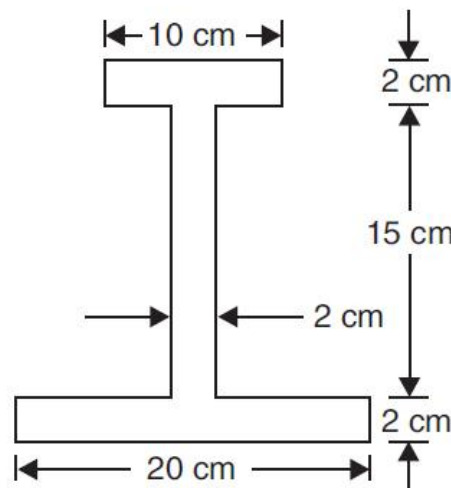
6. Find the centroid of the shaded area ACB in Fig. with respect to the X and Y axes shown.



12M 3 3

OR

7. Find the centre of gravity of the I-section shown in Fig.



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, $S=2t^3+4t^2-6t+8$ Find : (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) Explain about kinematics of rotation of a rigid body.
 b) The armature of an electric motor has angular speed $N=1800$ rpm at the instant when the power is cut off. If it comes to rest in 6 seconds,
 (i) Calculate the angular deceleration assuming that it is constant.
 (ii) How many complete revolutions does the armature make during this period?

4M 4 2

8M 4 3

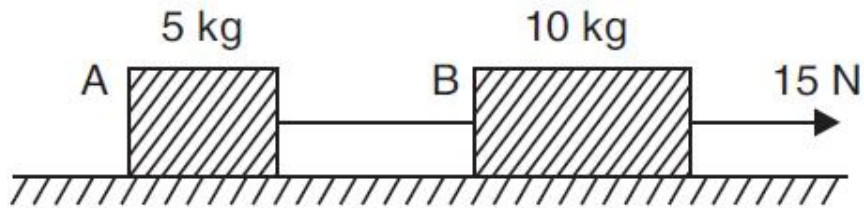
UNIT-V

10. A train of weight 2000 kN is pulled by an engine on a level track at a constant speed of 36 kilometre per hour. The resistance due to friction is 10 N per kN of the trains weight. Find the power of the engine.

12M 5 3

OR

11. Find the acceleration of bodies and tension in the string joining A and B shown in Fig.



12M 5 3

*** End ***

Hall Ticket Number :																			
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R-20

Code: 20AC24T

I B.Tech. II Semester Regular & Supplementary Examinations September 2022

Engineering Physics

(Common to CE & ME)

Max. Marks: 70

Time: 3 Hours

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

PART-A

(Compulsory question)

- | | CO | Blooms Level |
|---|-----|--------------|
| 1. Answer ALL the following short answer questions (5 X 2 = 10M) | | |
| a) What is a conservative force and give its expression? | CO1 | L2 |
| b) What is reverberation and give Sabine's formula? | CO2 | L2 |
| c) What are dielectrics? | CO3 | L2 |
| d) What are the characteristics of a laser? | CO4 | L2 |
| e) What is a 'sensor'? | CO5 | L2 |

PART-B

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

Marks	CO	Blooms Level
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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 the three laws of Kepler and explain them. | 6M | CO1 | L3 |

OR

- | | | | |
|--|----|-----|----|
| 3. a) Differentiate Newton's laws in inertial and non-inertial frames of reference. | 7M | CO1 | L2 |
| b) For a mass 'm' moving with velocity v along 'x' axis and write the angular moment about the origin. | 5M | CO1 | L3 |

UNIT-II

- | | | | |
|--|----|-----|----|
| 4. a) Explain nondestructive testing. | 6M | CO2 | L4 |
| b) Explain the construction and working of sonogram. | 6M | CO2 | L5 |

OR

- | | | | |
|---|----|-----|----|
| 5. a) What is acoustic absorption constant and what are the factors and remedies of an acoustically bad auditorium. | 5M | CO2 | L3 |
|---|----|-----|----|

- b) Explain a piezo electric method of ultrasonic wave production. 7M CO2 L2

UNIT-III

6. a) Give the relation between dielectric susceptibility and dielectric constant and recommend a relation between dielectric polarisability and dielectric constant. 4M CO3 L5
- b) Classify the different types of magnetic materials with two properties of each. 8M CO3 L4

OR

7. a) What is Orientational polarization. Graphically explain the frequency dependence of polarization on frequency of the applied AC signal and tabulate the three polarization mechanisms based on the frequency of their dominance. 8M CO3 L2
- b) Enumerate few applications of magnetic materials. 4M CO3 L3

UNIT-IV

8. a) Explain the construction and working of He-Ne laser and what are the three wavelengths emitted by it. 8M CO4 L3
- b) Give the block diagram of an optical fiber communication system. 4M CO4 L2

OR

9. a) Explain the construction and working of a semiconductor laser. 6M CO4 L5
- b) Enumerate any one medical applications of optical fibers and explain it. 6M CO4 L2

UNIT-V

10. a) Analyze any one pressure sensor based on the principle and working. 6M CO5 L4
- b) Explain a sensor device used in Hall effect principle. 6M CO5 L6

OR

11. a) What is magnetostriction sensor and explain. 6M CO5 L4
- b) Explain any two types of temperature sensors and compare the same. 6M CO5 L5

*** End ***