

Hall Ticket Number :

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R-20

Code: 20A243T

II B.Tech. II Semester Supplementary Examinations December 2023

Electromagnetic Fields

(Electrical and Electronics 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 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) Write properties of Gaussian surface. | CO1 | L1 |
| b) Apply Curl to the vector of $\vec{A} = A_r \vec{a}_r + A_\theta \vec{a}_\theta + A_\phi \vec{a}_\phi$. | CO1 | L6 |
| c) Write expression of force on the moving charges. | CO4 | L2 |
| d) Express differential length, differential surface area and differential volume in Cylindrical coordinate system. | CO1 | L4 |
| e) Write Maxwell's equations in vacuum. | CO5 | L3 |

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

Marks CO BL

UNIT-I

2. a) Obtain expression of electrical field intensity due to infinite sheet of charge. 6M 1 L3
- b) State coulomb's law of force between many point charges and state the units of force. 6M 1 L2

OR

3. a) Point charges 5 nC and -2 nC are located at (2, 0, 4) and (-3, 0, 5), respectively. Determine the force on a 1-nC point charge located at (1, -3, 7). 6M 1 L3
- b) The three vertices of a triangle are located at A(6,-1, 2), B(-2, 3,-4), and C (-3, 1, 5). Find: (i) $R_{AB} \times R_{AC}$; (ii) the area of the triangle; (iii) a unit vector perpendicular to the plane in which the triangle is located. 6M 1 L3

UNIT-II

4. a) Deduce the expression of electric potential due to electric dipole. 6M 2 L2
- b) Derive an expression of conduction current density. 6M 2 L3

OR

5. a) Express boundary conditions between dielectric to conductor. 6M 2 L2
 b) Obtain an expression for capacitance of a parallel plate with composite dielectrics. 6M 2 L3

UNIT-III

6. a) What is vector magnetic potential? Derive Vector Poisson's equation. 6M 3 L1
 b) State and Explain Biot- Savart law. 6M 3 L3

OR

7. a) State and prove Ampere's circuital law in point form. 6M 3 L6
 b) A steady current of 1000 A is established in a long straight, hollow aluminum conductor of inner radius 1 cm and outer radius 2 cm. Assuming uniform resistivity, calculate magnetic flux density as a function of radius 'r' from the axis of the conductor. 6M 3 L3

UNIT-IV

8. Obtain the expressions of boundary conditions between two dielectrics. 12M 4 L2

OR

9. a) A toroid has air core and has a cross sectional area of 10mm² it has 1000 turns and its mean radius is 10mm. find its inductance. 6M 4 L3
 b) Describe an expression for Magnetic Torque and Magnetic Dipole moment. 6M 4 2

UNIT-V

10. a) Analyze integral form of Poynting theorem. 6M 5 L4
 b) Find the conduction and displacement current densities in a material having a conductivity of 10^{-3} S/m and $\epsilon_r = 2.5$, if the electric field in the material is $E = 5.8 \times 10^{-6} \sin(9 \times 10^9 t) \text{ V/m}$. 6M 5 L3

OR

11. a) With necessary explanation, derive the Maxwell equations in electromagnetic fields. 6M 5 L6
 b) Explain of Faraday's law for time-varying fields. 6M 5 L2

*** End ***

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R-20

Code: 20A241T

II B.Tech. II Semester Supplementary Examinations December 2023

Electrical Machines - II

(Electrical and Electronics 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 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) Differentiate squirrel cage and slip ring induction motor | 1 | L2 |
| b) The starting current and starting torque of induction motor increases with decrease in supply frequency. How is the starting current and starting torque related to the supply frequency? | 2 | L4 |
| c) Is the single phase induction motor self-starting? Why? | 3 | L2 |
| d) Define the term voltage regulation of a synchronous generator. | 4 | L1 |
| e) What are the applications of three phase synchronous motor? | 5 | 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 3.73 kW, 200 V, 50 Hz, 3-phase star connected induction motor gave the following test results:
No load test : 200 V, 5 A, 350 W
Blocked rotor test : 100 V, 26 A, 1700 W
A rotor Cu losses at standstill is half the total Cu loss.
Draw the induction motor circle diagram and calculate:
(i) Line current. (ii) Power factor. (iii) Maximum torque in terms of full load torque. | 12M | 1 L3 |
|--|-----|---------|

OR

- | | | |
|--|----------|--------------------|
| 3. a) Derive an expression for condition for maximum torque of an induction motor under running condition.
b) Explain in detail about crawling and cogging of induction motor | 6M
6M | 1 L2
1 L2 |
|--|----------|--------------------|

UNIT-II

- | | | |
|--|-----|---------|
| 4. Mention the methods of speed control of induction motor and explain any two methods of speed control of 3-phase squirrel cage induction motor | 12M | 2 L2 |
|--|-----|---------|

OR

5. List out the starting methods of an induction motor and explain the star-delta starter and autotransformer starter in detail 12M 2 L2

UNIT-III

6. a) Explain with reasons, why single-phase induction motors are not self-starting 6M 3 L2
- b) Explain the principle of operation of a capacitor start and run induction motor with a circuit diagram. 6M 3 L2

OR

7. a) Explain the construction and working of split phase induction motor and its applications. 6M 3 L2
- b) Explain the construction and working of permanent split capacitor (PSC) motor 6M 3 L2

UNIT-IV

8. a) Derive an expression for induced E.M.F per phase in a three phase alternator? Mention how different winding factors affect the induced e.m.f? 6M 4 L3
- b) Explain the MMF method of determining the voltage regulation of alternator. 6M 4 L2

OR

9. a) Explain the two-reaction theory as applied to salient-pole synchronous machines and draw its phasor diagram for lagging p.f. load. 6M 4 L2
- b) Bring out the characteristics of two alternators working in parallel. What are the effects of change in excitation on load sharing? 6M 4 L3

UNIT-V

10. a) A 3300V, star-connected synchronous motor has synchronous impedance of $0.4 + j5$ per phase. For an excitation e.m.f. of 4000V and motor input power of 1000kW at rated voltage, compute the line current and power factor. 6M 5 L4
- b) Write a short note on hunting of synchronous machines. 6M 5 L2

OR

11. a) Explain the operation of synchronous motor with constant excitation and constant load. 6M 5 L2
- b) Derive the expression for power delivered by a synchronous motor in terms of load angle (). 6M 5 L2

*** End ***

Hall Ticket Number :

R-20

Code: 20AC45T

II B.Tech. II Semester Supplementary Examinations December 2023

Managerial Economics & Financial Analysis

(Common to EEE & 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 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) List the demand forecasting Techniques | CO1 | L1 |
| b) Illustrate Iso-quants curve | CO2 | L2 |
| c) Define Oligopoly market | CO3 | L1 |
| d) Why capital budgeting decisions also known as investment decisions? | CO4 | L2 |
| e) The trial balance is a rationale in preparation of final accounts, how it would act? | 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. Under different elasticity of demand, explain the relationship between demand and revenue. | 12M | CO1 | L2 |
|---|-----|-----|----|

OR

- | | | | |
|--|----|-----|----|
| 3. a) Describe the role of managerial economics in business decision making. | 6M | CO1 | L2 |
| b) Discuss the nature and scope of managerial economics | 6M | CO1 | L2 |

UNIT-II

- | | | | |
|--|-----|-----|----|
| 4. Explain the cost output relationship in both short run and long run period. | 12M | CO2 | L3 |
|--|-----|-----|----|

OR

- | | | | |
|---|----|-----|----|
| 5. a) Define production function. Explain cobb-douglas function in detail. | 6M | CO2 | L3 |
| b) From the following details, find out : (i) Contribution per unit (ii) BEP (iii) Margin of safety (iv) Profit and (v) Volume of sales to earn a profit of Rs.24,000. Fixed cost Rs. 18,000; Variable cost Rs. 30,000 ; Sales Rs. 60,000 ; and units sold 20000. | 6M | CO2 | L3 |

UNIT-III

- | | | | |
|---|-----|-----|----|
| 6. Examine the features of monopoly competition through appropriate examples. | 12M | CO3 | L2 |
|---|-----|-----|----|

OR

- | | | | |
|--|----|-----|----|
| 7. a) Distinguish between the partnership firm and joint stock company. | 6M | CO3 | L2 |
| b) A firm under perfect competition, the seller is the price taker not the price maker" explain. | 6M | CO3 | L2 |

UNIT-IV

- | | | | |
|--|-----|-----|----|
| 8. Classify the capital budgeting Techniques and explain each. | 12M | CO4 | L4 |
|--|-----|-----|----|

OR

- | | | | |
|--|-----|-----|----|
| 9. A proposal is expected to generate cash flows of Rs. 8,000, 6,000, 4,000, 2,000 and Rs. 2,000 over next 5 years. Find the payback period of initial outlay required is a. Rs. 20,000 and b. 18,500. | 12M | CO4 | L4 |
|--|-----|-----|----|

UNIT-V

10. Prepare final accounts from the following trial balance of Snigdha Enterprises as on 31-03-2020.

Particulars	Debit Amount	Credit Amount.
Stock (1-1-2010)	3,000	
Purchases	14,000	
Fuel and gas	1,000	
Wages	3,000	
Printing & stationery	2,900	
Commission Received		6,000
Factory Rent	300	
Sales		28,800
Debtors	5,000	
Rent and Taxes	2,000	
Capital		25,000
Salaries	4,800	
Machinery	8,000	
Cash	2,000	
Creditors		5,500
Insurance	1,800	
Buildings	19,000	
Bills Payable		2,000
Furniture	4,900	
Interest received		800
Bank Overdraft		3,600
Total	71,700	71,700

Adjustments:

- Closing Stock Rs. 25,000.
- Unpaid wages Rs. 500.
- Outstanding salaries Rs. 1900.
- Depreciate Machinery by 10%.

12M CO5 L5

OR

11. a) Write the importance of final accounts preparation of an organization.
 b) Find out the current assets of a company from the following information:
 Inventory turnover ratio is 4 times. Inventory at the end is Rs. 20,000 more than the inventory in the beginning. Revenue from Operations Rs. 3,00,000 and gross profit ratio is 20% of revenue from operations.

6M CO5 L5

Current liabilities = Rs.40,000

Quick ratio = 0.75 : 1

6M CO5 L5

*** End ***

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R-20

Code: 20AC42T

II B.Tech. II Semester Supplementary Examinations December 2023

Numerical Methods and Random Variables

(Common to EEE and ECE)

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 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)
- | | | |
|--|-----|----|
| a) Explain Bisection method to find the real root of the equation $f(x)=0$. | CO1 | L1 |
| b) Consider the differential equation $\frac{dy}{dx} = f(x, y), y(x_0) = y_0$. Explain Taylor's series method for finding the approximate solution $y(x)$. | CO2 | L1 |
| c) Find the mean, median, and mode of the following data. 8, 12, 10, 11, 13, 12, 15, 9, 11, 16. | CO3 | L2 |
| d) Write a short note on Continuous Probability distribution function. | CO4 | L1 |
| e) If the probability of a defective bolt is 0.1, find
(i) the mean (ii) the standard deviation of the Binomial distribution in a total of 400 bolts. | 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) Apply Newton-Raphson's method to find the real root of the equation $x \log_{10} x - 1.2 = 0$ by taking suitable initial approximation. 6M CO1 L3
- b) From the following table of yearly premiums for policies maturing at quinquennial ages, estimate the premiums for policies maturing at the age of 46 years.

Age (x):	45	50	55	60	65
Premium (y):	2.87	2.40	2.08	1.86	1.71

6M CO1 L4

OR

3. a) Apply Regula falsi method to find the root of the equation $\cos x = xe^x$ correct to three decimal places. 6M CO1 L3
- b) Interpolate the value of the function $y=f(x)$ corresponding to $x=1$ using Lagrange's interpolation formula from the following set of data:

x	0	3	4
y=f(x)	12	6	8

6M CO1 L4

UNIT-II

4. a) Find the first and second order derivatives of the function tabulated below at the point $x=10$.

x	2	4	6	8	10
y	5.5	6.1	7.2	15.3	16

6M CO2 L4

Evaluate the integral $\int_0^6 \frac{dx}{1+x^2}$ by taking 7 ordinates (i.e. six sub intervals) using i) Trapezoidal rule and ii) Simpson's 3/8th rule.

6M CO2 L4

b)

OR

5. Apply Euler’s method to find the approximate value of y for x = 1, in step of $h=0.1$, given that $\frac{dy}{dx} = \frac{y-x}{y+x}$, with y=1 for x=0. 12M CO2 L4

UNIT-III

6. a) Calculate Mean, Median, Mode from the following grouped data:

x	0	1	2	3	4
Frequency (f)	1	5	10	6	3

6M CO3 L5

- b) Make use of correlation coefficient formula to find the correlation coefficient between the ages of husbands (x) and wives (y) from the following data.

x	23	25	26	28	29	30	31	33	35	36
y	18	20	22	27	21	29	27	29	28	29

6M CO3 L5

OR

7. Compute the rank correlation coefficient for the following data of the marks obtained by 8 students in the Physics (x) and Mathematics (y).

Marks in Physics (x)	15	20	28	12	40	60	20	80
Marks in Mathematics (y)	40	30	50	30	20	10	30	60

12M CO3 L5

UNIT-IV

8. a) A husband and wife appear in an interview for two vacancies in the same post. The probability of husband's selection is $\frac{1}{7}$ and that of wife's selection is $\frac{1}{5}$. What is the probability that (i) both of them will be selected? (ii) Only one of them will be selected and (iii) none of them will be selected? 6M CO4 L3
- b) Three urns contain 6 red, 4 black; 4 red, 6 black; 5 red, 5 black balls respectively. One of the urns is selected at random and a ball is drawn from it. If the ball drawn is red find the probability that it is drawn from the first urn. 6M CO4 L3

OR

9. In the following probability distribution

x	0	1	2	3	4	5	6
p(x)	k	2k	3k	4k	5k	6k	7k

Find i) the value of 'k' ii) $P(x<5)$, $P(x\geq5)$, $P(0<x<4)$ iii) mean and iv) Variance of the distribution. 12M CO4 L3

UNIT-V

10. a) If 10% of bolts produced by a machine are defective. Determine the probability that out of 10 bolts, chosen at random (i) one (ii) none (iii) at most 2 bolts will be defective. 6M CO5 L6
- b) The distribution of typing mistakes committed by a typist is given below. Fit Poisson distribution, and compare the theoretical frequencies with actual ones.

x	0	1	2	3	4	5
f	142	156	69	27	5	1

6M CO5 L6

OR

11. Assuming that the average life span of computers produced by a certain company is 2040 hours with standard deviation of 60 hours. Find the expected number of computers whose life span is
- (a) more than 2150 hours
 - (b) less than 1950 hours
 - (c) more than 1920 hours and less than 2160 hours from a lot size of 5000 computers. 12M CO5 L6

*** End ***

Code: 20A242T

II B.Tech. II Semester Supplementary Examinations December 2023

Electrical and Electronics Measurements

(Electrical and Electronics 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 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) Derive the expression for shunt resistor (Rsh) in terms of Rm and multiplying factor (m) to extend the range of given PMMC ammeter. | 1 | 2 |
| b) What are the causes for creeping error in induction type energy meter? | 2 | 1 |
| c) Mention some application of potentiometer? | 3 | 1 |
| d) Which bridge is used to measure medium-Q coils and why? | 4 | 2 |
| e) What are the advantages of digital instruments over analog instruments? | 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) Write briefly on the various torque in analog indicating instruments. | 6M | 1 | 2 |
| b) The coil of the 300 V moving iron voltmeter has a resistance of 500 Ohms and inductance of 0.8H. The instrument reads correctly at 50 Hz A.C Supply and takes 100mA at full scale deflection. What is the percentage error in the instrument reading, when it is connected to 200V D.C supply? | 6M | 1 | 3 |

OR

- | | | | |
|--|----|---|---|
| 3. a) Define limiting errors. Derive the expression for relative limiting error. | 6M | 1 | 2 |
| b) The coil of a measuring instrument has a resistance of $10\ \Omega$, and the instrument has a full-scale deflection of 250V when a resistance of 4990 Ω is connected in series with it. Find the value of shunt resistance for the instrument to give a full-scale deflection of 10A. | 6M | 1 | 3 |

UNIT-II

- | | | | |
|--|----|---|---|
| 4. a) What are the causes for errors in electro dynamo meter type wattmeters? Describe the methods to minimize these errors in electro dynamo meter wattmeters? | 6M | 2 | 2 |
| b) A correctly adjusted, single phase, 240V induction watt-hour meter has a meter constant of 600 revolutions per kWh. Determine the speed of the disc, for a current of 10A at a power factor of 0.8 lagging. If the lag adjustment is altered so that the phase angle between voltages coil flux and applied voltage is 80° . Calculate the error introduced at
i) unity p.f. ii) 0.2 p.f. lagging | 6M | 2 | 3 |

OR

- | | | | |
|---|----|---|---|
| 5. a) With a neat diagram, explain the constructional details and working principle of an electro dynamometer type wattmeter. | 6M | 2 | 2 |
|---|----|---|---|

- b) The current and flux produced by series magnet of an induction watt-hour meter are in phase but there is an angular departure of 3 degrees from quadrature between voltage and the stator magnet flux. The speed of disc at full load and unity power factor is 40 rpm. Assuming the meter to resist correctly under this condition, calculate its speed at $\frac{1}{4}$ full load and 0.5 power factor lagging. Also find the percentage error.

6M 2 4

UNIT-III

6. a) Explain the functioning of Ferro-dynamic type electrical resonance frequency meter.
- b) Power is measured with an a.c. potentiometer. The voltage across a 0.1 ohm standard resistance connected in series with the load is $0.35 - j0.10$ V. The voltage across 300:1 potential divider connected to the supply is $0.8 + j0.15$ V. Determine the power consumed by the load and the power factor.

6M 3 2

6M 3 4

OR

7. a) Explain in detail about the laboratory type DC potentiometer. And give the applications of AC potentiometers.
- b) Design a volt ratio box with a resistance of 20ohm/volts and ranges 50V, 100V, 150V, 300V. The volt ratio box is to be used with a potentiometer having a measuring range of 1.7V.

6M 3 2

6M 3 4

UNIT-IV

8. a) Draw the circuit of a Kelvin's double bridge used for measurement of low resistances. Derive the condition for balance.
- b) The four arms of a Wheatstone bridge are as follows:
 $AB=200$, $BC=2000$, $CD=4000$ and $DA=400$. The Galvanometer has a resistance of 15 , a sensitivity of $100 \text{ mm}/\mu\text{A}$ and is connected across arm AC. A source of 5V DC is connected across the terminals BD. Calculate the current through the galvanometer and its deflection if the resistance of arm DA is changed from 400 to 405 .

6M 4 3

6M 4 5

OR

9. a) Explain construction and working principle of Desauty's bridge used for measurement of capacitance with neat diagram.
- b) In an Anderson's bridge for the measurement of inductance the arm AB consists of an unknown impedance with L and R , a known variable resistance in arm BC, fixed resistance of 600 each in arms CD & DA, a known variable resistance in arm DE, and a capacitor with fixed capacitance of $1\mu\text{F}$ in the arm CE. The a.c supply of 100 Hz is connected across A and C, and the detector is connected between B & E, If the balance is obtained with a resistance of 400 in the arm DE and a resistance of 800 in the arm BC, Calculate the value of unknown R and L.

6M 4 3

6M 4 5

UNIT-V

10. a) Explain the construction and working of a Digital Volt Meter (DVM) with a block diagram?
- b) A $3\frac{1}{2}$ digit voltmeter is used for measuring voltage
- (i) Find the resolution of the instrument.
- (ii) How would a reading of 14.53 V be displayed on 100 V scale?

6M 5 2

6M 5 3

OR

11. a) If a 4 digit DVM is used to measure 10.225 volts what should be the reading of the meter if 10 V range is selected?
- b) Explain the construction and working of smart energy meter.

6M 5 3

6M 5 2

*** End ***