Hall Ticket Number :										

R-20

Code: 20A243T

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

Electromagnetic Fields

(Electrical and Electronics 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)

1. **Answer ALL the following short answer questions** (5 X 2 = 10M)		CO	BL
a) Consider cylinder length L and radius R. obtain its volume by integration.		CO1	L3
b) Write an expression for parallel plate capacitor.		CO2	L3
c) State ampere's law.		CO3	L1
d) Draw B-H curve for magnetic materials.		CO4	L1
e) Write any two Maxwell's equations.		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) Express the following vectors into Cartesian coordinates $° z \sin ¤ \overline{a°} + 3 ° \cos ¤ \overline{a¤} + ° \cos ¤ \sin ¨ \overline{az}$	6M	1	L2
	b) Four concentrated charges Q1=0.3pC, Q2=0.2pC, Q3=-0.3pC, Q4=0.2pC are located at the vertices of a plane rectangle. The length of rectangle is 5 cm and breadth of the rectangle is 2cm. Find the magnitude and direction of resultant force on Q1?	6M	1	L2
	OR			
3.	a) State Gauss's law and obtain the expression of $\nabla.\overline{D} = \rho_v$	6M	1	L1
	b) Obtain expression of electrical field intensity due to infinite line charge.	6M	1	L3
	UNIT–II			
4.	a) Determine whether or not the following potential fields satisfy the Laplace's equation i)V= rcosΦ+z ii)V=rcosθ+Φ	6M	2	L3
	b) Obtain an expression for the energy stored in electrostatic fields. State its units.	6M	2	L2
	OR			

5.	a)	Analyze boundary conditions between dielectric to dielectric.	6M	2	L4
	b)	Obtain an expression for capacitance of a coaxial cable.	6M	2	L4

UNIT–III

6.	a)	State and Explain Biot- Savart law.	6M	3	L2
	b)	Obtain the expressions for scalar magnetic potential.	6M	3	L3

OR

7.	a)	State Ampere's circuital law and verify $\nabla \times \overline{H}$ = J.	6M	3	L5
	b)	A plane y=1 carries a current K=50az. Find Hat i) (0,0,0) ii) (1,5,-3)	6M	3	L3

UNIT–IV

8.	a)	Obtain the expressions for Force between two straight long and parallel current carrying conductors.	6M	4	L3
	b)	Formulate an expression for inductance of toroid.	6M	4	L6

OR

9.	a)	A solenoid of 10 cm in length consists of 1000 turns having the cross-sectional radius of lcm. Find the inductance of the solenoid. What is the value of the current required to maintain a flux of lmWb in the solenoid? Take μr=10.	6M	4	L3
	b)	Formulate an expression for Energy stored in magnetic fields.	6M	4	L6

UNIT–V

10.	a)	Find the displacement current density within a parallel plate capacitor having dielectric with ε_r = 10 and area of plates A= 0.01 m^2 distance of separation= 0.05 mm, applied voltage is V= 200 sin 200t.	6M	5	L3
	b)	Obtain expression of modified amperes circuital law.	6M	5	L6

OR

11.	a)	Derive pointing theorem in time varying field.	6M	5	L3
	b)	State and Explain Faraday's 1st and 2nd laws of electromagnetic Induction.	6M	5	L2

*** End ***

Hall Ticket Number :										

R-20

Code: 20A241T

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

Electrical Machines - II

(Electrical and Electronics 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) The induction motor is called as asynchronous motor. Justify.		1	L2
b) Mention any two speed control methods from stator side of Induction		2	L1
c) Write the applications of single-phase induction motors.		3	L2
d) What are the differences between salient and non-salient pole alternators?		4	L1
e) What is hunting phenomenon?		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)	Describe the principle of operation of a 3-phase induction motor.	6M	1	L2
b)	With a neat diagram, explain the constructional details of Three phase induction motor	6M	1	L2
	OR			
3.	A 10 kW, 400 V, 4-pole delta connected squirrel cage induction motor gave the following test results: No load test: 400 V, 8A, 250 W Blocked rotor test: 90 V, 35 A, 1350 W. The dc resistance of the stator winding per phase measured immediately after the blocked rotor test is 0.6Ω Calculate the rotational losses and the equivalent circuit parameters.	12M	1	L3
	UNIT–II			
4.	What are the various methods of starting of induction motor? Explain any two in detail.	12M	2	L2
	OR			
5.	Mention the methods of speed control of induction motor and explain any two methods of speed control of 3-phase squirrel cage induction motor in detail	12M	2	L2

UNIT–III

6.	a)	What are the shaded pole motors? Explain the working of shaded pole motors with proper circuit diagram.	6M	3	L2
	b)	Develop equivalent circuit of a single phase induction motor ignoring core losses.	6M	3	L6

OR

7.	a)	Compare between capacitor start motors and split phase motors.	6M	3	L4
	b)	Explain the construction and working of universal motor	6M	3	L2

UNIT–IV

8.	a)	Give a detailed constructional feature of Synchronous machine with the following: (i) Salient-pole. (ii) Cylindrical-rotor.	6M	4	L2
	b)	A 3-phase star connected alternator is rated 1600 kVA, 13,500 V. The armature effective resistance and synchronous reactance are 1.5Ω and 30Ω respectively per phase. Calculate the percentage regulation for a load of 1280 kW at power factor of 0.8 leading.	6M	4	L3

OR

9.	a)	Explain synchronous impedance method to predetermine the voltage regulation of an alternator.	6M	4	L2
	b)	Find synchronous impedance and reactance of an alternator in which a given filed current produces an armature current of 200 A on short circuit and a generated e.m.f of 50 V on open circuit. If Ra = 0.1Ω. Find necessary induced voltage to deliver a load of 100A at p.f of 0.8 lagging with a terminal voltage of 200 V.	6M	4	L3

UNIT–V

10.	a)	With the help of a neat vector diagram, explain the operation of synchronous motor as synchronous condenser.	6M	5	L2
	b)	Draw and explain V and inverted V curves of synchronous motor.	6M	5	L4

OR

11.	a)	Discuss the principle of operation of a synchronous motor. Also list their applications	6M	5	L2
	b)	Explain the construction of damper winding. Clearly show the location of damper winding.	6M	5	L2

*** End ***

Hall Ticket Number :										

R-20

Code: 20AC45T

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

Managerial Economics & Financial Analysis

(Common to EEE & 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)	Write the demand determinants		CO1	L1
b)	Describe the economies of scale		CO2	L3
c)	Define Cooperative society		CO3	L1
d)	What are the internal sources of capital		CO4	L1
e)	Write the features of trial balance		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.		Discuss the scope of managerial economics in business decision making.	12M	CO1	L2
		OR			
3.	a)	Define elasticity of demand. Discuss the methods to measure elasticity of demand	6M	CO1	L2
	b)	What do you mean by demand forecasting? How demand of particular commodity can be forecasted?	6M	CO1	L2
		UNIT–II			
4.		If machines were variable and labour fixed, how would the general shape of the short run average cost curve and marginal cost curve change?	12M	CO2	L3
		OR			
5.	a)	Explain the production function and influencing factors.	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.		Distinguish between the sole trader concern and partnership firm.	12M	CO3	L2
		OR			
7.		Explain the price determination of a firm under perfect competition in the product market.	12M	CO3	L2
		UNIT–IV			
8.		A company is considering the replacement of its existing machine which is obsolete and unable to meet the rapidly rising demand for its product. The company is faced with two alternatives: 1. To buy machine A which is similar to the existing machine or 2. To go in for machine B which is more expensive and has much greater capacity. The cash flows the present level of operations under the TWO alternatives are as follows:			

Cash flows (in lakhs of Rs.) at the end of year:

Years/Machines	0	1	2	3	4	5
Machine-A	-25	-	5	20	14	14
Machine-B	-40	10	14	16	17	15

The company's cost of capital is 10%. Evaluate the machine by calculating the Net Present Value. 12M CO4 L4

OR

9. Define Capital. What are the main sources of raising capital in detail? 12M CO4 L4

UNIT–V

10. From the following balances of Ved & Co. prepare the trading and profit and loss account and balance sheet as on 31-03-2020.

Debit Balances	Amount	Credit Balances	Amount
Drawings	6,300	Capital	1,50,000
Cash at bank	13,870	Discount received	2,980
Bills receivable	1,860	Loans	15,000
Loan and Building	42,580	Purchases return	1,450
Furniture	5,130	Sales	2,81,500
Discount allowed	3,960	Reserve for bad debts	4,650
Bank charges	100	Creditors	18,670
Salaries	6,420		
Purchases	1,99,080		
Stock (opening)	60,220		
Sales return	1,870		
Carriage	5,170		
Rent and Taxes	7,680		
General expenses	3,630		
Plant and Machinery	31,640		
Debtors	82,740		
Bad debts	1,250		
Insurance	750		
	4,74,250		**4,74,250**

Adjustments:

a) Closing stock Rs. 70,000
b) Create a reserve for bad and doubtful debts @10%
c) Insurance prepaid Rs. 50
d) Rent outstanding Rs. 150 and

Interest on loan is due @ 6% p. a. 12M CO5 L5

OR

11. a) Write the advantages of financial analysis for an organization. 6M CO5 L5

b) Given the following information:

Particulars	Rs.
Revenue from Operations	3,40,000
Cost of Revenue from Operations	1,20,000
Selling expenses	80,000
Administrative Expenses	40,000

Find out Gross profit ratio and Operating ratio. 6M CO5 L5

*** End ***

Hall Ticket Number :										

R-20

Code: 20AC42T

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

Numerical Methods and Random Variables

(Common to EEE and ECE)

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 missing value in the following table using forward difference operator.

x	0	1	2	3	4
y	1	3	9	-	81

CO1 L1

b) Consider the differential equation $\frac{dy}{dx} = f(x, y), y(x_0) = y_0$. Explain Euler's method for finding the approximate solution *y(x).* CO2 L1

c) Find the mean and median of the data set. 15, 13, 9, 9, 7, 1, 11, 10, 13, 1, 13. CO3 L2

d) Write a short note on Discrete Probability distribution function. CO4 L1

e) Find the mean of the Poisson distribution. 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 Regula Falsi method to find the real root of the equation $3x - \cos x - 1 = 0$. 6M CO1 L3

b) Apply Newton's Forward interpolation formula to find number of students who obtained marks between 40 and 45 from the following data.

Marks	30-40	40-50	50-60	60-70	70-80
Number of students	31	42	51	35	31

6M CO1 L4

OR

3. a) Apply Newton-Raphson's method to find the real root of the equation $xe^x = 2$ by taking suitable initial approximation. 6M CO1 L3

b) Apply Lagrange's interpolation formula to find f(x) from the data. Hence, find f(3.5).

x	0	2	3
f(x)	0	8	27

6M CO1 L4

UNIT–II

4. Apply Runge-Kutta method of order 4 to find the approximate value of y for x = 0.2, in step of *h=0.1* if $\frac{dy}{dx} = x + y^2, y = 1 \text{ when } x = 0.$ 12M CO2 L4

OR

5. a) From the following table, find the values of $\frac{dy}{dx}, \frac{d^2y}{dx^2}$ at x = 2.02.

x	1.96	1.98	2	2.02	2.04
f(x)	0.78	0.77	0.76	0.75	0.74

6M CO2 L4

b) A river is 60 feet wide. The depth d (in feet) of the river at a distance x from one bank is given by the following table.

Distance (x)	0	10	20	30	40	50	60
Depth (d)	0	3	7	10	12	8	4

Find approximately the area of the cross-section of the river $\int_0^{60} y\,dx$ using Simpson's 1/3rd rule. 6M CO2 L4

UNIT–III

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

Class	2-4	4-6	6-8	8-10
Frequency(*f*)	3	4	2	1

6M CO3 L5

b) Find the coefficient of correlation between industrial production and export using following data.

Production(in crore tones)	55	56	58	59	60	60
Exports (in crore tones)	35	38	38	39	44	43

6M CO3 L5

OR

7. The following marks have been obtained by ten students in Physics (x) and Mathematics (y). Compute the rank correlation coefficient.

x	68	64	75	50	64	80	75	40	55	64
y	62	58	68	45	81	60	68	48	50	70

12M CO3 L5

UNIT–IV

8. An urn I contains 3 white and 4 red balls and an urn II contains 5 white and 6 red balls. One ball is drawn at random from one of the urns and is found to be white. Find the probability that it was drawn from urn I. 12M CO4 L3

OR

9. Define Continuous Probability distribution function. The frequency function of a continuous random variable is given by $f(x) = Cx(2-x)$ for $0 \le x \le 2$. Find the value of C, mean and variance of x. 12M CO4 L3

UNIT–V

10. Four coins were tossed 200 times. The number of tosses showing 0, 1, 2, 3 and 4 heads was found as under.

No. of Heads (x)	0	1	2	3	4
No. of Tosses (f)	15	35	90	40	20

Fit a Binomial distribution to above observed results and compare the theoretical frequencies with actual ones. 12M CO5 L6

OR

11. Let X be a continuous random variable, « is the mean and ± is the standard deviation of the normal distribution. In a normal distribution, 31% of the items are under 45 and 8% are over 64. Find the mean and standard deviation of the distribution. 12M CO5 L6

*** End ***

Hall Ticket Number :										

R-20

Code: 20A242T

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

Electrical and Electronics Measurements

(Electrical and Electronics 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 are the different types of errors in the measuring instruments?		1	1
b)	List the common error adjustments for single phase energy meter?		2	2
c)	What is the difference between a.c and d.c calibrations?		3	1
d)	A Kelvin bridge is balanced with the following constants : Outer ratio arm 100ohm and 1000ohm; inner arms ratio 99.92ohm and 1000.6ohm; resistance of link is 0.1ohm; standard cell 0.0037ohm. Calculate the value of unknown resistance		4	3
e)	What are the advantages of using digital voltmeter in particular?		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)	Describe the construction and working of PMMC instrument	6M	1	2
	b)	The inductance of a certain moving iron ammeter is $[8+4\theta-(1/2)\theta^2]$ μH where θ is the deflection in radians from zero position. The control spring torque is $12*10^{-6}$ N-m/rad. Calculate the scale position in radians for a current of 4A.	6M	1	3
		OR			
3.	a)	With a neat sketch explain the construction and working of moving iron instrument. Give the torque equation.	6M	1	2
	b)	A moving coil instrument has at normal temperature a resistance of 10ohm and a current of 45milliampere gives a full scale deflection. If this resistance rises to 10.2ohm due to temperature change. Calculate the reading when a current of 2000A is measured by means of a 0.225mA shunt of constant resistance. What is the percentage error?	6M	1	3
		UNIT–II			
4.	a)	Derive the torque equation of electro dynamometer type instrument?	6M	2	2
	b)	A 230 V, 1-Φ watt hour meter has a constant load of 4 A passing through it for 6 hours at unity power factor. i) If the meter disc makes 2208 revolutions during this period what is meter constant in rev/kwh. ii) Calculate the power factor of the load if the no. of revolutions made is 1472 when operating at 230 V, 5 A for 4 hours.	6M	2	3
		OR			
5.	a)	What is the effect of load power factor on the reading of wattmeters used for measurement of 3-phase active power in two-wattmeter method? Describe with the help of suitable examples	6M	2	2
	b)	A wattmeter having a range of 500 w has an error of ±1.5 percent of full scale deflection. If the true power is 50w, what should be the range of readings? If the Error is specified as percentage of true value, what would be the range of the readings?	6M	2	3

UNIT–III

6.	a)	Draw the circuit diagram of a crompton's potentiometer and explain its working. Describe the steps used when measuring an unknown resistance	6M	3	2
	b)	In the measurement of power by polar potentiometer, the following were obtained: voltage across a 0.2 Ω standard resistance in series with the load=1.46∟32° V; voltage across a 200:1 potential divider across the line =1.37∟56°V. Estimate the current, power and power factor of the load.	6M	3	3

OR

7.	a)	Describe the working of Crompton's potentiometer and explain how it is standardized.	6M	3	2
	b)	A basic slide wire potentiometer has a working battery voltage of 3V. The resistance of slide wire is 200Ω and its length is 200cm. The slide wire has 1mm scale divisions and it is possible to read up to 1/5 of a division. The instrument is standardized with 1.018V standard cell with sliding contact at 101.8 cm. Calculate i) working current ii) the resistance of series rheostat iii) the measurement range iv) the resolution of instrument	6M	3	3

UNIT–IV

8.	a)	Give the classification of resistance based on the value. What are the problems to measure low resistance and high resistance using traditional voltmeter and ammeter method? How these problems are minimized using bridge method?	6M	4	4
	b)	In a low voltage Schering bridge designed for the measurement of permittivity, the branch ab consists of two electrodes between which the specimen under test may be inserted: arm bc is a non-reactive resistor R_3 in parallel with a standard capacitor C_3, arm cd is a non reactive resistor R_4 in parallel with a standard capacitor _4 , arm da is a standard air capacitor of capacitance C_2. Without the specimen between electrodes , balance is obtained with the following values: $C\_(3 =)$ C_4=120 pF, C_2=150 pF, $R\_(3 =)$ R_4=5000 Ω. With the specimen inserted these values become $C\_(3 =)$ 200 pF, $C\_(4 =)$ 1000 pF, $C\_(2 =)$ 900 pF and $R\_(3 =)$ R_4=5000 Ω. In each test ω=5000 rad/sec. Find the relative permittivity of the specimen.	6M	4	5

OR

9.	a)	Explain construction and working principle of Wien's bridge for measurement of frequency with neat diagram.	6M	4	4
	b)	The arms of a five node bridge are as follows : Arm ab : an unknown impedance (R1,L1) in series with a non-inductive variable resistor r1, arm bc : a non-inductive resistor R3=100 Ω; arm cd : a non-inductive resistor R4=200Ω; arm-da: a non-inductive resistor R2=250Ω; arm de: a non-inductive variable resistor r; arm ec: a loss-less capacitor C=1 μF, and arm be : a detector. An a.c. supply is connected between a and c. Calculate the resistance and inductance R1, L1 when under balance conditions r1=43.1Ω and r=229.7Ω.	6M	4	5

UNIT–V

10.	a)	Explain with neat circuit diagram the working of successive approximation type DVM.	6M	5	2
	b)	Explain the following term as applied to digital displays 3½ digit and 4½ digit display.	6M	5	3

OR

11.	a)	Explain the working of a digital multimeter with a schematic block diagram.	6M	5	2
	b)	A certain 3½ digit DVM has an accuracy specifications of ±0.5 percent of reading ±2 digits. What is the possible error, in volt, when the instrument is reading 5.00 V on its 10 V range?	6M	5	3

*** End ***