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 $E \sin \frac{t}{\sqrt{LC}}$ 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: 20A224T

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

Electrical Circuits and Technology

(Electronics and Communication 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

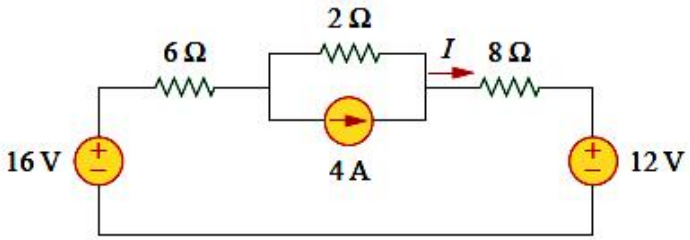
(Compulsory question)

		CO	BL
1.	Answer ALL the following short answer questions (5 X 2 = 10M)		
a)	Determine the initial conditions of the capacitor.	CO1	L3
b)	Define the quality factor and peak factor.	CO1	L2
c)	For a symmetrical and reciprocal network, if the transmission parameters are A= 2 and B=3 then, determine the other parameters.	CO1	L3
d)	Outline the equivalent circuit of a single-phase transformer.	CO1	L2
e)	What is the torque equation for a 3-phase induction motor?	CO1	L2

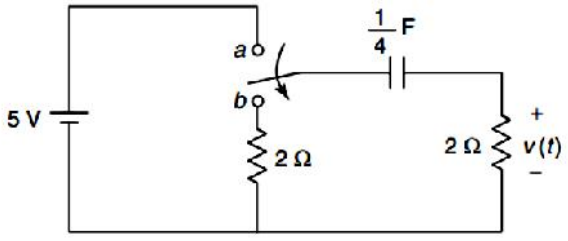
PART-B

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

		Marks	CO	BL
	UNIT–I			
2. a)	Find the current I in the circuit shown below	6M	CO1	L3

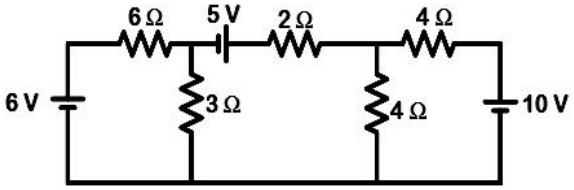


b)	Determine the voltage v(t) for t>0 for the network shown in figure:	6M	CO1	L4

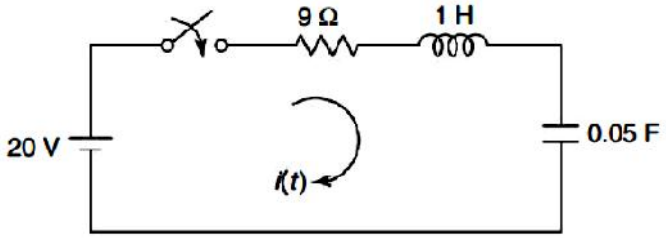


OR

3. a)	Find the power dissipated in 3Ω resistor of the circuit shown in figure using Nodal analysis.	6M	CO1	L4



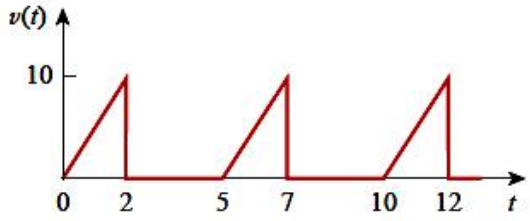
b) For the network shown in figure, the switch is closed at t=0 Obtain the expression for i(t) for t>0.



6M CO1 L4

UNIT–II

4. a) Find the average and rms value of the voltage waveform of the figure shown below.



6M CO2 L3

b) Develop the expression for the resonant frequency of RLC series circuit. 6M CO2 L3

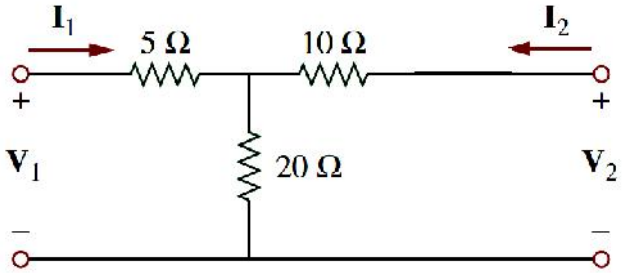
OR

5. A voltage V = 10 sinwt Is applied to series RLC circuit. Under resonance condition the max voltage across capacitor is found to be 500V, bandwidth is 400 rad/sec and the impedance at resonance is 100 ohms. Find the resonant frequency and circuit constants. 12M CO2 L3

UNIT–III

6. a) Express ABCD parameters in terms of admittance parameters for a generalized network. 6M CO3 L3

b) Compute the *z* parameters of the circuit in figure. Invistigate whether the netwok is symmetrical and reciprocal.



6M CO3 L4

OR

7. a) The Z parameters of a two port network are Z_{11}=6Ω, Z_{22}=4Ω, Z_{12}=Z_{21}= 3Ω Compute hybrid Parameters and write the describing equations. 6M CO3 L3

b) Obtain the *y* parameters for the two-port shown in Figure:

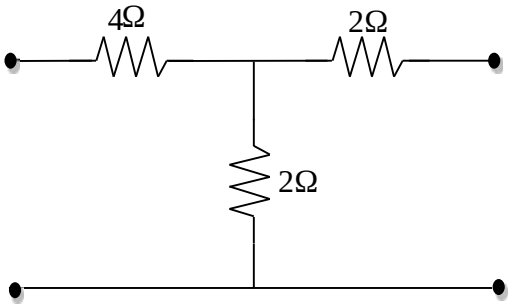


Fig.4

6M CO3 L4

UNIT–IV

8. a) Explain the significance of back EMF of a DC motor. Derive the torque equation of a DC motor. 6M CO4 L3

b) A 4-pole DC series motor has 946 wave-connected armature conductors. At a certain load the flux per pole is 34.8 mWb and the total mechanical torque developed is 205 N-m. Calculate the line current taken by the motor and the speed at which it will run with an applied voltage of 500 V. Take total armature resistance as 3 Ω. 6M CO4 L3

OR

9. a) Select and discuss suitable technique for controlling speed of DC shunt motor at above rated speed. Write the applications of DC shunt motor. 6M CO4 L3

b) Develop the expression for emf equation of DC generator. 6M CO4 L3

UNIT–V

10. a) Derive an expression for the emf induced in a transformer winding. Show that emf per turn in primary is equal to emf per turn in the secondary. 6M CO5 L2

b) Explain the OC & SC tests on 1-Φ transformer in brief. 6M CO5 L3

OR

11. a) Draw and explain the slip-torque characteristic of a typical induction motor. How do starting and maximum torques vary with the rotor resistance? 6M CO5 L2

b) Explain the principle of operation of 3-Φ induction motor. 6M CO5 L3

*** End ***

Hall Ticket Number :										

R-20

Code: 20A421T

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

Electronic Devices and Circuits

(Electronics and Communication 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) Draw the circuit diagram of fixed bias arrangement of a JFET CO1 L1

b) Explain thermal stability CO2 L2

c) Give the Comparisons between CB, CE, CC configurations CO3 L3

d) What are the different types of FETs CO4 L2

e) Differentiate between ordinary diode and PN junction diode 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)	Derive the equation for stability factor for fixed bias.	6M	1	L1
	b)	Write a short notes on Stabilization against variations in VBE and β.	6M	2	L2
		OR			
3.	a)	Explain CE configuration with the help of input and output characteristics.	8M	3	L1, L2
	b)	Explain the need for biasing in electronic circuits. What are the factors affecting the stability factor.	4M	2	L2
		UNIT–II			
4.		Explain the working of a depletion type MOSFET with a neat construction diagram and its characteristics.	12M	3	L3
		OR			
5.	a)	With a neat sketch explain the operation of Enhancement mode MOSFET.	6M	3	L4
	b)	Explain the principle of Voltage divider bias used in FETs.	6M	3	L2

UNIT–III

6.	a)	Deduce the relationship between Drain resistance, Trans-conductance and Amplification factor of FET amplifier	6M	4	L2
	b)	With neat circuit diagram, explain the small signal model of CE amplifier	6M	5	L3
		OR			
7.		Discuss about input Impedance, Output impedance, Voltage gain and Current gain of an amplifier.	12M	4	L4

UNIT–IV

8.	a)	Compare BJT and FET.	6M	4	L3
	b)	Explain how FET works as voltage variable resistor.	6M	5	L4
		OR			
9.	a)	Explain the drain VI characteristics of p-channel JFET.	6M	4	L4
	b)	Differentiate between CD an CS amplifiers	6M	3	L3

UNIT–V

10.	a)	Write short notes on i) Varactor diode ii) Photo diode	6M	3	L5
	b)	Draw the energy level diagram of a tunnel diode and explain the operation of tunneling effect	6M	4	L4
		OR			
11.	a)	Draw the energy level diagram of an LED and explain how it emits light.	6M	5	L3
	b)	Draw the structure, symbol and circuit diagram of UJT and explain its operation.	6M	5	L5

*** End ***

Hall Ticket Number :										

R-20

Code: 20AC23T

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

Chemistry

(Common to EEE, ECE, and AI&ML)

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 solid-state ion selective electrode. Give two examples.	CO1	L1
	b) Distinguish between cell and battery.	CO2	L2
	c) What is copolymerization. Give any one example.	CO3	L1
	d) Describe the basic principle of IR-Spectroscopy.	CO4	L2
	e) Define molecular elevator.	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.	Discuss the origin of electrode potential? Derive the Nernst equation for determination of single electrode potential	12M	CO1	L4
	OR			
3. a)	Describe the classification gas sensing electrodes. Give its significance.	6M	CO1	L2
b)	Explain briefly how the Nernst equation is useful in calculating the electrode potential. Calculate the electrode potential of copper wire (1M) dipped in 0.1M copper sulphate solution at 25 ^{O}C. The standard electrode potential of copper is 0.34V.	6M	CO1	L3
	UNIT–II			
4. a)	Distinguish between primary and secondary batteries.	6M	CO2	L2
b)	What are dry cells? Explain the respective cell reactions involved in Leclanché cell.	6M	CO2	L2
	OR			

5.		Discuss about the classification of fuel cells. Differentiate between ordinary galvanic cell and fuel cell. Give the advantages of fuel cells.	12M	CO2	L4

UNIT–III

6.		What are conducting polymers? Discuss about the mechanism conduction in poly acetylene. Give its applications.	12M	CO3	L4

OR

7.	a)	Discuss about the preparation and applications of the following polymers. i) Urea- formaldehyde resin ii) Buna-N	8M	CO3	L4
	b)	Comment on "All thermosets are condensation polymers but all condensation polymers may not be thermosets. Explain?	4M	CO3	L2

UNIT–IV

8.		Describe the principle of Thin Layer chromatography (TLC)? How do you separate components of a sample mixture by Thin Layer chromatography?	12M	CO4	L2

OR

9.	a)	Discuss about Beer-Lambert's law. Give its limitations.	6M	CO4	L4
	b)	Distinguish between Potentiometry and conductometry.	6M	CO4	L2

UNIT–V

10.		What are rotaxanes? Describe the structure of rotaxane.	12M	CO5	L2

OR

11.	a)	Define molecular switches. Discuss about cyclodextrin - based molecular switches.	6M	CO5	L4
	b)	Distinguish between rotaxane and catenane. Describe the linear motions in rotaxanes.	6M	CO5	L2

*** End ***

Hall Ticket Number :										

R-20

Code: 20AC25T

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

Communicative English

(Common to EEE, ECE and AI&ML)

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)	Is it correct to judge a classmate's character by his very first acquaintance, according to William Hazlitt?	CO1	L2
b)	Explain the following lines: "For men may come and men may go, But I go on forever."	CO1	L2
c)	What did Muhammad Yunus learn when he interviewed a woman who was making bamboo stools?	CO1	L2
d)	Why does the prince feel "Life is so horribly fascinating when one is young"?	CO1	L2
e)	What do you learn from the life story of Mrinalini Sarabhai?	CO1	L2

PART-B

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

		Marks	CO	BL
	UNIT–I			
2.	Why should a pupil be courteous and polite to his classmates, according to William Hazlitt?	12M	CO1	L4
	OR			
3. a)	Change the following statements into questions. i. He killed a tiger. ii. He has an ulcer on his leg. iii. We shall be living in a day or two. iv. I prefer your company to theirs. v. The child has been suffering from viral fever since last week. vi. Time and tide waits for none.	6M	CO3	L3
b)	Identify the parts of speech for the underlined words in the following sentences. i. Bad habits grow unconsciously. ii. He is too ill to go to work. iii. The book is where you left it.	6M	CO3	L3
	UNIT–II			
4.	How successful is Alfred Lord Tennyson in conferring human qualities to the brook?	12M	CO2	L4
	OR			
5.	Write a well-constructed paragraph on Time is Money.	12M	CO2	L4

UNIT–III

6. In what ways does Dr Stronetz succeed in saving the prince's life from the blood-thirsty assassins? 12M CO3 L4

OR

7. a Rearrange each group of jumbled sentences below so as to have well-written paragraphs.
   i. It teaches you to interact with people, communicative with them and collaborate as a team.
   ii. Research has shown that playing badminton, tennis, cricket or baseball is said to improve mathematical skills in children.
   iii. They help develop one's personality, thanks to the numerous 'similar to life' situations that one experiences.
   iv. It helps develop leadership qualities too and fosters a sense of team spirit.
   v. Playing helps in the development of social skills.
   vi. It fosters collective thinking and harnesses your planning and delegation skills too.
   vii. Sports inculcate a sense of competition and help you deal with success and failure with a positive spirit. 7M CO4 L3

   b Put the verbs in correct form.
   i. I _____ relived to see that my friend had corrected the draft. (be)
   ii. They always _____ coffee at breakfast. (drink)
   iii. Sheldon _____ the process of strategic management. (describe)
   iv. Smriti _____ five kilometers a day for the last three years. (walk)
   v. He _____ here all his life. (live) 5M CO4 L3

UNIT–IV

8. What was Muhammad Yunus's idea of a "micro-credit model"? What major changes did it bring in the lives of Bangladeshi women? 12M CO1 L4

OR

9. Prepare an analytical essay on "Income Inequality: It's Causes and Consequences." 12M CO4 L4

UNIT–V

10. Correct the following sentences and rewrite them.
   a) She said that she will come home on Sunday.
   b) The place is not as bad like it looks.
   c) The management compensated him the loss.
   d) He has too much proudness to ask for help.
   e) The war lasted almost hundred years.
   f) They were shocked over the sight of the destruction.
   g) The burglar got in by the window besides the door.
   h) They have left for Bombay yesterday.
   i) He is driving too fastly.
   j) My sister always worked hardly.
   k) When did they arrived?
   l) l. Suppose if it rains, where shall we go? 12M CO3 L3

OR

11. Narrate the inspiring story of Mrinalini Sarabhai and describe the left by her for future generation. 12M CO4 L4

*** End ***