Hall Ticket Number :

Code: 20AC23T
I B.Tech. II Semester Regular & Supplementary Examinations September 2022
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 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) Write about gas sensing electrodes		CO1	L1
b) Compare primary batteries, secondary batteries and fuel cells.		CO2	L2
c) Outline the preparation of Buna-N rubber		CO3	L4
d) State the beer lambert law with its mathematical expression.		CO4	L1
e) What are molecular machines? Give TWO examples.		CO5	L1

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 single electrode potential? Derive Nernst equation for the determination of single electrode potential.		6M	CO1	L2
b) Describe the construction and working of Calomel electrode.		6M	CO1	L2

OR

3. a) Explain the construction of galvanic cell and its conventions. Derive an equation for the determination of cell potential of galvanic cell.		6M	CO1	L2
b) What is an ion selective electrode? Give the classification of selective electrodes.		6M	CO1	L2

UNIT–II

4. a) Describe the construction, working and applications of Leclanche battery.		6M	CO2	L2
b) Illustrate the construction working and applications of H_2-O_2 fuel cell.		6M	CO2	L4

OR

5. a) Describe the construction, working and applications of Li-MnO2 battery.   6M   CO2   L2

b) Illustrate the construction working and applications of propane-oxygen fuel cell.   6M   CO2   L4

UNIT–III

6. a) Differentiate thermoplastics and thermo settings.   6M   CO3   L4

b) Define step growth polymerization. Explain the preparation of Nylon-6, 6 by step growth polymerization process.   6M   CO3   L1

OR

7. a) Outline the synthesis Urea-Formaldehyde resin and discuss its applications.   6M   CO3   L4

b) Explain the conduction mechanism in polyacetylene and its uses.   6M   CO3   L2

UNIT–IV

8. a) Describe the working principle of Thin layer chromatography (TLC)? Write its applications   12M   CO4   L2

OR

9. a) Discuss the principle involved in conductometric titrations and its applications   6M   CO4   L2

b) Explain the working principle and applications of IR spectroscopy   6M   CO4   L2

UNIT–V

10. a) Explain Rotaxanes as artificial molecular machines   6M   CO5   L2

b) Describe molecular shuttle with an example   6M   CO5   L2

OR

11.   Explain about each of the following
    a) In and out molecular switching   6M   CO5   L2
    b) Back and forth switching   6M   CO5   L2

*** End ***

R-20

Code: 20AC25T

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

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 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's the theme of the lesson 'On the Conduct of Life'?		1	2
b) What are the meanings of the words 'foamy' and 'lusty' in context in 'The Brook.?		1	2
c) How does the Prince take revenge on his disloyal guards?		1	2
d) What is so unique about Muhammad Yunus?		1	2
e) Is Mrinalini a role model for you? How?		1	2

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

	Marks	CO	Blooms Level

UNIT–I

		Marks	CO	Blooms Level
2.	Analyze the message of Hazlitt on the conduct of life.	12M	CO1	L4

OR

3. a) **Identify the parts of speech of the underlined words in the following sentences.**
    i. It's a breakable item.
    ii. He ran very fast.
    iii. I like black bat.
    iv. What a lovely scenery!
    v. Paint it on the floor, please.   6M   CO3   L4

   b) **Choose the correct word (adjective/adverb) to complete each sentence.**
    i. She just_____(sudden / suddenly) decided that she'd had enough and she left him.
    ii. I only had time for a ___ (quick / quickly) glance at the paper this morning.
    iii. I've (near / nearly) _____finished that book you lent me.
    iv. The empty house was completely_____(silent / silently).
    v. (Scarce / scarcely) _____ resources should be used sensibly.
    vi. She stumbled (sleepy/sleepily)_____ into the bathroom.   6M   CO3   L4

UNIT–II		

4. What do these lines convey?

   'I come from haunts of coot and hern,
   I make a sudden sally,
   And sparkle out among the fern,
   To bicker down a valley.'   12M CO1 L1

OR

5. Write a grammatical paragraph of about 100 words using cohesive devices on 'Advantages and Disadvantages of Online Classes.'   12M CO4 L4

UNIT–III		

6. Explain the theme of 'The Death Trap' mentioning a few characters.   12M CO1 L1

OR

7. a) **Fill in the blanks using appropriate verb form given in brackets.**

   i. Where _____ (be) you yesterday?
   ii. I _____ (attend) his wedding in 2020.
   iii. 'Please have a cup of coffee.' Oh! Sorry. I have just ____(have) my lunch.
   iv. I found that my children _____already (sleep) when I went home.
   v. The call is _____ (be) recorded.
   vi. Why are you _____ (shout) at me?   6M CO3 L4

   b) **Choose the appropriate one with regard to Subject-Verb agreement.**

   i. One of the boys _____ (is/are) not well.
   ii. Neither he nor I _____(is/am) fine.
   iii. Either the student or the teachers _____(is/are) in the campus.
   iv. The scissors _____(does/do) not work.
   v. Politics _____ (is/are) not an interesting subject for me.
   vi. Each doctor, nurse, and technician _____(get/gets) training here.   6M CO3 L4

UNIT–IV		

8. How do you appreciate Muhammad Yunus for his contribution to the society?   12M CO1 L2

OR

9. Write a comparative essay on 'Are private schools better than state schools?' – 250 words.   12M CO4 L4

UNIT–V		

10. "I was looking for subjects that would shake people in dance," What do you learn from the life of Mrinalini Sarabhai?   12M CO1 L2

OR

11. Write a formal letter to your municipal commissioner bringing to his notice about the growing number of malaria cases in your area due to the poor maintenance of sanitation work.   12M CO4 L4

*** End ***

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

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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 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　BL

		CO	BL
a)	Solve $\dfrac{d^4x}{dt^4} + 4x = 0$	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
	UNIT–I			
2.	Solve $(D-2)^2 = 8\left(e^{2x} + \sin 2x + x^2\right)$	12M	CO1	L3
	OR			
3.	Solve the differential equation $(D^2+4)\,y = \sec 2x$ by the method of variation of parameters.	12M	CO1	L3
	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 $L\dfrac{d^2q}{dt^2} + R\dfrac{dq}{dt} + \dfrac{q}{C} = 0.$ Given that L= 0.25 henries, R = 250 ohms, $C=2\times10^{-6}$ 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
	OR			

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

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UNIT–III

</div>

6. a) Form a partial differential equation by eliminating the arbitrary functions f(x) and g(y) from $z = y f(x) + x g(y)$.   6M   CO3   L2

   b) Solve $x^2 (y - z) p + y^2 (z - x) q = z^2 (x - y)$.   6M   CO3   L3

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OR

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

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UNIT–IV

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8. a) Find the directional derivative of $\phi = x^2 y z + 4 x z^2$
   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

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OR

</div>

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

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UNIT–V

</div>

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
    $$\iint_s (x+z)\, dy\, dz + (y+z)\, dz\, dx + (x+y)\, dx\, dy$$

    where s is the surface of the sphere $x^2 + y^2 + z^2 = 4$.   6M   CO5   L3

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OR

</div>

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

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*** End ***

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R-20

Code: 20A221T

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

Electrical Circuits

(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 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 the principle of Duality in electrical networks?	1	L1
b) Define Root Mean Square(RMS) value of an alternating quantity?	1	L1
c) List the advantages of three phase supply?	2	L2
d) State Thevenin's theorem for DC excitation?	4	L1
e) Define resonance for a series RLC circuit?	5	L1

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) Analyze super node analysis of an electrical network with suitable example.   4M   1   L3

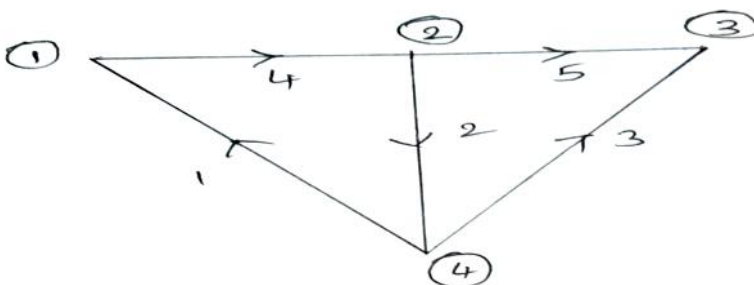   b) Determine the mesh currents for the given circuit?
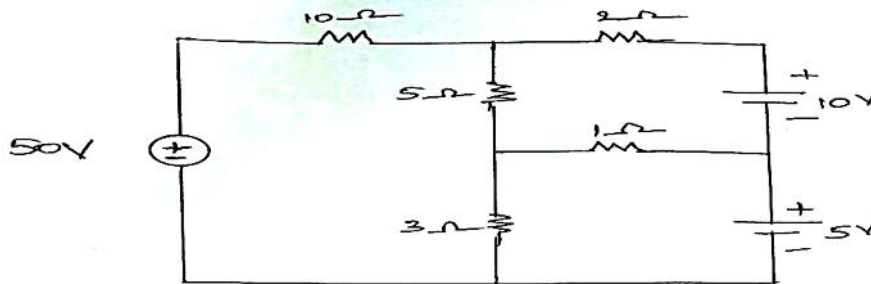
                                                                                  8M   1   L3

OR

3. a) Explain the procedure of formulating Basic Cutset matrix?   4M   1   L4

   b) Formulate the Basic Tieset matrix for the given connected graph?

                                                                                  8M   1   L4

UNIT–II

4. a) List the advantages of AC Supply?   4M   2   L1

   b) Determine the Average value and RMS value of a full wave rectifier sinusoidal waveform.   8M   2   L2

OR

5. a) What are the functions of operator-j?   4M   2   L2

   b) A Sine wave generator supplies a 500Hz, 10V RMS signal to a 2000 resistor in series with a 0.1μF capacitor. Determine the total impedance, current, phase angle, capacitive voltage and resistive voltage   8M   2   L3

UNIT–III

6. For a three phase star connected system, with neat phasor diagram, prove that

   i) Line Voltage = $\sqrt{3}$ x Phase Voltage

   ii)Line Current= Phase Current   12M   4   L3

OR

7. Analyze the measurement of three phase active power using two wattmeter method?   12M   4   L3

UNIT–IV

8. a) Prove that maximum power can be transferred to load only if the Thevenin's resistance is equal to Load resistance.   6M   4   L3

   b) Explain Millman's Theorem with a suitable example.   6M   4   L2

OR

9. Determine the current flowing through 2   resistor as shown in the given circuit using Superposition theorem.
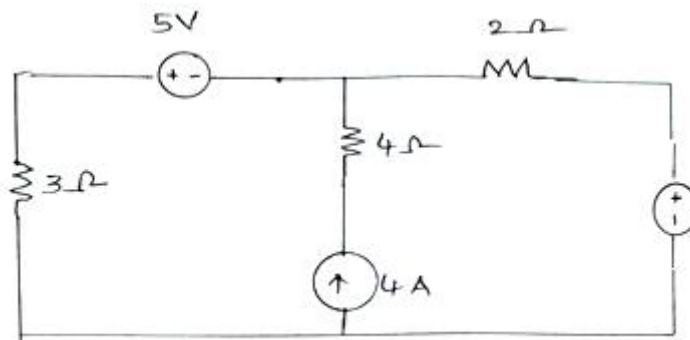
    12M   4   L3

UNIT–V

10. Derive the expressions for Resonance frequency, Bandwidth and quality factor for a series RLC circuit?   12M   5   L3

OR

11. a) Derive an expression for coefficient of coupling?   6M   6   L3

    b) Two inductively coupled coils have self-inductances 50mH and 200 mH. If the coefficient of coupling is 0.5

    i) Find the mutual inductance between the coils

    ii) What is the mutual inductance when these two coils are connected in series aiding and series opposing?   6M   6   L3

*** End ***

Code: 20A222T

R-20

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

Fundamentals of Electronic Devices and Circuits

(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 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)	Define ripple factor and give its significance.	CO1	L1
b)	Obtain the relation between and of a transistor?	CO2	L1
c)	List out the types Amplifiers.	CO3	L2
d)	Compare MOSFET with JFET?	CO4	L1
e)	What are the required properties of photo diode?	CO5	L1

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

			Marks	CO	Blooms Level

UNIT–I

			Marks	CO	Blooms Level
2.	a)	Classify the Clippers and explain any two clippers with neat wave forms.	6M	CO1	L1
	b)	The voltage across a silicon diode at a room temperature of $310^\circ k$ is 0.64 V when 2 mA current flows through it. If the voltage is increased to 0.72 V, calculate the diode current at the same temperature?	6M	CO1	L3

OR

			Marks	CO	Blooms Level
3.	a)	Define percentage regulation and prove that the percentage regulation of half wave and full wave rectifier is equal to $\frac{R_f}{R_L} X100$	6M	CO1	L2
	b)	Design a voltage regulator using Zener diode for the following specifications			
		Unregulated input voltage = 20-40 V Regulated output voltage = 12 V			
		Load current = 0 -10 mA I_{Zmin} = 2mA and I_{Zmax} = 40 mA.	6M	CO1	L3

UNIT–II

			Marks	CO	Blooms Level
4.	a)	List the BJT configurations? Explain input and output characteristics of CE configuration with neat graphs.	6M	CO2	L3

b) For a collector to base bias circuit, show that $S = \dfrac{1 - \frac{+\beta}{R_C}}{1 + \beta\left(\overline{RC+RB}\right)}$ 6M   CO2   L2

OR

5. List the biasing circuits of BJT. Explain voltage divider biasing circuit and derive its stability factors.   12M   CO2   L2

UNIT–III

6. For the CE transistor amplifier stage, derive the expression for the following in-terms of its h parameters: (i) current gain (ii) Voltage gain (iii) voltage gain including source resistance.   12M   CO3   L2

OR

7. Draw the equivalent circuit of a transistor and explain the amplification action with graphical approach.   12M   CO3   L2

UNIT–IV

8. a) Define and explain the three parameters of a JFET give the relation between them   6M   CO4   L1

b) A common source FET amplifier uses load resistance R_L = 100 K and an un bypassed resistors in the source circuit. The FET has a drain resistance R_d = 200 K and μ = 20. Compute the voltage gain and output impedance R_o, for R_s =10 K .   6M   CO4   L3

OR

9. a) Explain about CS amplifier and derive the expression for gain and input impedance?   6M   CO4   L1

b) An N-channel JFET has I_{dss} = 8 mA and V_P =-5V. Determine the minimum value of V_{ds} for pinch off region and the drain current I_{ds} for V_{gs} = -2 V in pinch off region.   6M   CO4   L3

UNIT–V

10. a) Define Tunneling phenomenon? Describe the operation of tunnel diode?   6M   CO5   L1

b) Show the four-layer construction, two transistor equivalent circuit of an SCR and explain the device operation in detail.   6M   CO5   L2

OR

11. a) Describe the construction and working of UJT with its equivalent circuit and V I characteristics?   8M   CO5   L1

b) Explain the VI Characteristics of LED.   4M   CO5   L1

*** End ***