Hall Ticket Number :										

R-20

Code: 20A224T

I B.Tech. II Semester Supplementary Examinations February 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 mark.**
3. Answer **ALL** the questions in **Part-A** and **Part-B**

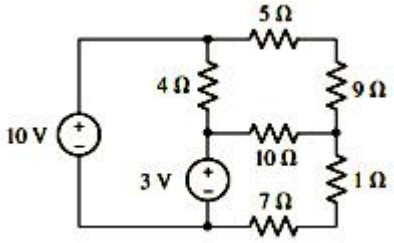
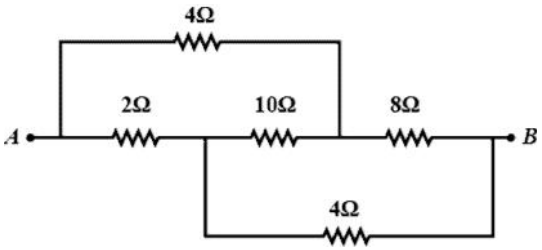
PART-A

(Compulsory question)

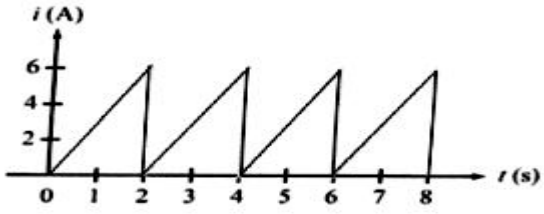
1. **Answer ALL the following short answer questions** (5 X 2 = 10M)	CO	BL
a) Explain the conversion of star to delta and vice-versa	1	L1
b) Define frequency and amplitude	2	L1
c) What are the conditions for symmetry and reciprocity in terms of Y parameters	3	L1
d) What is a back EMF and give its expression.	4	L2
e) What is the importance of OC and SC tests	4	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)	For the circuit shown in figure find the loop currents. 	6M	1	L2
b)	Find the equivalent resistance between the terminals A abd B of the circuit shown. 	6M	1	L2
	OR			
3. a)	In a series RLC circuit, R=6 ohms, L=2 H, C=2 F. A DC voltage of 50 V is applied at t=0. Obtain the expression for i(t) using differential equation approach.	6M	1	L2
b)	Explain the procedure of finding i(t) for a series RL circuit with DC input.	6M	1	L1
	UNIT–II			
4. a)	What are the advantages of AC supply?	6M	2	L1

b) Find the average and RMS value of the signal shown.



6M 2 L2

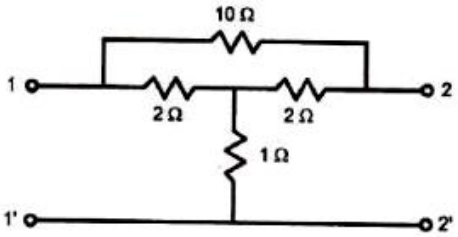
OR

5. a) In a resonant circuit show that the resonant frequency is the geometric mean of two half power frequencies. 6M 2 L2

b) A series *RLC* circuit has the following parameters: R = 17 Ω, L = 38 μH, and C=44μF. Calculate the resonant frequency. And under resonant condition, calculate current, power, and voltage drops across various elements, if the applied voltage is 70 V. 6M 2 L3

UNIT–III

6. a) For the two port network shown obtain Z parameters.

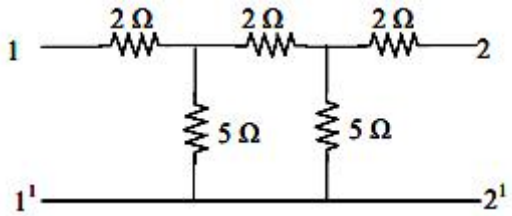


6M 3 L3

b) Explain the relation between Z, Y and h parameters. 6M 3 L2

OR

7. a) Obtain h parameters of the two port network shown below



6M 3 L3

b) What is cascading? Explain the cascading of two port network parameters. 6M 3 L2

UNIT–IV

8. a) Explain the principle of operation of DC generator and explain its characteristics. 6M 4 L2

b) Derive the EMF equation of DC generator and list out the applications of DC generator. 6M 4 L2

OR

9. a) Explain the operation and Characteristics of DC Shunt Motor. 6M 4 L2

b) Explain the speed control methods of DC motor. 6M 4 L2

UNIT–V

10. a) Explain the constructional features and operation of a transformer. 6M 4 L2

b) What is voltage regulation of a transformer? Derive the conditions for maximum and zero voltage regulation in a transformer 6M 4 L2

OR

11. a) Derive the expression for a Torque of a three phase induction motor 6M 4 L2

b) Explain the Brake test on three phase induction motor. 6M 4 L2

*** End ***

Hall Ticket Number :										

R-20

Code: 20A421T

I B.Tech. II Semester Supplementary Examinations February 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 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

a) Define biasing and mention the types of biasing

b) Draw the enhancement and depletion mode characteristics of MOSFET

c) Compare input impedance and output impedance in CE and CB configurations

d) Draw the symbols of N-Channel and P-Channel MOSFET

e) Draw the SCR characteristics

PART-B

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

Marks

UNIT–I

2. a) Sketch a voltage divider bias circuit using an npn transistor and explain the analysis procedure 6M

b) Discuss the advantages and disadvantages of the three types of biasing circuits 6M

OR

3. a) A base bias circuit has Vcc=20v, Rc=5.6kΩ, R_B=270KΩ and V_{CE}=10v. Determine the transistor hfe value. Calculate the new V_{CE} level when a transistor with hfe =40 6M

b) Discuss the thermal stability of transistor bias circuit with regard to ICBo and VBE. State the approximations for the variation in VBE and ICBo with temperature changes. 6M

UNIT–II

4. a) Sketch drain and transfer characteristics for an N-Channel depletion MOSFET and explain 6M

b) Analyze the voltage divider bias circuit using MOSFET 6M

OR

5. a) Explain the construction and operation of N-channel JFET with the help of drain and transfer characteristics. 6M

b) A JFET self-bias circuit has VDD=30v, RD=4.7KΩ, Rs=820Ω and Rg-1MΩ. calculate the VDs 6M

UNIT–III

6. a) Explain the practical single stage amplifier using CE configuration 6M

b) What is the advantage of h-parameter model? Explain the transistor h-parameter model in detail 6M

OR

7. a) Comparison of CE, CB and CC configurations 6M

b) Calculate Zi, Zo and Av for a CE circuit with the following quantities R1=18KΩ, R2=8.2KΩ, Rc=5.6 KΩ, RE=2.7KΩ, RL=68 KΩ, hie=1 KΩ, hfe=100, hoe=1.67μs 6M

UNIT–IV

8. a) Explain the small signal model of JFET 6M

b) Explain the small signal model of MOSFET 6M

OR

9. a) Construct and Explain the common drain amplifier using FET 6M

b) Construct and Explain the common source amplifier using FET 6M

UNIT–V

10. a) Explain the operation of photodiode 6M

b) Explain the operation of LED 6M

OR

11. a) Explain the operation of SCR with characteristics 6M

b) Explain the operation of Varactor diode 6M

*** End ***

Hall Ticket Number :										

R-20

Code: 20AC23T

I B.Tech. II Semester Supplementary Examinations February 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 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)	Explain ion-selective electrodes and their applications.	CO1	L2
b)	Differentiate primary batteries and secondary batteries.	CO2	L2
c)	Outline the preparation of Buna-S rubber	CO3	L4
d)	State the Beer Lambert law and define all terms in it.	CO4	L1
e)	Explain molecular machines with TWO examples.	CO5	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. a)	Define is single electrode potential. Derive Nernst equation for the determination of single electrode potential.	6M	CO1	L2
b)	Differentiate Galvanic cell and Electrolytic cell.	6M	CO1	L2
	OR			
3. a)	What is galvanic cell? Explain the determination EMF of a galvanic cell.	6M	CO1	L2
b)	Explain the construction, working and uses of glass membrane electrode.	6M	CO1	L2
	UNIT–II			
4. a)	Describe the construction, working and applications of dry cell.	6M	CO2	L2
b)	What are fuel cells? Discuss the classification and merits of fuel cells.	6M	CO2	L4
	OR			

5.	a)	Discuss the construction, working and applications of Zn-air battery.	6M	CO2	L2
	b)	Illustrate the construction working and applications of H_2-O_2 fuel cell.	6M	CO2	L4

UNIT–III

6.	a)	Differentiate thermoplastics and thermo settings.	6M	CO3	L4
	b)	Explain the preparation and uses of Bekalite.	6M	CO3	L1

OR

7.	a)	Differentiate addition polymerization and condensation polymerization..	6M	CO3	L4
	b)	Explain the conduction mechanism in poly aniline.	6M	CO3	L2

UNIT–IV

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

OR

9.	a)	Discuss the principle involved in pH metry and its applications	6M	CO4	L2
	b)	Explain the working principle and applications of UV-Vis spectroscopy	6M	CO4	L2

UNIT–V

10.	a)	Explain Catenanes as artificial molecular machines	6M	CO5	L2
	b)	Describe the linear motion in Rotaxanes	6M	CO5	L2

OR

11.		Explain about each of the following a) Cyclodextrin based molecular switches b) Displacement switching	12M	CO5	L2

*** End ***

Hall Ticket Number :										

R-20

Code: 20AC21T

I B.Tech. II Semester Supplementary Examinations February 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 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

a) Find the P.I of $(D^2-2D+4)\,y = e^x \cos x$ CO1 L2

b) Solve $x^2\frac{d^2y}{dx^2} - x\frac{dy}{dx} + y = \log x$ CO2 L3

c) Find the partial differential equation of all planes passing through the origin. CO3 L2

d) Find $\nabla\left(\nabla.\frac{\bar{r}}{r}\right)$ 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 BL

UNIT–I

2. Solve $(D^2-4D+4)\,y = 8x^2 e^{2x} \sin 2x.$ 12M CO1 L3

OR

3. Solve, by the method of Variation of Parameters, $y''-2y'+y = e^x \log x$ 12M CO1 L3

UNIT–II

4. In an L-C-R circuit, the charge q on a plate of a condenser is given by $L\frac{d^2q}{dt^2} + R\frac{dq}{dt} + \frac{q}{C} = E\sin pt$. The circuit is tuned to resonance so that $p^2 = 1/LC$. If initially the current i and the charge q be zero, show that, for small values of R/L, the current in the circuit at time t is given by $(Et/2L)\sin pt.$ 12M CO2 L3

OR

5. Solve $(2x-1)^2\frac{d^2y}{dx^2}+(2x-1)\frac{dy}{dx}-2y=8x^2-2x+3$ — 12M CO2 L1

UNIT–III

6. a) Form the partial differential equation by eliminating the arbitrary function from $\phi\left(\frac{y}{x},\ x^2+y^2+z^2\right)=0.$ — 6M CO3 L2

   b) Solve the partial differential equation $\frac{p}{x^2}+\frac{q}{y^2}=z.$ — 6M CO3 L3

OR

7. Use Separation of Variables to solve $4u_x+u_y=3u$ with $u(0,y)=3e^{-y}-e^{-5y}.$ — 12M CO3 L3

UNIT–IV

8. a) Find the values of a and b so that the surfaces $ax^2-byz=(a+2)x$ and $4x^2y+z^3=4$ may intersect orthogonally at the point $(1,-1,2)$. — 6M CO4 L2

   b) Show that $\frac{\bar{r}}{r^3}$ is solenoidal. — 6M CO4 L3

OR

9. a) Find constants a, b, c so that the vector $\bar{A}=(x+2y+az)\bar{i}+(bx-3y-z)\bar{j}+(4x+cy+2z)\bar{k}$ is irrotational. Also find ϕ such that $\bar{A}=\nabla\phi$ — 6M CO4 L2

   b) Prove that $\text{div curl}\,\bar{f}=0.$ — 6M CO4 L3

UNIT–V

10. Evaluate $\iint_S \bar{F}.\bar{n}\,ds$ where $\bar{F}=12x^2y\bar{i}-3yz\bar{j}+2z\bar{k}$ and S is the portion of the plane $x+y+z=1$ included in the first octant. — 12M CO5 L5

OR

11. Verify Green's theorem for $\int_c\left[(3x^2-8y^2)dx+(4y-6xy)dy\right]$ where c is the region bounded by $x=0,\ y=0$ and $x+y=1.$ — 12M CO5 L5

*** End ***