Hall Ticket Number :										

R-20

Code: 20A231T

II B.Tech. I Semester Supplementary Examinations July 2023

Electrical Machines - I

(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)	Brief about the types of armature windings of a DC Motor		1	L1
b)	Draw the load characteristics of a DC Separately Exited Generator		2	L4
c)	Write the swinburne's test on DC machine		3	L1
d)	Write equation of Regulation of a Transformer		4	L3
e)	What is the need of connecting transformers in parallel		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 500 V wave wound 750 rpm dc shunt generator supplies a load Of 195 A. The armature has 720 conductors and shunt field resistance is 100 ohms. Find the demagnetizing AT/ pole if the brushes are advanced through 3 commutator 10:34 AMsegments at this load. Also calculate the extra field turns required to neutralize this demagnetization.		12M	1	L4
	OR				
3.	Draw and explain the following characteristics Of dc generators a) No-load and load magnetization characteristics b) External and Internal characteristics		12M	1	L4
	UNIT–II				
4.	a)	A 4-pole generator has a lap-wound armature with 50 slots with 16 conductors per slot. The useful flux per pole is 30 m Wb, determine the speed at which the machine need to be rotated to have an induced EMF of 200V.	6M	2	L4
	b)	Define voltage regulation and its importance	6M	2	L4
		OR			

5.		Explain the parallel operation of dc compound generator with and without equalizer bar	12M	2	L1

UNIT–III

6.		The Hopkinson's test on two similar DC machine gave the following full load data: Line Voltage=110V Field currents are 3A & 3.5A Line current=48 A Armature resistance of two machines are 0.07 Ohms Motor armature current = 230 A Calculate the efficiency of each machine assuming brush contact drop of 1.5 Volts/Brush	12M	3	L1

OR

7.		Draw and explain speed-torque characteristics of shunt and compound motor and list their application	12M	3	L1

UNIT–IV

8.	a)	Draw and explain the phaser diagram of a transformer on resistive load	6M	4	L4
	b)	Explain the functions of following in a transformer i) Breather ii) Conservator iii) Oil iv) Relay	6M	4	

OR

9.		Write a short notes on All-Day efficiency of a transformer	12M	4	L3

UNIT–V

10.	a)	Explain about the Scott connection of transformer with net diagram	6M	5	L4
	b)	Write the comparisons for two winding transformer and auto transformer	6M	5	L4

OR

11.	a)	Derive expression for the saving of copper for auto transformer	6M	5	L3
	b)	Draw the three phase transformer connections with neat diagram	6M	5	L3

*** End ***

Hall Ticket Number :										

R-20

Code: 20A232T

II B.Tech. I Semester Supplementary Examinations July 2023

Network Analysis and Signals

(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**

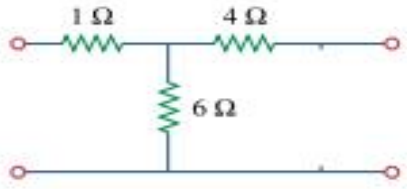
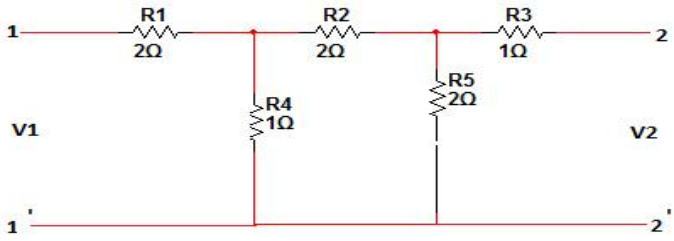
PART-A

(Compulsory question)

		CO	BL
1.	Answer *all* the following short answer questions (5 X 2 = 10M)		
a)	What is the Condition for Reciprocity of Z and Y Parameters	CO1	L1
b)	List out the applications of Laplace transform	CO2	L2
c)	Define i)Steady State ii)Transient State	CO3	L1
d)	What is the concept of Convolution	CO4	L1
e)	Write a short notes on Fourier series.	CO5	L2

PART-B

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

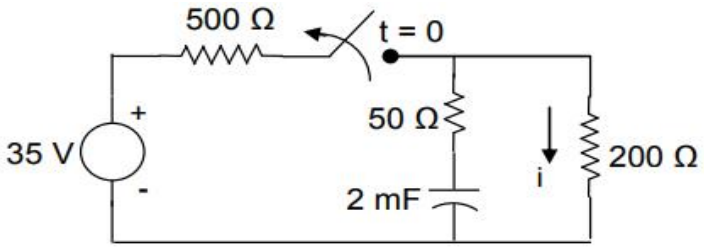
		Marks	CO	BL
	UNIT–I			
2. a)	Find the Z Parameters for the network shown below. 	6M	CO1	L2
b)	Derive the Y parameters in terms of Z Parameters.	6M	CO1	L3
	OR			
3. a)	Find the Y parameters for the given Π network and write the current equations 	8M	CO1	L2
b)	What is the condition for symmetry and condition for reciprocity of ABCD parameters	4M	CO1	L2
	UNIT–II			
4. a)	Write the Laplace transforms of following signals. • unit step • exponential • sinusoids	4M	CO2	L2
b)	Find the inverse Laplace transform of $F(s) = \frac{s^2 + s + 1}{s^3 + s}$.	8M	CO2	L2
	OR			
5. a)	Discuss the final value theorem of Laplace transform	6M	CO2	L2

b) Discuss the following.
i)Disadvantages of Laplace transform ii)Properties of Laplace transform — 6M CO2 L2

UNIT–III

6. a) Discuss the DC Response of RL Series circuit and derive the expression for current. — 8M CO3 L2

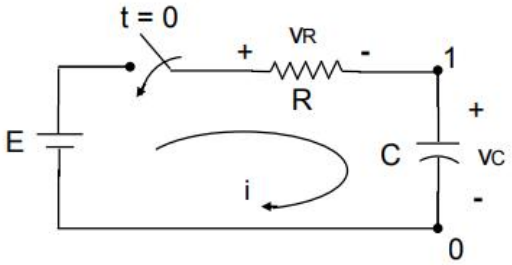
b) Consider the circuit shown below. The switch was in closed position for a long time. It is opened at time t = 0. Find the current i(t) for t > 0.



4M CO3 L4

OR

7. a) A series RC circuit has a constant voltage of E, applied at time t = 0 as shown in Fig. below. The capacitor has no initial charge. Find the equations for i, vR and vC. Sketch the wave shapes.



E = 100 V
R = 5000 Ω
C = 20 μF

6M CO3 L4

b) Derive the current expression in RC series circuit excites by constant DC voltage Source after closing the switch at t=0 — 6M CO3 L4

UNIT–IV

8. a) With neat graphical representation explain different types of continuous time signals with examples. — 6M CO4 L2

b) Find the convolution of the following signals
x1(t)=e-3tu(t) and x2(t)=u(t+3). — 6M CO4 L3

OR

9. a) Draw the signal x(t) = 1; 0<t<1
2; 1<t<2
0; elsewhere
also determine and sketch (i) x(2t) (ii) X(3t-1) — 6M CO4 L3

b) State and prove properties of Cross-correlation function. — 6M CO4 L3

UNIT–V

10. a) Find the Fourier series of the function f(x) = x^2, $-\pi < x < \pi$ — 6M CO5 L2

b) Explain the properties of Fourier Transform — 6M CO5 L2

OR

11. a) Find the Fourier series of the periodic function f(x), such that

$$f(x) = \begin{cases} -\pi & ,when \ -\pi < x < 0 \\ x & when \ -0 < x < \pi \end{cases}$$

6M CO5 L2

b) Explain even, odd and half wave symmetry property by using relevant examples. — 6M CO5 L2

*** End ***

Hall Ticket Number :										

R-20

Code: 20A234T

II B.Tech. I Semester Supplementary Examinations July 2023

Switching Theory and Logic Design

(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)	Solve AB+A′C+BC = AB+A′C and represent which theorem.	CO1	L3
b)	Explain about don't cares?	CO2	L2
c)	Define Multiplexer. Explain in brief about 2:1 Mux.	CO3	L1
d)	Differentiate between latches and flipflops.	CO4	L2
e)	List the limitations of finite state machines.	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)	Simplify and realize the following Boolean expression using logic gates. Y=AB+A′C+BC	6M	CO1	L2
b)	Simplify and realize the following Boolean expression using logic gates Y=(A+B′+C′)(A+B′+C)	6M	CO1	L2
	OR			
3. a)	Convert the given Gray code number to equivalent binary 001001011110010.	6M	CO1	L4
b)	Convert $(A0F9.0EB)_{16}$ to decimal, binary, octal.	6M	CO1	L4
	UNIT–II			
4. a)	Simplify the following Boolean function using Tabular method. F(A,B,C,D)=∑m(0,1,2,5,7,8,9,10,13,15)	6M	CO2	L3
b)	Reduce the expression using K-map ∑m (0,1,4,5,7,9,11,15) +d(10,14).	6M	CO2	L3
	OR			
5. a)	Simplify the Boolean function F using the don't care conditions d, in (i) sum of products and (ii) product of sums. F= A'B'D' + A'CD+A'BC d=A'BC'D+ACD+AB'D'	6M	CO2	L3

b) F (A, B, C, D) = π max [5, 8, 14] + dπ [7, 11, 12, 13, 15]. Obtain minimal sop function. 6M CO2 L4

UNIT–III

6. a) Briefly describe about the programmable array logic with suitable diagrams. 6M CO3 L2

b) Implement the following Boolean function with a multiplexer,

i) F(A,B,C,D) =∑(1,2,5,8,6,10,12,14)

ii) F(A,B,C,D) =∑(1,2,5,6,12) 6M CO3 L4

OR

7. a) List the merits and demerits of PROM, PAL and PLA. 6M CO3 L1

b) Implement f(A, B,C,D) = ∑(0,1,3,5,6,8,9,11,12,13) using 8:1 MUX and explain its procedure. 6M CO3 L4

UNIT–IV

8. a) Design and explain a synchronous MOD-12 down-counter using j-k flipflop. 6M CO4 L5

b) What do you mean by triggering? Explain the various triggering modes with examples. 6M CO4 L2

OR

9. a) Draw the logic diagram of a JK flip flop and using excitation table. Explain its operation. 6M CO4 L2

b) Draw the circuit diagram of Johnson counter using D-flip-flops and explain its operation with the help of bit pattern. 6M CO4 L3

UNIT–V

10. a) Draw the state diagrams of a sequence detector which can detect 101. 6M CO5 L3

b) Illustrate partition techniques in sequential circuits. 6M CO5 L3

OR

11. a) Explain the procedure for state minimization using merger graph and merger table 4M CO5 L2

b) Convert the following Melay machine into a corresponding Moore machine.

Present State	Input , X=0 Next state, output	Input , X=1 Next state, output
A	B,0	E,0
B	E,0	D,0
C	D,1	A,0
D	C,1	E,0

8M CO5 L6

*** End ***

Hall Ticket Number :										

R-20

Code: 20AC32T

II B.Tech. I Semester Supplementary Examinations July 2023

Transform Techniques & Complex 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)

		CO	BL
1.	Answer *all* the following short answer questions (5 X 2 = 10M)		
a)	Answer *all* t t step function and write Laplace transform of unit step function What is uni $u(t-a)$ State conv	2	2
b)	State convolution theorem.	2	1
c)	Define half- range sine series, half-range cosine series.	2	1
d)	Find real and imaginary parts of $e^{f(z^2)}$.	2	2
e)	Find the poles and order of poles of f(z)= $\frac{z}{2z^2+1}$	2	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)	Find $L(\int_0^t \frac{e^t \sin t}{t} dt)$	6M	1	2
b)	Apply Laplace transform and evaluate $\int_0^\infty \frac{\sin 2t}{t} dt$	6M	1	3
	OR			
3. a)	Find Laplace transform of nd evaluate $\int_0^\infty \frac{\sin 2t}{t} dt$ OR $\cos t \cos 2t \cos 3t$.	6M	1	2
b)	Fi nd La p lace transform of OR $\cos t \cos 2t$ d hence find transform of $\sin\sqrt{t}$ anc $\frac{\cos\sqrt{t}}{\sqrt{t}}$	6M	1	3
	UNIT–II			
4. a)	Find inverse Laplace transform of $\frac{1}{\sqrt{2s-3}}$	6M	2	2
b)	Apply convolution and find N rm c $\frac{1}{\sqrt{2s-3}}$ $L^{-1}[\frac{1}{(s^2+a^2)(s^2+b^2)}]$.	6M	2	3
	OR			
5. a)	Find $L^{-1}[\frac{2s-5}{s^2-4}]$	6M	2	2
b)	Solve $L^{-1}[\frac{2s-5}{s^2-4}]$ $x'' + 2x' + x = 3te^{-t}$ given $x(0) = 4, x'(0) =$ 0	6M	2	3

UNIT–III

6. a) Find Fourier series of the function $f(x) = e^{-x}$ in $(0, 2\pi)$. 6M 3 3

   b) Using Fourier sine integral show that

$$\int_0^\infty \frac{a \sin a x}{(a^2 + a^2)(a^2 + b^2)} da = \frac{\pi}{2(b^2 - a^2)}(e^{-ax} - e^{-bx}),$$

   $a,b > 0$ 6M 3 3

OR

7. a) Find the Fourier Sine transform and Fourier Cosine transform of $f(x) = 2e^{-5x} + 5e^{-2x}$. 6M 3 3

   b) Find the half range cosine series of $f(x) = (x-1)^2$ in the interval $0 < x < \pi$ and show that $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \cdots = \frac{\pi^2}{8}$. 6M 3 3

UNIT–IV

8. a) Show that the function $f(z) = \frac{(xy)^n}{\sqrt{|xy|}}$ is not analytic at the origin although Cauchy-Riemann equations are satisfied at that point. 6M 4 3

   b) Evaluate $\int_c (z^2 + y^2)dx + (z^2 + x^2)dy + (x^2 + y^2)dz$ from (0, 0, 0) to (1, 1, 1) where c is the curve $x=t, y=t^2, z=t^3$ in the parametric form. 6M 4 3

OR

9. a) Find the analytic function $f(z) = u+iv$ if $u-v = e^x(\cos y - \sin y)$ 6M 4 3

   b) Evaluate $\int_c \frac{z^3 e^{-z}}{(z-1)^3} dz$ where c is $|z-1| = \frac{1}{2}$ using Cauchy's integral formula 6M 4 3

UNIT–V

10. a) Find the Taylor's series expansion of $f(z) = \frac{1}{z^2+z-6}$ in the region $|z| < 1$ 6M 5 3

    b) Apply Cauchy's residue theorem, evaluate $\int_c \frac{z-3}{z^2+2z+5} dz$ where c is the circle $|z+1+i| = 2$. 6M 5 3

OR

11. a) Expand $f(z) = \frac{z+3}{z(z^2-z-2)}$ in power series of z where $1 < |z| < 2$ 6M 5 3

    b) Find the residues of $f(z) = \frac{\sin \pi z^2 + \cos \pi z^2}{(z-1)^2(z-2)}$ and evaluate $\int_c f(z)dz$ where c is $|z| = 3$. 6M 5 3

*** End ***

Hall Ticket Number :										

R-20

Code: 20A233T

II B.Tech. I Semester Supplementary Examinations July 2023

Analog Electronics

(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)	List the advantages of negative feedback.		CO1	L1
b)	What are log amplifiers?		CO2	L2
c)	Draw the hysteresis curve for a Schmitt trigger circuit.		CO3	L1
d)	Mention the uses of PLL.		CO4	L2
e)	Compare the weighted resistor DAC and R-2R ladder DAC.		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.		Explain the Colpitts Oscillator and derive the expression for frequency.	12M	CO1	L2
		OR			
3.	a)	Explain the working of crystal oscillator and write the expression for frequency.	6M	CO1	L2
	b)	Design a RC phase shift oscillator for a frequency of 300Hz.	6M	CO1	L6
		UNIT–II			
4.	a)	Explain the Differentiator circuit using OpAmp and obtain the expression for output	6M	CO2	L2
	b)	Design the same to obtain an output expression $V_o = -(2V_1 + 3V_2 + V_3)$.	6M	CO2	L6
		OR			
5.		Explain the operation of an instrumentation amplifier using three OpAmps and derive and expression for the output.	12M	CO2	L2

UNIT–III

6.		Explain the working of a positive and negative clipper using opamp using neat waveforms.	12M	CO3	L2
		OR			
7.	a)	With neat circuit diagram and waveform explain a full wave rectifier.	6M	CO3	L2
	b)	Design a Schmitt trigger circuit with UTP = 4V, LTP = -2V and $V_= 12V$.	6M	CO3	L6

UNIT–IV

8.		Explain the operation of an astable multivibrator using 555 timer IC and design one to generate a clock of 2KHz and duty cycle 60%.	12M	CO4	L2
		OR			
9.	a)	Explain about astable multivibrator using OpAmp and write the expression for pulse width.	6M	CO4	L2
	b)	Explain the basic principle of PLL.	6M	CO14	L2

UNIT–V

10.	a)	Explain the R-2R ladder type DAC.	6M	CO5	L2
	b)	Explain the working of dual slope ADC.	6M	CO5	L2
		OR			
11.		Explain the SAR ADC.	12M	CO5	L2

*** End ***