Hall Ticket Number :										

R-20

Code: 20A231T

II B.Tech. I Semester Regular & Supplementary Examinations December 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)

			CO	BL
1.	Answer ***all*** the following short answer questions	(5 X 2 = 10M)		
a)	Define Commutation and list out the methods of improving commutation		1	L2
b)	Classify the DC Generators		2	L2
c)	Why the starter is required for DC Motor? Justify		3	L2
d)	Define Regulation of Transformer		4	L2
e)	Write the necessary and sufficient conditions for parallel operation of transformer.		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)	How are the de-magnetizing and Cross-magnetizing ampere-Turns/pole in DC Machines are calculated?	6M	1	L2
	b)	A 500V, wave-wound 750rpm shunt generator supplies a load current of 195A.The armature has 720 conductors and shunt field resistance is 100Ω. Find the de-magnetizing ampere-Turns/pole, if the brushes are advanced through 3 segments at this load. Also calculate the extra shunt field turns required to neutralize this demagnetization.	6M	1	L2
		OR			
3.	a)	Explain the Armature reaction and its effects in DC Machine	6M	1	L2
	b)	What is commutation? Discuss the methods of improving commutation in DC machines	6M	1	L2
		UNIT-II			
4.		Discuss the internal and external characteristics of DC shunt generator	12M	2	L2
		OR			

5. The following data pertains to the magnetization curve of a DC-Shunt generator at 300rpm

I_F in Amps:	0	0.2	0.3	0.4	0.5	0.6	0.7	0.8
E_G in Volts:	7.5	93	135	165	186	202	215	230

The field resistance of the machine is adjusted to 354.5Ω and the speed is 300rpm. For this generator,

a) Determine the no load generated voltage
b) Determine the critical value of the shunt field resistance
c) Determine the critical speed for the given shunt field resistance

12M 2 L3

UNIT-III

6. a) Explain in detail about the Losses and Efficiency of a DC Machine 6M 3 L2

b) A 4-pole, lap wound DC motor has 540 conductors. Its speed is found to be 1000rpm.the flux per pole is 25 mwb. It is connected to 230 Volts dc supply. Ra is 0.8Ω. Calculate induced emf and armature current. 6M 3 L3

OR

7. Briefly explain different speed control methods in DC-Shunt Motors? 12M 3 L3

UNIT-IV

8. a) With neat diagram Explain the working principle of transformer 6M 4 L2

b) Explain the constructional details of a single-phase transformer 6M 4 L2

OR

9. a) Explain Sumpner's test on single phase transformer. 6M 4 L2

b) Obtain the equivalent circuit of a 200/400V, 50Hz, 1-phase transformer from the following test data:

OC test: 200V, 0.7A, 70W – on LV side

SC test: 15V, 10A, 85W – on HV side.

Calculate the equivalent circuit parameters and show them on equivalent circuit. 6M 4 L3

UNIT-V

10. Explain in detail about Parallel operation of Transformers 12M 5 L4

OR

11. Discuss various types of connections used for Three Phase transformers. 12M 5 L3

*** End ***

Hall Ticket Number :										

R-20

Code: 20A232T

II B.Tech. I Semester Regular & Supplementary Examinations December 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**

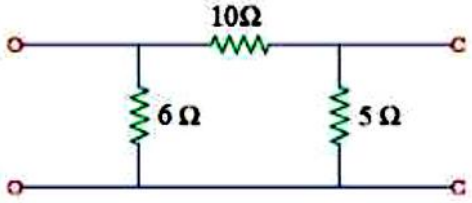
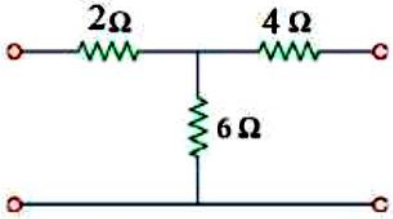
PART-A

(Compulsory question)

		CO	BL
1.	Answer ***all*** the following short answer questions (5 X 2 = 10M)		
a)	Write the general equations of Z and Y parameters.	CO1	L1
b)	What is the Laplace transform of f (t) = t Sin 2t?	CO3	L1
c)	Define time constant of RL and RC series circuit.	CO2	L1
d)	List out the types of discrete time Signals.	CO4	L1
e)	What is Periodic Function?	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.	Find the ABCD and h - parameters for the following circuit and verify the network is reciprocal or not. 	12M	CO1	L3
	OR			
3.	Find the Z and Y parameters for the following circuit and verify the network is symmetrical or not. 	12M	CO1	L3
	UNIT-II			
4.	Find the initial value and final value of the signal corresponding to the Laplace transform. Y(S) = (S+1) / S(S+2)	12M	CO3	L4
	OR			

5.		A 1kΩ resistor is in series with a 500mH inductor. This series combination is in parallel with a 0.4μF capacitor. Express the equivalent s-domain impedance of these parallel branches as a rational functional.	12M	CO3	L4

UNIT-III

6.		Derive the transient response of an RLC circuit with AC excitation.	12M	CO2	L4

OR

7.		A series RC circuit consists of resistor of 10 and capacitor of 0.1F has a constant voltage of 20v is applied to the circuit at t=0.obtain the current equation. Determine the voltage across the resistor and the capacitor.	12M	CO2	L4

UNIT-IV

8.	a)	Find the convolution of the following signals $x_1(t)=e^{-3t}u(t)$ and $x_2(t)=u(t+3)$.	6M	CO4	L3
	b)	State and prove properties of Cross-correlation function.	6M	CO4	L3

OR

9.	a)	What is the periodicity of the signal x(t) = sin 100πt + cos 150 πt?	6M	CO4	L2
	b)	What are the basic continuous time signals? Draw any four Waveforms and write their equations.	6M	CO4	L2

UNIT-V

10.	a)	Explain the properties of Fourier Transform.	6M	CO5	L2
	b)	Determine the effective value of voltage, current and power if, $v(t) = 10+6\cos(50t+45^0) + 1.8\cos(150t-10^0)$ and $i(t) = 3+1.4\cos(50t+20^0) + 0.5\cos 150t$	6M	CO5	L3

OR

11.	a)	Explain even, odd and half wave symmetry property by using relevant examples.	6M	CO5	L2
	b)	Express the Trigonometric Fourier series expansion of the square waveform.	6M	CO5	L3

*** End ***

Hall Ticket Number :										

R-20

Code: 20A234T

II B.Tech. I Semester Regular & Supplementary Examinations December 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)

1. Answer ***all*** the following short answer questions (5 X 2 = 10M) CO BL

a) List the universal gates. CO1 L1

b) Distinguish between 1's and 2's complement. CO2 L2

c) Compare the PLAs. CO3 L1

d) Denote the characteristic table of JK flipflop. CO4 L1

e) Specify the conditional output box. 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) Convert the following binary number to decimal, octal and hexadecimal number system. $(1101.11)_2$ 6M CO1 L3

b) Test the following Hamming code for a 4-bit message and correct it if necessary 1110 and 1011. 6M CO1 L3

OR

3. a) Convert the following into decimal :
(i) $(110011101)_2$ (ii) $(246)_8$ (iii) $(EEE)_{16}$ 6M CO1 L3

b) Subtract the decimal number $(75_{10}-27_{10})$ using 2's complement arithmetic. 6M CO1 L3

UNIT-II

4. a) Simplify the following Boolean functions using k maps
F (w,x, y,z) =∑ m (3, 7, 11, 13, 14, 15) 6M CO2 L3

b) Implement the function F = B' D + A C using only NAND gates. 6M CO2 L4

OR

5. a) Simplify the following Boolean function F , together with the don't-care conditions d , and then express the simplified function in sum-of-minterms form:
F(a,b,c,d)=∑m(5, 6, 7, 12, 14, 15)+d(∑m (3,9,11)) 8M CO2 L3

	b)	Implement the NOT gate using NAND gate.	4M	CO2	L4

UNIT-III

6.	a)	Implement full adder circuit using 3X8 Decoder.	6M	CO3	L5
	b)	Elucidate 4 bit parallel adder with an example	6M	CO3	L3

OR

7.		Consider the following boolean functions and implement the circuit using PAL. $W = \sum(2,12,13)$ $X=\sum(7,8,9,10,11,12,13,14,15)$ $Y=\sum(0,2,3,4,5,6,7,8,10,11,15)$	12M	CO3	L3

UNIT-IV

8.	a)	Draw the logic symbols and truth tables of JK and T flip flop	6M	CO4	L3
	b)	Explain the operation of twisted ring counter with the help of logic diagram and its timing diagrams.	6M	CO4	L3

OR

9.	a)	Design and explain the working of a Johnson counter with example.	8M	CO4	L3
	b)	Analyze the characteristic table and excitation table of D flipflop.	4M	CO4	L4

UNIT-V

10.		Draw the state diagram, state table, and ASM chart for a 2-bit binany counter having one enable line E such that E = 1 counting enabled, and E= 0 counting disabled.	12M	CO5	L5

OR

11.	a)	Compare between Moore and Mealy machine.	6M	CO5	L5
	b)	Discuss the various blocks of ASM chart.	6M	CO5	L4

*** End ***

Hall Ticket Number :										

R-20

Code: 20AC32T

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

Transform Techniques & Complex Variables

(Common to EEE &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 Laplace transform of $\sin 2t$ CO1 L4

b) Find the inverse Laplace transforms of $\left(\frac{s^2}{s-2}\right)^{-3}$ CO2 L4

c) Write the Dirichlet's conditions. CO3 L1

d) If w=log z, find $\frac{dw}{dz}$ CO4 L4

e) Find the nature and location of singularities of the function $\frac{\sin z}{z^2}$ 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)	Find the Laplace transform of F(t) = $\begin{cases} 1, & 0 < t \le 1 \\ t, & 1 < t \le 2 \\ 0, & t > 2 \end{cases}$	6M	CO1	L3
b)	Find the Laplace transform of the function f(t) = sinωt, 0<t<π/ω 0 , π/ω<t<2 π/ω	6M	CO1	L1
	OR			
3. a)	Find the Laplace transform of $\frac{\cos at - \cos bt}{t}$	6M	CO1	L1
b)	Find the Laplace transforms of tsinat	6M	CO1	L1
	UNIT–II			
4.	Find the inverse transforms of $\frac{5s+3}{(s-1)(s^2+2s+5)}$	12M	CO2	L3
	OR			

5. Solve $(D^3-3D^2+3D-1)y = t^2e^t$
given that y(0)=1, y'(0)=0, y''(0)=-2. 12M CO2 L3

UNIT–III

6. If f(x) = |cosx|, expand expand f(x) as a fourier series in the interval $(-\pi, \pi)$. 12M CO3 L4

OR

7. Find the Fourier transform of f(x) = $\begin{cases} 1-x^2, & |x| \le 1 \\ 0, & |x| > 1 \end{cases}$ 12M CO3 L1

UNIT–IV

8. Evaluate, using Cauchy's integral formula: $\int_c \frac{e^{2\pi z}}{z^2-1}dz$ around a rectangle with vertices $2\pm i,-2\pm i$. 12M CO4 L2

OR

9. Find the orthogonal trajectories of the family of curves $x^4+y^4-6x^2y^2 = \text{constant}$. 12M CO4 L3

UNIT–V

10. Find the Taylor's expansion of $f(z)=\frac{2z^3+1}{z^2+z}$ about z=i. 12M CO5 L3

OR

11. Find the residue of $f(z)=\frac{z^3}{(z-1)^4(z-2)(z-3)}$ at its poles and hence evaluate $\oint_C f(z)dz$ where C is the circle |z|=2.5 12M CO5 L2

*** End ***

*** End ***

Hall Ticket Number :										

R-20

Code: 20A233T

II B.Tech. I Semester Regular & Supplementary Examinations December 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)

			CO	BL
1.	Answer ***all*** the following short answer questions	(5 X 2 = 10M)		
	a) What are the components of feedback amplifier?		1	L1
	b) Define CMRR of an op-amp.		2	L1
	c) Draw the circuit of peak value Detector using op-amp		3	L2
	d) What are the basic building blocks of PLL?		4	L1
	e) Which is the fastest ADC and why?		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.		Draw the circuit diagram of voltage series feedback amplifier and derive expressions for input and output resistances.	12M	1	L1
		OR			
3.	a)	Show that the bandwidth increases in negative feedback amplifiers.	6M	1	L3
	b)	Draw the circuit diagram of RC-phase shift oscillator using BJT and derive the expression for frequency of oscillations.	6M	1	L2
		UNIT–II			
4.	a)	Explain how an op-amp can be used as integrator? Also derive expression for the output.	6M	2	L3
	b)	Design inverting amplifier with R_1=5KΩ, R_F=20KΩ, V_i=1V. A load of 5KΩ is connected to the output terminal. Calculate (i) A_{CL} (ii) V_0 (iii) I_I and total current I_0 into the output pin.	6M	2	L3
		OR			
5.	a)	Explain the operation of I-V converter.	6M	2	L2
	b)	Explain non inverting op-amp with neat circuit diagram and derive the expression for output voltage	6M	2	L3

UNIT–III

6.	a)	An op-amp multivibrator circuit is constructed using the following components. R1=35kΩ, R2=30kΩ, R=50kΩ and C = 0.01uF. Calculate the circuits frequency of oscillation.	6M	3	L3
	b)	Design a first order high pass filter for a high cut-off frequency of 2 kHz and Pass band gain of 2.	6M	3	L3

OR

7.		Explain the working principle and operation of Astable Multi-vibrator using Op-Amp with relevant sketch.	12M	3	L3

UNIT–IV

8.		Derive the Expression for time period of Monostable MV using 555 Timer with relevant waveforms.	12M	4	L3

OR

9.	a)	Draw the block diagram of 555 timer and explain function of each pin of 555 timer	6M	4	L2
	b)	Derive an expression for Capture Range of PLL.	6M	4	L3

UNIT–V

10.		Explain the working principle of Successive approximation ADC with a neat diagram.	12M	5	L2

OR

11.	a)	Find the output voltage of a 4-bit binary weighted resistor DAC with following inputs, R= R_f = 1KΩ and V_R = +8V. (i) 1001 (ii) 1100	6M	5	L3
	b)	Obtain an expression for the output voltage of R-2R DAC.	6M	5	L3

*** End ***