Hall Ticket Number :										

R-20

Code: 20A432T

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

Digital Logic Design

(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)	Why NAND and NOR gates are called as universal gates	CO1	L1
b)	Explain Demorgan's theorem	CO2	L2
c)	Define combinational logic design	CO3	L1
d)	List two differences between combinational and sequential circuits	CO3	L1
e)	Identify the two capabilities of Finite state machines	CO4	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)	Compute $(351)_{10} - (547)_{10}$ using 9's complement method.	6M	CO1	L3
b)	Solve $(111011)_2 - (110111)_2$ using 2's complement approach.	6M	CO1	L3
	OR			
3. a)	Generate Hamming code for the given data 1100 using Odd parity	8M	CO1	L3
b)	What is the BCD and binary equivalent of given $(47)_{10}$	4M	CO1	L1
	UNIT-II			
4. a)	Design a NAND gate circuit for OR operation.	5M	CO2	L6
b)	Determine minimal SOP using K-map, and realize using NOR gates $F = \pi (0,1,2,4,6,7,9,11,15)+d(3,10,14)$	7M	CO2	L3
	OR			
5. a)	Solve the minimal expression using Boolean algebra $F = A'B'C' + A'BC' + A'BC + ABC'$	6M	CO2	L3
b)	Determine minimal SOP using Tabulation method $F = \sum_m (1,2,3,4,5,6,7,9,11,15,20,21,23,31)$	6M	CO2	L3
	UNIT-III			
6.	Develop a circuit to identify Prime numbers between 0 to 12 using Decoder	12M	CO3	L6
	OR			

7.	a)	Design a Half adder operation using 4 X 1 Multiplexer.	6M	CO3	L6
	b)	Design a 3 bit binary ripple carry adder	6M	CO3	L6

UNIT-IV

8.	a)	Compare Asynchronous and Synchronous Counters	6M	CO3	L5
	b)	What is the characteristic table and characteristic equation for SR flip-flop?	6M	CO3	L1

OR

9.		Design a 3-bit synchronous updown counter using JK flip flops.	12M	CO3	L6

UNIT-V

10.		Obtain the state diagram for the given state table	12M	CO4	L3

PS	NS,Z	
	X=0	X=1
A	F,0	B,1
B	A,0	A,1
C	B,0	C,1
D	C,0	B,1
E	D,0	A,1
F	E,1	F,1

OR

11.	a)	List the capabilities and limitations of finite state machines.	6M	CO4	L1
	b)	Compare Mealy and Moore machines.	6M	CO4	L5

*** End ***

Hall Ticket Number :										

R-20

Code: 20AC36T

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

Managerial Economics and Financial Analysis

(Common to CE & 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)	What is Demand Schedule?	1	L1
b)	List out the determinants of cost	2	L1
c)	Briefly explain about monopoly.	3	L1
d)	What is profitability index	4	L1
e)	What is going concern concept?	5	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)	Define law of demand. What are its exceptions? Explain.	6M	1	L2
b)	Explain nature and scope of Managerial economics.	6M	1	L2
	OR			
3.	Write a short note on the following. i) Survey Method ii) Expert Opinion Method iii) Test Marketing	12M	1	L2
	UNIT-II			
4. a)	Define production. Explain the law of variable proportions of the production.	6M	2	L2
b)	Explain Law of Returns to scale with appropriate examples.	6M	2	L2
	OR			
5. a)	What do you mean by Iso-Quants? Explain the law of returns to scale of production.	6M	2	L2
b)	Define Break-Even-Point. Explain Assumptions and uses of Break Even Analysis	6M	2	L2
	UNIT-III			
6.	Discuss why perfect Competition is better form of competition when compared to Monopoly.	12M	3	L3
	OR			

7. a) Explain the features of partnership company. What are its advantages and disadvantages? 6M 3 L2

   b) What are the different forms of business organizations? Comment on their relative merits and demerits. 6M 3 L2

UNIT-IV

8. From the following information calculate the net present value of the two projects and suggest which of the project should be accepted assuming a discounting rate is 10% (I year 0.909, II Year 0.857, III Year 0.751, IV Year 0.698, V Year 0.591)

	Project X	**Project Y**
Investment	Rs 20,000	Rs,30,000
Estimated Life	5 Years	5 years
Scrape value	Rs 1000	Rs 1000

Project cash flows are as follows

Year	**Project X**	**Project Y**
1	5,000	20,000
2	10,000	10,000
3	10,000	5,000
4	3,000	3,000
5	2,000	2,000

12M 4 L4

OR

9. What factors should a finance manager take into consideration while raising sources of capital? 12M 4 L2

UNIT-V

10. Journalize the following transactions in the books of Mr. Hari.
April 2022

1. Mr. Hari started business with cash Rs. 50,000.
2. Purchased furniture for cash Rs. 10,000.
4. Purchased goods for cash Rs. 25,000.
5. Bought goods from Mr. Kamalesh Rs. 15,000.
6. Sold goods for cash Rs. 36,000.
8. Sold goods to Mr. Ram for Rs. 30,000.
10. Paid cash to Mr. kamalesh Rs. 15,000.
14. Received cash from Mr. Ram Rs. 18,000.
16. Purchased goods from Mr. Sohan Rs. 6,000.
18. Paid rent for office Rs. 1,000.
26. Received commission Rs. 750.
27. Paid salary to Mr. Bopal Rs. 1,200

12M 5 L3

OR

11. The following trading and profit and loss account of a Fantacy Ltd. For the year 31/03/2011 is given below.

Particulars	Amount	Particulars	Amount
To Opening stock	76,250	By Sales	5,00,000
To Purchases	3,15,250	By Closing stock	98,500
To Carriage	2,000		
To Wages	5,000		
To Gross profit c/d	2,00,000		
Total	**5,98,500**	**Total**	**5,98,500**
To Administration expenses	1,01,000	By Gross profit b/d	2,00,000
To Selling and distribution expenses	12,000	By Non operating income (Profit on sale of shares)	6,000
To Non operating expenses	2,000		
To Financial expenses	7,000		
To Net profit c/d	84,000		
Total	**2,06,000**	**Total**	**2,06,000**

Calculate:

i. Gross profit ratio
ii. Expenses ratio
iii. Operating ratio
iv. Net profit ratio
v. Operating (net) profit ratio 12M 5 L3

*** End ***

Hall Ticket Number :										

R-20

Code: 20A431T

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

Signals & Systems

(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**

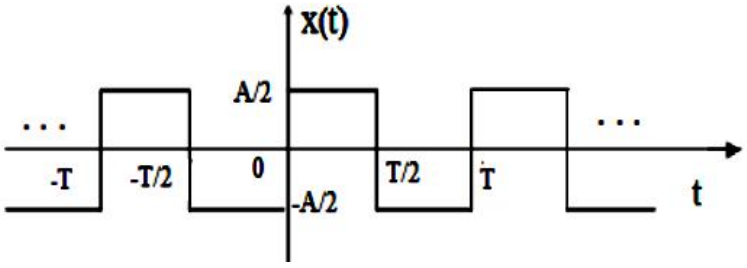
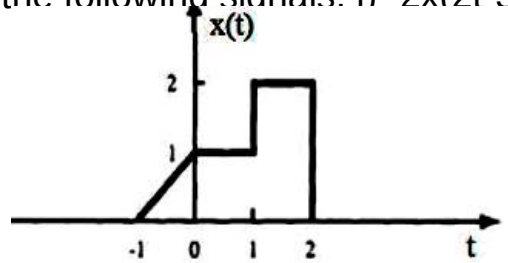
PART-A

(Compulsory question)

1.	Answer ***all*** the following short answer questions (5 X 2 = 10M)		CO	BL
a)	Given a system with the input $x(t)=2e^{-3t}$ and the output $y(t)=4e^{-3t}$ determine whether the system is time-invariant. Justify your answer.		CO1	L3
b)	State and explain the linearity and frequency-shifting properties of Fourier transforms.		CO2	L2
c)	Define the concept of distortion less transmission and explain its significance in signal processing. What are the conditions for distortion less transmission through an LTI system?		CO3	L2
d)	Explain the relationship between the autocorrelation function and the energy density spectrum of a signal.		CO4	L2
e)	Determine the ROC for the z-transform of the sequence $x[n] = 1/(n + 1)^2$ and analyze the implications for the inverse z-transform.		CO5	L3

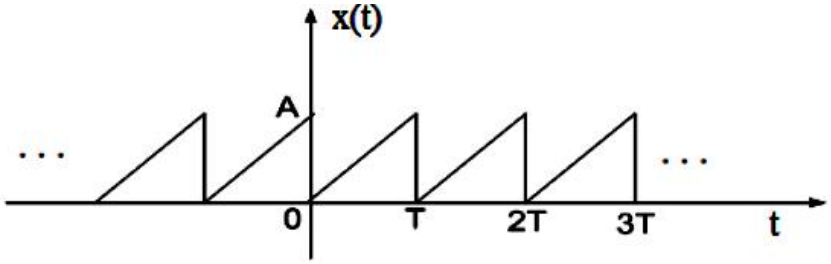
PART-B

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

		Marks	CO	BL
	UNIT-I			
2. a)	Evaluate the exponential Fourier Series of the following signal and also draw magnitude and Phase spectrum. 	6M	CO1	L4
b)	A continuous-time signal x(t) is shown in Fig. Sketch and label each of the following signals. i) -2x(2t-3) ii) 3x(-3t +2) 	6M	CO1	L3

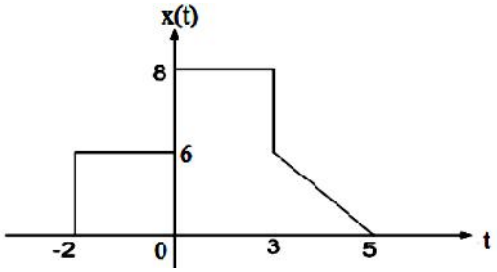
OR

3. a) Evaluate the exponential Fourier Series of the following signal and also draw magnitude and Phase spectrum.



6M CO1 L4

b) Calculate the even and odd components of the signal x(t).



6M CO1 L3

UNIT-II

4. a) Explain how Fourier transform is developed from Fourier series. 6M CO2 L2

b) Determine the Fourier transform of x(t) = u(2t), where u(t) is the unit step function. 6M CO2 L3

OR

5. a) State and prove time shifting and frequency scaling properties of Fourier transform. 6M CO2 L2

b) Determine out the Fourier Transform of $x(t) = e^{-at} \sin(w_o t)$ u(t) 6M CO2 L3

UNIT-III

6. a) What are the different techniques of Sampling? Explain each with neat sketch. 4M CO3 L2

b) Consider an LTI system with input $x(t) = e^{-3t}$ u(t) and impulse response $h(t) = e^{-3t}u(t)$. Determine the output response y(t). 8M CO3 L3

OR

7. a) What is an LTI system? Explain its properties. Derive an expression for the transfer function of an LTI system. 6M CO3 L2

b) Derive the relation between bandwidth and rise time of a system. 6M CO3 L3

UNIT-IV

8. a) State and prove the properties of Cross-correlation. 4M CO4 L2

   b) Compute the convolution of y[n] = x[n] * h[n] , where

$$x[n] = \begin{cases} 1\,;\ 3 \le n \le 8 \\ 0\,;\ \text{otherwise} \end{cases} \text{ and}$$

$$h[n] = \begin{cases} 1\,;\ 4 \le n \le 6 \\ 0\,;\ \text{otherwise} \end{cases}$$

8M CO4 L4

OR

9. a) State and prove the relation between auto correlation function and energy/power spectral density function. 4M CO4 L2

   b) Let x(t) = u(t-3) - u (t-5) and h(t) = e^{-3t} u(t). Compute the convolution of the y(t) = x(t) * h(t) using graphical method. 8M CO4 L4

UNIT-V

10. a) State and Prove i) Linearity ii) Differentiation in Time iii) Convolution in Time Properties of Laplace Transform. 6M CO5 L2

    b) Determine the Laplace Transform of

$$x(t) = 2t/T;\ 0 \le t \le T/2$$
$$= (2 - 2t)/T;\ T/2 \le t \le T$$

6M CO5 L3

OR

11. a) Distinguish between one-sided and two sided z-transforms and its region of convergence. 6M CO5 L2

    b) Determine Inverse Z Transform of

$$X(Z) = \frac{z(z^2 - 4z + 5)}{(z-1)(z-2)(z-3)} \quad \text{for ROC } |z| < 1$$

6M CO5 L3

*** 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) = $\begin{cases} 1, 0 < t \leq 1 \\ t, 1 < t \leq 2 \\ 0, t > 2 \end{cases}$	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: 20A433T

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

Analog 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)

		CO	BL
1.	Answer ***all*** the following short answer questions (5 X 2 = 10M)		
a)	State Miller's theorem.	1	L1
b)	Discuss the amplifier characteristics that get affected by negative feedback.	2	L1
c)	Explain the factors effecting the stability of oscillators.	3	L1
d)	Compare the linear wave shaping with non-linear wave shaping.	4	L2
e)	Draw the basic circuit diagram of negative peak clamper circuit.	5	L4

PART-B

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

		Marks	CO	BL
	UNIT–I			
2. a)	Draw the h-parameter equivalent circuit for a typical common base amplifier and derive expression for A_i , A_v, R_i and R_o.	6M	1	L2
b)	A CE amplifier is driven by a voltage source of internal resistance Rs=600Ωand load impedance is RL=1KΩ, R1=R2=10KΩ. The h-parameters are hfe=50, hie=1100Ω hoe=25μA/V and hre=$2x10^{-4}$. Compute the current gain Ai, input resistance Ri, voltage gain Av and output resistance Ro with exact model	6M	1	L3
	OR			
3. a)	Derive the equations for voltage gain, current gain, input impedance and output admittance for a BJT using low frequency h-parameter model for CC configuration	8M	1	L3
b)	For a CE amplifier given I_E= 2.5mA, h_{fe}= 140, h_{oe}= 20 μs and h_{ob}= 0.5 μs. Draw hybrid equivalent circuit.	4M	1	L3
	UNIT–II			
4.	Draw the block diagram of current shunt feedback amplifier and derive the expression for R_{if} and R_{of}.	12M	2	L2
	OR			
5. a)	Show that current–series negative feedback increases the input	6M	2	L2

impedance and Increases the output impedance.

b) Draw the voltage series feedback amplifier and explain its operations. 6M 2 L2

UNIT–III

6. a) Starting from the description of a generalized Oscillator, derive the expression for frequency of Oscillation in a Colpitts Oscillator. 6M 3 L2

b) A Colpitts oscillator is designed with C_1=100pF and C_2=7500pF. Find the range of inductance values if the frequency of oscillation vary between 950 KHz and 2050 KHz. 6M 3 L4

OR

7. a) Derive the expression for the phase shift as a function of frequency for the feedback network of RC phase shift oscillator. 8M 3 L2

b) What are the merits of crystal oscillators? Draw the circuit diagram. 4M 3 L2

UNIT–IV

8. a) Sketch the circuit diagram of a push-pull amplifier and explain its working. 5M 4 L2

b) Analyze the operation of Series-Fed Class-A power amplifier and derive the expression for efficiency. 7M 4 L3

OR

9. a) Describe the operation of Class B Push pull amplifier and show how even harmonics are eliminated. 6M 4 L2

b) Derive the expression for maximum conversion efficiency for a Transformer coupled Class A power amplifier. 6M 4 L2

UNIT–V

10. a) Obtain the expression for response of a low-pass RC circuit excited by a pulse input. Plot the typical responses for different time constants. 6M 5 L2

b) Design a diode clamper circuit to clamp the positive peaks of the input signal at zero level. The frequency of the input voltage is 750 Hz. 6M 5 L2

OR

11. a) Draw the circuit of transistor clipper and explain its operation. 6M 5 L2

b) Design a diode clamper to restore a dc level of +5 V to an input signal of peak-to-peak value 15 V. Assume the drop across the diode is 0.7 V and the signal frequency is 1 kHz. 6M 5 L3

*** End ***