| Hall Ticket Number : | | | | | | | | | | |
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**R-20**

**Code: 20A431T**

II B.Tech. I Semester Regular & Supplementary Examinations February 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 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) | Determine the following system for time-invariant or not. y(t) = x(-2t). | CO1 | L2 |
| b) | State the properties of Hilbert transform. | CO2 | L2 |
| c) | Explain the effects of under sampling. | CO3 | L2 |
| d) | State the properties of correlation function. | CO4 | L2 |
| e) | State initial and final value theorems of Z-transforms. | 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 even and odd parts of the signal $x(t) = e^{-2t}\cos(t)$. | 6M | CO1 | L2 |
| | b) | Determine whether the system is linear time invariant & Causal: y(n) = x (n) + nx (n-1). | 6M | CO1 | L2 |
| | | **OR** | | | |
| 3. | a) | Find the exponential Fourier series representation of the signal $x(t) = \cos^2 t$. | 6M | CO1 | L2 |
| | b) | Discuss about Gibbs phenomenon. | 6M | CO1 | L2 |
| | | **UNIT–II** | | | |
| 4. | a) | Derive Fourier transform from Fourier series. | 6M | CO2 | L6 |
| | b) | State and prove the following properties of Fourier transform (i) Frequency shifting (ii) Differentiation in time | 6M | CO2 | L2 |
| | | **OR** | | | |
| 5. | a) | Compute the Fourier transform of the Rectangular pulse. | 6M | CO2 | L2 |
| | b) | Compute the Fourier transform and spectrum of the signal $e^{-a\|t\|}u(t)$. | 6M | CO2 | L2 |

## UNIT–III

6. a) Explain how input and output signals are related to impulse response of a LTI system. 6M CO3 L2

   b) Explain causality and physical reliability of a system and hence give poly-wiener criterion. 6M CO3 L2

**OR**

7. a) Find the Nyquist rate and Nyquist interval for the following signals:

   i) $x(t) = 2\,\text{sinc}(100\pi t)$ ii) $x(t) = -10 \sin 40\pi t \cos 300\pi t$ 6M CO3 L2

   b) Explain about Flat-top sampling technique. 6M CO3 L2

## UNIT–IV

8. a) Derive convolution integral and also state the properties of convolution. 6M CO4 L6

   b) Find the convolution of the following signals using graphical method: $x(t)=e^{-3t}\,u(t)$; $h(t)=u(t-3)-u(t-5)$. 6M CO4 L2

**OR**

9. a) If $x(t) = \sin\omega_o t$, find i) $R(\tau)$ and ii) ESD. 6M CO4 L2

   b) Find the autocorrelation of $x(t) = A\cos(w_o t + \theta)$. 6M CO4 L2

## UNIT–V

10. a) Find the inverse Laplace transform of $X(s)= -\frac{1000}{s^2-10^0}$ ROC: -10 < Re(s) <10. 6M CO5 L2

    b) Compute the Laplace transform of the signal $x(t) = te^{-2t}\sin 2t\,u(t)$ using properties of Laplace transform. 6M CO5 L2

**OR**

11. a) Find the Z-transform of the sequence $x(n) = \left(\frac{1}{2}\right)^n u(n) - 2^n u(-n-1)$. 6M CO5 L2

    b) Find the inverse Z-transform of $X(z) = \frac{z(z-1)}{(z+1)^3(z+2)}$, ROC: $|z| > 2$ 6M CO5 L2

** End ***

| Hall Ticket Number : | | | | | | | | | | |
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**R-20**

**Code: 20AC32T**

II B.Tech. I Semester Regular & Supplementary Examinations February 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 mark.**
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) | Find the Laplace Transform of $e^{-t}\sin 2t$ by choosing first shifting property | 1 | 2 |
| b) | State convolution theorem of Laplace Transform. | 2 | 1 |
| c) | Write Fourier sine integral, cosine integral. | 3 | 1 |
| d) | Test whether the function f(z)=$z^2$ is harmonic or not | 4 | 2 |
| e) | Find the poles and residues at each pole of f(z) = $\frac{z}{z^2+1}$ . | 5 | 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 $L\left[\frac{\cos 2t - \cos 3t}{t}\right]$ | 6M | 1 | 2 |
| b) | Evaluate $\int_0^\infty \frac{e^{-t}-\cos 3t}{t}\sin 2t\, dt$ | 6M | 1 | 3 |
| | **OR** | | | |
| 3. a) | Find $L[t^2 e^{3t}]$ | 6M | 1 | 2 |
| b) | Find Laplace transform of $\sin\sqrt{t}$ and hence find transform of $\frac{\cos\sqrt{t}}{\sqrt{t}}$ | 6M | 1 | 3 |
| | **UNIT–II** | | | |
| 4. a) | Find inverse Laplace transform of $\log\left(\frac{s^2+4}{s^2+9}\right)$ | 6M | 2 | 3 |
| b) | Find $L^{-1}\left[\frac{s}{(s^2+a^2)(s^2+b^2)}\right]$ using convolution theorem. | 6M | 2 | 3 |
| | **OR** | | | |
| 5. a) | Find $L^{-1}\left[\frac{s-2}{s^2+5s+6}\right]$ | 6M | 2 | 2 |
| b) | Solve $x'' + 2x' + x = 3te^{-t}$ given $x(0) = 4, x'(0) =$ | 6M | 2 | 3 |

**UNIT–III**

6. a) Find Fourier series expansion of $f(x) = \frac{\pi - x}{2}$ in $0 < x < 2$. 6M 3 3

b) Find Fourier cosine integral of $f(x) = \pi$, $|x| \le 1$; $f(x) = 0$, $|x| > 1$ and hence find $\int_0^\infty \frac{\sin nx}{x}\, dx$ 6M 3 3

**OR**

7. a) Obtain the cosine series for the function $f(x) = x^2$ in $(0, \pi)$. Hence find the sum of the series $\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} \cdots = \frac{\pi^2}{8}$ 6M 3 3

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

**UNIT–IV**

8. Show that the function $f(x,y) = \begin{cases} \frac{x^3 y(y-ix)}{x^6+y^2} & if\ z \neq 0 \\ 0 & if\ z = 0 \end{cases}$ is not analytic at the origin although Cauchy-Riemann equations are satisfied at that point. 12M 4 3

**OR**

9. Show that the function $u = y^3 - 3x^2y$ is harmonic and find its harmonic conjugate. 12M 4 3

**UNIT–V**

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

b) Apply Cauchy residue theorem, evaluate $\oint_c \frac{2z+1}{(2z-1)^2}\, dz$, where c is $|z| = 1$. 6M 5 3

**OR**

11. a) Expand $f(z) = \frac{1}{z^2-3z+2}$ in the region $0 < |z-1| < 1$. 6M 5 3

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

*** End ***

| Hall Ticket Number : | | | | | | | | | | |
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**R-20**

**Code: 20A433T**

II B.Tech. I Semester Regular & Supplementary Examinations February 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 mark.**
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) | Explain how RC coupled amplifier differ from transformer coupled amplifier. | | 1 | 1 |
| b) | Compare Voltage series and Voltage shunt feedback. | | 2 | 1 |
| c) | Why positive feedback is generally used in oscillator circuits? | | 3 | 3 |
| d) | Compare direct coupled and transformer coupled amplifiers. | | 4 | 2 |
| e) | State clamping circuit theorem. | | 5 | 1 |

## PART-B

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

| | | | Marks | CO | BL |
|---|---|---|---|---|---|
| | | **UNIT–I** | | | |
| 2. | a) | The hybrid parameters of a transistor used as an amplifier in the CE configuration are $h_{ie}$ = 800Ω, $h_{fe}$ = 46, $h_{oe}$ = 80× $10^{-6}$ and $h_{re}$ = 5.4× $10^{-4}$. If $R_L$ = 5kΩ and $R_s$ =500Ω. Find $A_i$, $R_i$, $A_v$, $R_o$. | 4M | 1 | 3 |
| | b) | State and prove Miller's theorem and its dual. | 8M | 1 | 1 |
| | | **OR** | | | |
| 3. | a) | Draw the small signal model of CE Amplifier and derive the expression for its $A_V$, $A_I$, $R_i$, $R_O$. | 6M | 1 | 3 |
| | b) | Explain Frequency response of RC Coupled amplifier. | 6M | 1 | 1 |
| | | **UNIT–II** | | | |
| 4. | a) | Determine the voltage gain, input, and output impedance with feedback for voltage series feedback having A=-100, $R_i$=10 kΩ, $R_o$= 20 kΩ for feedback of (a) β=-0.1 and (b) β=-0.5. | 6M | 2 | 4 |
| | b) | Draw the circuit diagram and equivalent circuit for current shunt feedback amplifier and derive the expression for total voltage gain. | 6M | 2 | 1 |
| | | **OR** | | | |
| 5. | a) | Explain the relevant information, how the negative feedback improves stability reduce noise and increase input impedance? | 6M | 2 | 1 |

| | | | | | |
|---|---|---|---|---|---|
| | b) | If the gain of an amplifier changes from a value of -1000 by 10%, calculate the gain change if the amplifier is used in a feedback circuit having β=-1/20. | 6M | 2 | 3 |

**UNIT–III**

| | | | | | |
|---|---|---|---|---|---|
| 6. | a) | What is Barkhausen criterion? How this condition is used in oscillator? Explain. | 6M | 3 | 1 |
| | b) | A 1 mH inductor is available. Choose the capacitor values in a Colpitts oscillator so that f = 1 MHz and β = 0.25. | 6M | 3 | 4 |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 7. | a) | Why Wien-bridge oscillators are most popular in audio frequency range? | 4M | 3 | 2 |
| | b) | Derive the condition for oscillation in RC phase shift oscillator. What type of waveform does it generate? Give some advantages and disadvantages. | 8M | 3 | 3 |

**UNIT–IV**

| | | | | | |
|---|---|---|---|---|---|
| 8. | a) | Draw and explain the circuit diagram of a class B npn push-pull power amplifier using transformer-coupled input. | 6M | 4 | 4 |
| | b) | Analyze the operation of Series-Fed Class-A power amplifier and derive the expression for efficiency. | 6M | 4 | 4 |

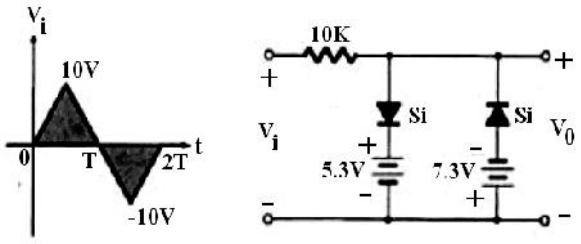
**OR**

| | | | | | |
|---|---|---|---|---|---|
| 9. | a) | With suitable circuit diagram explain a Complementary Symmetry amplifier. | 6M | 4 | 2 |
| | b) | For a class B amplifier with $V_{CC}$ 25 V driving an 8Ω load, determine: (i) Maximum input power, (ii) Maximum output power and (iii) Maximum circuit efficiency | 6M | 4 | 5 |

**UNIT–V**

| | | | | | |
|---|---|---|---|---|---|
| 10. | a) | State and prove clamping circuit theorem. | 6M | | 1 |
| | b) | Draw the response of High pass RC circuits to sinusoidal, step, pulse, square, ramp and exponential input signals. | 6M | 5 | 5 |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 11. | a) | Determine the output for the following circuits   | 6M | 5 | 4 |
| | b) | Design positive and negative clipper circuits and also draw their corresponding waveforms. | 6M | 5 | 6 |

*** End ***

| Hall Ticket Number : | | | | | | | | | | |
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**R-20**

**Code: 20A432T**

II B.Tech. I Semester Regular & Supplementary Examinations February 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 mark.**
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) | Distinguish between weighted and non-weighted codes with example. | CO1 | L3 |
| b) | Find the duality of the function A'B(C+D)+B'C'D+AB'C. | CO2 | L3 |
| c) | Realize full adder using two half adders and or gate. | CO3 | L2 |
| d) | Define a latch and flip-flop. | CO3 | L1 |
| e) | What is the use of ASM chart? | 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) | Implement AND, OR, NOR and EX-OR gates by using NAND gates only. | 6M | CO1 | L2 |
| b) | Convert the following to the corresponding bases i) $(343)_2 = (\ )_{10}$ ii) $(7654)_8 = (\ )_{10} = (\ )_{16}$ | 6M | CO1 | L2 |
| | **OR** | | | |
| 3. a) | How are negative numbers represented? Represent signed numbers from +7 to -8 using different ways of representation. | 6M | CO1 | L3 |
| b) | Explain about even and odd parity hamming code with an example, what is the drawback. | 6M | CO1 | L2 |
| | **UNIT–II** | | | |
| 4. a) | Implement the following Boolean function with only two input NAND gates f = (AB'+D')C'+C(A'+B'). | 5M | CO2 | L2 |
| b) | Using Quine McCluskey method and prime implicants reduction table, determine the minimal SOP expression for the following using decimal notation f = Σm(1,4,7,9,12,14)+Σdc(2,13). | 7M | CO2 | L3 |
| | **OR** | | | |

| | | | | | |
|---|---|---|---|---|---|
| 5. | a) | Simplify the following Boolean function with the don't conditions using K-map method<br>f(A, B, C, D) = Σm(1,3,8,10,15) +Σd(0, 2, 9) | 6M | CO2 | L3 |
| | b) | Obtain the simplified expression in sum of products for the following Boolean function<br>BDE+B′C′D+CDE+A′B′CE+A′B′C+B′C′D′E′. | 6M | CO2 | L3 |

**UNIT–III**

| | | | | | |
|---|---|---|---|---|---|
| 6. | a) | Perform the realization of half adder and full adder using decoders and required logic gates. | 6M | CO3 | L3 |
| | b) | Define a multiplexer? Design a multiplexer for the function<br>f(x,y,z) = Σm(0,2,3,5,7). | 6M | CO3 | L3 |
| | | **OR** | | CO3 | |
| 7. | a) | Write the steps involved in designing a combinational circuit with example. | 6M | CO3 | L3 |
| | b) | With the help of truth table and simplification using K-Map, design a 2 bit comparator using basic gates. | 6M | CO3 | L2 |

**UNIT–IV**

| | | | | | |
|---|---|---|---|---|---|
| 8. | a) | Show that the characteristic equation for the output of JK flip-flop is Q(t+1) = J.Q'(T) + K'.Q(T). | 6M | CO3 | L2 |
| | b) | Explain the operation of mod-10 counter with circuit diagram. | 6M | CO3 | L2 |
| | | **OR** | | | |
| 9. | a) | Write the truth table of the SR, JK and T flip-flops. | 6M | CO3 | L3 |
| | b) | Explain D flip flop. | 6M | CO3 | L3 |

**UNIT–V**

| | | | | | |
|---|---|---|---|---|---|
| 10. | | Draw the diagram for serial adder and explain its operation. | 12M | CO4 | L3 |
| | | **OR** | | | |
| 11. | a) | Draw the ASM chart for D-Flip Flop. | 6M | CO4 | L3 |
| | b) | Write the salient features of ASM chart. | 6M | CO4 | L2 |

*** End ***

| Hall Ticket Number : | | | | | | | | | | |
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**R-20**

**Code: 20AC36T**

II B.Tech. I Semester Regular & Supplementary Examinations February 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) | Define managerial economics. | CO1 | L1 |
| b) | List the disadvantages of breakeven analysis. | CO2 | L1 |
| c) | Write a short note on partnership business. | CO3 | L1 |
| d) | Mention the advantages of payback method. | CO4 | L2 |
| e) | State the importance of liquidity ratios. | 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. | Explain the nature and scope of managerial economics. | 12M | CO1 | L1 |
| | **OR** | | | |
| 3. | Explain the different types of elasticity of demand with suitable examples. | 12M | CO1 | L2 |
| | **UNIT–II** | | | |
| 4. | Explain various types of internal economies of scale. | 12M | CO2 | L1 |
| | **OR** | | | |
| 5. | From the following information relating to ABC company, you are required to find out contribution, breakeven point in units, margin of safety and profit. Given<br>Total fixed costs-Rs.4,500<br>Total variable costs-Rs.7,500<br>Total sales-Rs.25,000<br>Units sold-5,000 | 12M | CO2 | L1 |
| | **UNIT–III** | | | |
| 6. | What is meant by perfect competition market? Enumerate on price output determination in perfect competition | 12M | CO3 | L1 |

**OR**

7. Evaluate the merits of sole proprietorship business. 12M CO3 L1

**UNIT–IV**

8. Discuss the various methods of discounted cash flow techniques. 12M CO4 L4

**OR**

9. A firm is considering the following project

| Cash flows in Rupees | | | | | |
|---|---|---|---|---|---|
| $C_0$ | $C_1$ | $C_2$ | $C_3$ | $C_4$ | $C_5$ |
| -70,000 | +10,500 | +11,969 | +12,129 | +13,735 | +14,521 |

Calculate NPV of the project, if the cost of capital is 12 percent 12M CO4 L4

**UNIT–V**

10. a) Elaborate the importance of various accounting concepts. 6M CO5 L1

b) Explain the importance of trail balance. 6M CO5 L1

**OR**

11. Journalize the following transactions in the books of Kumar.

April 2005

1 Kumar commenced business with Rs.15, 000.

2 Paid in to bank Rs.10, 000.

5 Purchased goods from B for Rs.5,000

9 Returned goods to B for Rs.2, 000.

14 Paid to B in full settlement of account Rs.1,5000

18 Received interest from the bank Rs.1750

21 Sold goods for cash Rs.7,000

25 Received goods worth Rs.500 from Krishna with a complaint about damage.

26 Paid salaries Rs.400 12M CO5 L3

*** End ***.