| Hall Ticket Number : | | | | | | | | | | |
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**R-19**

**Code: 19A237T**

II B.Tech. I Semester Supplementary Examinations November 2023

# Electrical Circuits and Technology

(Electronics and Communication Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks )

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Marks

**UNIT–I**

1. Derive the expression for current in terms of steady state and transient part for RC series circuit excited by a DC voltage. Also find the voltage across the resistor and power absorbed by resistor. 14M

**OR**

2. Derive the equations to convert (i) Delta network to Star network; (ii) Star network to a Delta network 14M

**UNIT–II**

3. a) Define Resonant frequency, Band Width & Q-Factor 6M

   b) Define Cycle, Time Period, Frequency & Amplitude 8M

**OR**

4. a) Explain about the sinusoidal response of parallel RLC circuit. 4M

   b) Define Average & RMS Value, Form Factor, Peak Factor, Peak Value, Peak to Peak Value 10M

**UNIT–III**

5. The z parameters of a symmetrical four terminal network are $z_{11}=z_{22}=20\Omega$ and $z_{12}=z_{21}=5\Omega$. Find the ABCD parameters of the network 14M

**OR**

6. Explain the series connection of two port networks. Which type of 2-port parameters is ideal for such a series connection? 14M

**UNIT–IV**

7. a) Describe the principle of operation of a dc generator? 7M

   b) A 2 pole lap wound generator has 200 conductors on armature. It is driven by prime mover at a constant speed of 600 rpm. If the flux per pole is 0.1 Wb, calculate the generated emf. 7M

**OR**

8. a) List the types of characteristics in a dc generator? 6M

   b) What is the function of commutator in a dc machines? 8M

**UNIT–V**

9. a) Write the principle of Induction motor. 4M

   b) Explain with the help of suitable diagram how the rotating magnetic field is produced in a three phase motor? 10M

**OR**

10. a) Define slip, rotor speed, rotor frequency, synchronous speed 8M

    b) A 3-phase induction motor is wound for 4 pole, & is supplied from 50HZ system calculate a) The synchronous speed b) The speed of motor when the slip is 4% c) The rotor current frequency when the motor runs at 600rpm 6M

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| Hall Ticket Number : | | | | | | | | | | |
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**R-19**

**Code: 19AC31T**

II B.Tech. I Semester Supplementary Examinations November 2023

# Partial Differential Equations and Complex Variables

(Common to CE, EEE, ME & ECE)

Max. Marks: 70 Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks )

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| | | Marks | CO | BL |
|---|---|---|---|---|
| | **UNIT–I** | | | |
| 1. a) | Evaluate $L\{t \sin 3t\}$ | 7M | CO1 | L2 |
| b) | Find the L.T of $L\{t\, e^{-2t} \cos t\}$ | 7M | CO1 | L1 |
| | **OR** | | | |
| 2. a) | Find $L\left\{\int_0^t \int_0^t \cosh at \, dt \, dt\right\}$ | 7M | CO1 | L1 |
| b) | Using L.T, Evaluate $\int_0^\infty te^{-t} \sin t \, dt$ | 7M | CO1 | L3 |
| | **UNIT–II** | | | |
| 3. a) | Find the inverse L.T of $\log\left(\frac{s^2+4}{s^2+9}\right)$ | 7M | CO2 | L1 |
| b) | Find $L^{-1}\left\{\log\left(\frac{s+a}{s+b}\right)\right\}$ | 7M | CO2 | L1 |
| | **OR** | | | |
| 4. | Using L.T, solve $\left(D^2+4D+5\right)y = 5$, given that $Y(0)=0, Y'(0)=0$ | 14M | CO2 | L3 |
| | **UNIT–III** | | | |
| 5. | Expand $f(x) = x^2,\ 0 < x < 2®$ as a Fourier series. | 14M | CO3 | L2 |
| | **OR** | | | |
| 6. | Find the Fourier Series of periodicity 3 for $f(x) = 2x - x^2$ in $0 < x < 3$ | 14M | CO3 | L1 |

**UNIT–IV**

7. Use separation of variables to solve $\frac{\partial^2 u}{\partial x \partial t} = e^{-t}\cos x$, given that $u = 0$ when $t = 0$ and $\frac{\partial u}{\partial t} = 0$ when $x = 0$. 14M CO4 L3

**OR**

8. A tightly stretched string with fixed end points $x = 0 \quad and \quad x = l$ is initially in a position given by $y(x,0) = y_0 \sin^3\left(\frac{® x}{l}\right)$. If it is released from rest from this position, Find the displacement $y$ at any time and at any distance from the end $x = 0$ . 14M CO4 L3

**UNIT–V**

9. Prove that $z^n$ (n is a positive integer) is analytic and hence find its derivative. 14M CO5 L5

**OR**

10. a) Evaluate $\int_c \frac{\log z}{(z-1)^3} dz \quad where \quad c : |z-1| = \frac{1}{2}$ . Using Cauchy's integral formula. 7M CO5 L5

b) Evaluate $\int_c \frac{dz}{z^3(z+4)}$ where $C \ \ is \ |z| = 2$ using Cauchy's integral formula. 7M CO5 L5

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| Hall Ticket Number : | | | | | | | | | | |
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**R-19**

**Code: 19A434T**

II B.Tech. I Semester Supplementary Examinations November 2023

# Signals and Systems

(Electronics and Communication Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks )

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| | | | Marks |
|---|---|---|---|
| | | **UNIT–I** | |
| 1. | a) | Explain the various operations on signals | 7M |
| | b) | Write the Classification of systems based on certain properties. | 7M |
| | | **OR** | |
| 2. | a) | Obtain the expressions to represent trigonometric Fourier coefficients in terms of exponential Fourier coefficients. | 7M |
| | b) | Define Fourier series of signal f(t) .Derive the Relationship between various types of Fourier series representation | 7M |
| | | **UNIT–II** | |
| 3. | a) | What is the Significance of Hilbert Transform? Explain | 7M |
| | b) | Obtain the Fourier transform of the following functions. i) Unit step function ii) Unit impulse function | 7M |
| | | **OR** | |
| 4. | | Define Fourier transform. Explain the properties of Fourier transform | 14M |
| | | **UNIT–III** | |
| 5. | a) | Differentiate LTI system with LTV system. | 7M |
| | b) | Discuss the conditions for distortionless transmission. | 7M |
| | | **OR** | |
| 6. | a) | State and prove the sampling theorem for a band limited signals | 7M |
| | b) | State and derive the relationship between bandwidth and rise time. | 7M |
| | | **UNIT–IV** | |
| 7. | | Find the graphical convolution between following signals $x(t)=1$ for $0\le t\le 2$ and 0 otherwise; $h(t)=1$ for $0\le t\le 3$ and 0 otherwise | 14M |
| | | **OR** | |
| 8. | a) | State and explain Parseval's theorem. | 7M |
| | b) | State and prove any four properties of Cross correlation function | 7M |
| | | **UNIT–V** | |
| 9. | a) | Find the inverse Laplace transform of $x(s) = 5(s+5)/ s(s+3) (s+7)$; $Re(s) > -3$ | 7M |
| | b) | Explain the constraints on ROC for various classes of signals | 7M |
| | | **OR** | |
| 10. | a) | Derive the relation between Z transform and Fourier transform | 7M |
| | b) | Find the z-Transform of i) $X(z) = 1/(1-0.5z^{-1}+0.5-2)$ for ROC $Z > 1$ ii) $1/(z^2 -1.2z+0.2)$ | 7M |

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| Hall Ticket Number : | | | | | | | | | | |
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**R-19**

**Code: 19A431T**

II B.Tech. I Semester Supplementary Examinations November 2023

# Electronic Circuits

(Electronics and Communication Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks )

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Marks

**UNIT–I**

1. a) Draw and explain the circuit of cascaded amplifier and mention the advantages 7M

   b) Draw the equivalent circuit of a CE amplifier using Millers theorem. What is the upper 3-dB frequency of such circuit? 7M

**OR**

2. A transistor in CB configuration is driven by a voltage source VS of internal resistance Rs=800 Ω. The load impedance is resistor RL = 2000 Ω. The h- parameters are hib=22 Ω, hrb=3 x 10-4 , hfb=-0.98 and hob=0.5 μA/V. Compute the current gain AI, input impedance Ri, voltage gain AV, overall voltage gain AVS, overall current gain AIS and output impedance Zo. 14M

**UNIT–II**

3. a) Derive the expression for short circuit current gain AIS of a CE amplifier. Define fβ and ft. 8M

   b) With hybrid π equivalent circuit, derive the expressions for trans conductance. 6M

**OR**

4. a) Derive the expression of Gain Bandwidth Product. 7M

   b) Draw the Hybrid – π model and discuss the significance of components present. 7M

**UNIT–III**

5. a) Derive the expressions for input impedance, output impedance for Current series feedback. 6M

   b) Explain voltage shunt feedback employed in emitter follower with neat diagrams and obtain the expressions for voltage gain, current gain, input and output impedances 8M

**OR**

6. a) Derive the expressions for input resistance ,voltage gain and output resistance of current series feedback circuit 8M

   b) What is the impact of negative feedback on bandwidth? If an amplifier with gain of A = 1000 and feedback of β = 0.1 has a gain change of 20% due to temperature, calculate the change in gain of the feedback amplifier if negative feedback is introduced. 6M

**UNIT–IV**

7. Derive the expression of frequency of oscillations of Hartley oscillator. 14M

**OR**

8. a) Explain the Working of transistorized Wien-bridge oscillator with neat diagram 8M

   b) Design the R & C elements of a Wien bridge oscillator for operation at fo = 10 KHz of Wien bridge oscillator. 6M

**UNIT–V**

9. a) Give the classification of large signal amplifiers 7M

   b) Distinguish between power amplifiers. 7M

**OR**

10. Explain the working principle of a push pull power amplifier. Justify your answer mathematically For a class-B Power Amplifier providing a 22V Peak signal to an 8Ω load and a power supply of VCC=25V. determine: (a) Input Power, Pi(dc) (b) Output Power, Po(ac) and (c) Circuit efficiency, %η. 14M

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