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

**Code: 20A232T**

II B.Tech. I Semester Supplmentary Examinations August 2022

# 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 mark.**
3. Answer **ALL** the questions in **Part-A** and **Part-B**

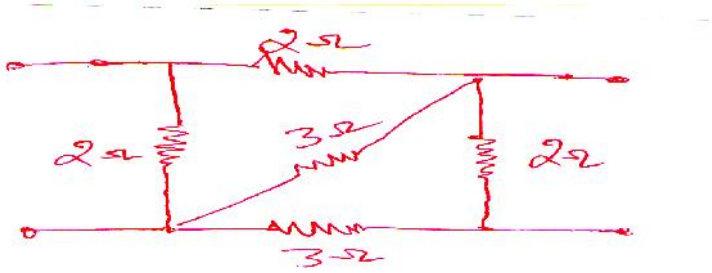
## PART-A

**(Compulsory question)**

| | | CO | Blooms Level |
|---|---|---|---|
| 1. | Answer ***all*** the following short answer questions ( 5 X 2 = 10M ) | | |
| a) | List the dependent and independent variables of transmission parameters in terms of network parameters. | 1 | L1 |
| b) | State final value theorem. | 2 | 1 |
| c) | Define time constant. | 3 | 1 |
| d) | Define unit impulse function. | 4 | 1 |
| e) | Define odd function symmetry. | 5 | 1 |

## PART-B

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

| | | Marks | CO | Blooms Level |
|---|---|---|---|---|
| | **UNIT–I** | | | |
| 2. a) | Determine the relation between A, B, C, D and z parameters. | 5M | 1 | 3 |
| b) | The following equations refer to a two port network: $V_1 = 5\ I_1 + 2\ I_2$ $V_2 = 2\ I_1 + I_2$ A load resistance of 3Ω is connected across port 2 terminals. Determine the input impedance. | 7M | 1 | 3 |
| | **OR** | | | |
| 3. a) | Determine the relation between hybrid and z parameters. | 5M | 1 | 3 |
| b) | Determine the A,B,C,D parameters of the circuit shown below:   | 7M | 1 | 3 |

**UNIT–II**

| | | | | | |
|---|---|---|---|---|---|
| 4. | a) | Derive the Laplace transform of cos ωt. | 6M | 2 | 6 |
| | b) | Apply Laplace transform concept to simple R-L series circuit. | 6M | 2 | 3 |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 5. | a) | Derive the Laplace transform of exponential function. | 6M | 2 | 6 |
| | b) | Apply Laplace transform concept to simple R-C series circuit. | 6M | 2 | 3 |

**UNIT–III**

| | | | | | |
|---|---|---|---|---|---|
| 6. | | Analyze the response of series R-L-C circuit when excited by sinusoidal voltage. | 12M | 3 | 4 |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 7. | | Analyze the response of series R-C circuit when excited by a dc voltage. | 12M | 3 | 4 |

**UNIT–I**

| | | | | | |
|---|---|---|---|---|---|
| 8. | | Explain the classification of discrete time signals. | 12M | 4 | 2 |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 9. | | Explain the concept of convolution of signals. | 12M | 4 | 2 |

**UNIT–IV**

| | | | | | |
|---|---|---|---|---|---|
| 10. | | Evaluate the Fourier series of a triangular waveform. | 12M | 5 | 5 |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 11. | | What is a Fourier series? Explain the half wave symmetry of the series. | 12M | 5 | 2 |

*** End ***

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

**Code: 20A231T**

II B.Tech. I Semester Supplmentary Examinations August 2022

# Electrical Machines - I

( Electrical and Electronics Engineering )

Max. Marks: 70 Time: 3 Hours

*********

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 | Blooms Level |
|---|---|---|---|
| 1. | Answer ***all*** the following short answer questions ( 5 X 2 = 10M ) | | |
| a) | What is the purpose of commutator in DC machines? | 1 | 1 |
| b) | Define critical speed of a DC machine? | 2 | 4 |
| c) | What is the significance of field test on DC machines? | 3 | 3 |
| d) | What is the effect of frequency variation on iron losses? | 4 | 3 |
| e) | What is the use of tertiary windings in three phase transformers? | 5 | 2 |

## PART-B

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

| | | Marks | CO | Blooms Level |
|---|---|---|---|---|
| | **UNIT–I** | | | |
| 2. | Draw a neat sketch of DC generator. State the functions of each part? | 12M | 1 | 1 |
| | **OR** | | | |
| 3. a) | What is armature reaction? Describe the effects of armature reaction on the operation of DC machines | 6M | 1 | 1 |
| b) | Explain the process of commutation in DC machines and describe the methods to improve it? | 6M | 1 | 1 |
| | **UNIT–II** | | | |
| 4. a) | What are the different types of DC generators according to the ways in which the fields are excited? Show the connection diagram of each type? | 12M | 1 | 1 |
| | **OR** | | | |
| 5. a) | With neat circuit diagram, explain how the magnetization characteristics can be obtained for self-excited DC machine? | 8M | 2 | 4 |
| b) | What is the critical field resistance of a DC shunt generator? What is its significance? | 4M | 2 | 4 |
| | **UNIT–III** | | | |
| 6. a) | Explain what is back EMF and it's significance in a DC motor? | 4M | 3 | 3 |

| | | | | | |
|---|---|---|---|---|---|
| | b) | What is the necessity of starter for a DC motor? Explain, with a neat sketch, the working of a 3 point DC shunt motor starter, bringing out the protective features incorporated in it? | 8M | 1 | 1 |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 7. | a) | Describe Swinburne's test with the help of a neat circuit diagram to find the efficiency of a DC machine? | 6M | 3 | 3 |
| | b) | A 200V.14.92 KW DC shunt motor when tested by Swinburne's method gave the following test results.<br>Running light: Armature current=6.5A, Field current=2.2A<br>Aramture locked: The current was 70A when a potential difference of 3V was applied to the brushes. Estimate the efficiency of the motor when working under full load conditions? | 6M | 3 | 3 |

**UNIT–IV**

| | | | | | |
|---|---|---|---|---|---|
| 8. | a) | Develop the phasor diagram of a single phase transformer under loaded condition. Assume lagging power factor load? | 6M | 4 | 3 |
| | b) | Develop the exact equivalent circuit of a single phase transformer. From this derive the approximate and simplified equivalent circuits of the transformer. State the various assumptions made? | 6M | 4 | 3 |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 9. | a) | Explain Sumpner's test for testing two single phase transformers. Also explain why this method is beneficial to find the efficiency of transformers? | 6M | 4 | 3 |
| | b) | The full load copper loss and iron losses of a 15 KVA single phase transformer are 320W and 200W respectively. Calculate the efficiency of the transformer on<br>i) Full load ii) Half load.<br>Assume the power factor as 0.8 lagging. | 6M | 4 | 3 |

**UNIT–V**

| | | | | | |
|---|---|---|---|---|---|
| 10. | a) | What is an auto transformer? State it's merits and demerits over the two winding transformer? | 6M | 4 | 3 |
| | b) | Draw the Scott connection of transformers and mark the terminals and turn ratio. What are the applications of Scott connection? | 6M | 5 | 2 |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 11. | a) | Describe briefly the essential and desirable conditions to be fulfilled for operating two three phase transformers in parallel? | 6M | 5 | 2 |
| | b) | Draw schematically how a three phase transformer can be phased in with another three phase transformer? | 6M | 5 | 2 |

*** End ***

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

**Code: 20A234T**

II B.Tech. I Semester Supplmentary Examinations August 2022

# 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 mark.**
3. Answer **ALL** the questions in **Part-A** and **Part-B**

## PART-A

**(Compulsory question)**

| | | | Blooms Level |
|---|---|---|---|
| 1. | Answer ***all*** the following short answer questions ( 5 X 2 = 10M ) | CO | |
| a) | What is the necessity of binary codes in computers? | CO1 | L1 |
| b) | What are the advantages of tabulation method over K-map? | CO2 | L1 |
| c) | Draw the 1-to-4 line DEMUX and truth table. | CO3 | L1 |
| d) | What is meant by race around condition? | CO4 | L1 |
| e) | Write the capabilities and 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 | Blooms Level |
|---|---|---|---|---|---|
| | | **UNIT–I** | | | |
| 2. | a) | Distinguish between weighted and non-weighted codes with examples. | 6M | CO1 | L2 |
| | b) | What is the advantage of 2's complement representation in computers? Perform the following operations using 2's complement method: (i) (+55) - (+15) (ii) (-55) - (-15) | 6M | CO1 | L1 |
| | | **OR** | | | |
| 3. | a) | State duality theorem. List Boolean laws and their duals. | 6M | CO1 | L1 |
| | b) | Given Boolean expression AB' + A'B=C. Show that AC'+A'C=B. | 6M | CO1 | L3 |
| | | **UNIT–II** | | | |
| 4. | a) | Simplify the following Boolean function using tabulation method. Y (A, B, C, D) = **Σ** (0, 1, 3, 7, 8, 9, 11, 15) | 6M | CO2 | L3 |
| | b) | Define prime implicant and essential prime implicant with example using K-map. | 6M | CO2 | L2 |
| | | **OR** | | | |
| 5. | | Simplify the following Boolean function using K- map and implement using NAND –NAND Logic. $Y(A, B, C, D) = \Sigma m(0,1,2,3,5,7,8,9,11,14)$ . | 12 | CO2 | L3 |

**UNIT–III**

| | | | | | |
|---|---|---|---|---|---|
| 6. | a) | Design a combinational circuit that accepts a three-bit binary number and generates an output binary number equal to the twice the input number. | 6M | CO3 | L4 |
| | b) | Design 4x16 decoder using two 3x8 decoders with block diagram. | 6M | CO3 | L4 |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 7. | a) | Explain the general combinational PLD configuration with suitable block diagram. | 6M | CO3 | L2 |
| | b) | Give the logic implementation of a 32 x 4 bit & 8 x 4 bit ROM using suitable decoder. | 6M | CO3 | L1 |

**UNIT–IV**

| | | | | | |
|---|---|---|---|---|---|
| 8. | a) | Draw the logic diagram and write functional table of an SR latch using NAND gates. Explain the operation. | 6M | CO4 | L4 |
| | b) | Design mod 8 synchronous counter using T flip-flop. | 6M | CO4 | L4 |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 9. | | Draw the circuit diagram of J-K Flip-Flop with NAND gates with positive edge triggering and explain its operation with the help of truth table. How race around condition is eliminated? | 12 | CO4 | L1 |

**UNIT–V**

| | | | | | |
|---|---|---|---|---|---|
| 10. | | Draw the state diagram for mod-6 counter and obtain ASM chart | 12 | CO5 | L1 |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 11. | a) | Compare between Moore and Mealy machine. | 6M | CO5 | L2 |
| | b) | Explain in detail the block diagram of ASM chart. | 6M | CO5 | L2 |

*** End ***

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

**Code: 20AC32T**

II B.Tech. I Semester Supplmentary Examinations August 2022

# Transform Techniques & Complex Variables

( Common to EEE and ECE )

Max. Marks: 70 Time: 3 Hours

*********

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 | Blooms Level |
|---|---|---|---|
| 1. | Answer ***all*** the following short answer questions ( 5 X 2 = 10M ) | | |
| a) | Find $L\left[\sin^3 3t\right]$. | CO1 | L4 |
| b) | Evaluate: $L^{-1}\left[\frac{1}{(s+1)(s+2)}\right]$. | CO2 | L3 |
| c) | Find the Fourier coefficient $b_n$ of the Fourier series expansion for the function $f(x)=x^2$ in the interval $[0,2®]$. | CO3 | L3 |
| d) | Apply C-R conditions to $f(z)=z^2$ and show that the function is analytic everywhere. | CO4 | L1 |
| e) | Find the poles and residues of $f(z)=\frac{e^z}{z(1+z)^2}$. | CO5 | L2 |

## PART-B

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

| | | Marks | CO | Blooms Level |
|---|---|---|---|---|
| | **UNIT–I** | | | |
| 2. a) | Find the Laplace Transformation of $f(t)=t\,e^{3t}\sin t$. | 6M | CO1 | L3 |
| b) | Prove that $\int_0^\infty \left(\frac{e^{-t}-e^{-3t}}{t}\right)dt=\log(3)$. | 6M | CO1 | L2 |
| | **OR** | | | |
| 3. a) | Find the Laplace Transform of $f(t)=\begin{cases}1 & 0\le t<a\\ -1 & a<t<2a\end{cases}$ and $f(t)$ is periodic with period $2a$. | 6M | CO1 | L1 |
| b) | Find the Laplace Transformation of $f(t)=\frac{e^{-t}\sin t}{t}$. | 6M | CO1 | L1 |

**UNIT–II**

4. a) Apply convolution theorem to evaluate $L^{-1}\left(\frac{1}{(s^2+a^2)(s^2+b^2)}\right)$ 6M CO2 L3

b) Find the inverse Laplace Transformation of

$$F(s)=\frac{s^2-15s-11}{(s+1)(s-2)^2}.$$ 6M CO2 L3

**OR**

5. Solve the differential equation

$$\frac{d^2y}{dt^2}-6\frac{dy}{dt}+9y=t^2e^{3t};\ y(0)=2;\ y'(0)=6$$

by using Laplace Transformation. 12M CO2 L3

**UNIT–III**

6. Find Fourier series of $f(x)=x+x^2$ in $(-\pi,\pi)$ and hence deduce that $\frac{1}{1^2}-\frac{1}{2^2}+\frac{1}{3^2}-\frac{1}{4^2}+\ldots\ldots=\frac{\pi^2}{12}$. 12M CO3 L1

**OR**

7. Find Fourier Cosine and Sine transform of

$$f(x)=\begin{cases}x & 0<x<1\\ 2-x & 1<x<2\\ 0 & x>2\end{cases}.$$ 12M CO3 L1

**UNIT–IV**

8. Show that the function $u=e^{2x}\left(x\cos(2y)-y\sin(2y)\right)$ is harmonic. Find the conjugate function $v$ and express $u+iv$ as an analytic function of $z$. 12M CO4 L1

**OR**

9. Evaluate $\int_C \frac{e^z}{z(1-z)^3}dz$ where $C$ is (i) $|z|=\frac{1}{2}$

(ii) $|z-1|=\frac{1}{2}$ (iii) $|z|=2$. 12M CO4 L2

## UNIT–V

10. a) Find Laurent's series of $f(z)=\frac{1}{(z+1)(z+3)}$ for $1<|z|<3$. 6M CO5 L2

    b) State Cauchy Residue theorem and hence evaluate $\int_C \frac{\sin^2 z}{\left(z-\frac{®}{6}\right)^3}dz$ where $C$ the circle is $|z|=1$. 6M CO5 L2

**OR**

11. a) Expand $f(z)=\frac{1}{1-z}$ in a Taylor series with center $z_0=2i$. 6M CO5 L3

    b) State Cauchy Residue theorem and hence evaluate $\int_C \frac{\cos z}{(z-®i)^2}dz$ where $C$ is the circle $|z|=5$. 6M CO5 L3

*** End ***

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

**Code: 20A233T**

II B.Tech. I Semester Supplmentary Examinations August 2022

# Analog Electronics

( Electrical and Electronics Engineering )

Max. Marks: 70 Time: 3 Hours

*********

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 | Blooms Level |
|---|---|---|---|
| 1. | Answer ***all*** the following short answer questions (5X2 = 10M ) | | |
| a) | Draw the circuit diagram of RC phase shift oscillator and write its frequency of oscillation formula. | CO1 | L2 |
| b) | What are the limitations of ideal differentiator? | CO2 | L2 |
| c) | Define Comparator and list its applications. | CO3 | L2 |
| d) | What is the difference between capture range and lock range in PLL? | CO4 | L2 |
| e) | Define the terms settling time and conversion time of DAC. | CO5 | L2 |

## PART-B
**Answer any *five full* questions by choosing one question from each unit ( 5 x 12 = 60 Marks )**

| | | Marks | CO | Blooms Level |
|---|---|---|---|---|
| | **UNIT–I** | | | |
| 2. a) | Explain the circuit diagram of colpitts oscillator with a neat diagram&, derive the expression for frequency of oscillation | 10M | CO1 | L2 |
| b) | Sketch the circuit diagram of a voltage shunt feed-back amplifier | 2M | CO1 | L2 |
| | **OR** | | | |
| 3. a) | Explain the circuit diagram of Crystal oscillator with a neat diagram&, derive the expression for frequency of oscillation | 10M | CO1 | L2 |
| b) | List the steps required to carry out the analysis of a feed- back amplifier. | 2M | CO1 | L2 |
| | **UNIT–II** | | | |
| 4. | Draw the circuit of Log and Anti log Amplifiers. Explain its operation in detail | 12M | CO2 | L2 |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 5. | | Explain the operation of Instrumentation amplifier with the help of block diagram and derive equation for gain. | 12M | CO2 | L2 |

**UNIT–III**

| | | | | | |
|---|---|---|---|---|---|
| 6. | a) | Construct and explain the working principle of a Triangular wave generator using Op-amp. | 9M | CO3 | L2 |
| | b) | Discuss the working of a Clipper circuit | 3M | CO3 | L2 |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 7. | a) | Explain the working principle and operation of Astable multivibrator using Op-Amp with relevant sketch | 9M | CO3 | L2 |
| | b) | Explain opamp based full-wave Rectifier | 3M | CO3 | L2 |

**UNIT–IV**

| | | | | | |
|---|---|---|---|---|---|
| 8. | | With the help of neat circuit diagram explain the functioning of 565 PLL in detail. | 12M | CO4 | L2 |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 9. | | Explain in detail the principle and operation of PLL | 12M | CO4 | L2 |

**UNIT–V**

| | | | | | |
|---|---|---|---|---|---|
| 10. | | Explain in detail about R-2R ladder type digital to analog converter? | 12M | CO5 | L2 |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 11. | | Explain the operation of successive approximation type analog to digital converter? | 12M | CO5 | L2 |

*** End ***