H.T No: | | | | | | | | | | | **R18** | **Course Code: A30224**

CMR COLLEGE OF ENGINEERING & TECHNOLOGY

(UGC AUTONOMOUS)

B.Tech III Semester Supplementary Examinations December-2024

Course Name: Electrical Engineering

(Electronics & Communication Engineering)

Date: 19.12.2024 AN | **Time: 3 hours** | **Max.Marks: 70**

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions

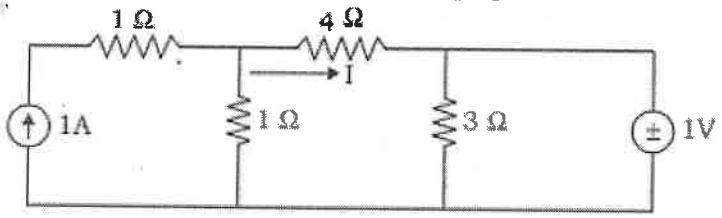
Each question carries TWO marks. **10x2=20M**

1. Define active and passive elements. 2 M
2. State the Maximum Power transfer theorem for DC circuits. 2 M
3. Define RMS and Average values of alternating quantity. 2 M
4. Define Band width and Q factor of RLC series circuits. 2 M
5. Explain the initial and final value theorems in Laplace transform. 2 M
6. What is the DC Steady State Solution in Transient Circuits? 2 M
7. Define the voltage regulation. 2 M
8. Why the transformer efficiency is very high compared to other electrical machines? 2 M
9. Write the EMF Equation of DC generator. 2 M
10. Write the expression for the voltage induced in an alternator. 2 M

PART-B

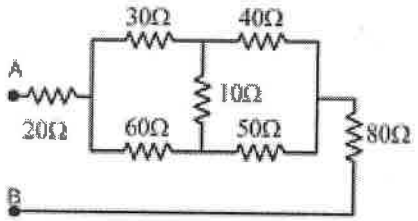
Answer the following. Each question carries TEN Marks. **5x10=50M**

11.A). Find the current I in the circuit shown below using superposition theorem. 10M



OR

11. B). Find the equivalent resistance between A and B as shown in Figure. 10M



12. A). i) Derive expression for current, voltage across capacitor in a series RL circuit. 6M

ii) A 20 ohms resistance and 30mH inductance are connected in series and the circuit is fed from 230 V, 50 Hz AC supply. Find: (a) Total impedance. (b) Current in the circuit. (c) Voltage across resistance and inductance. (iv) Power factor. 4M

OR

12. B). i) Derive the relationship between line current and phase current in a 3-phase delta connected balanced load. 5M

ii) Compare 3-phase star and delta connected systems. 5M

(P.T.O..)

13. A). Derive the transient response of an RL circuit with DC excitation. 10M

OR

13. B). Analyze an RLC series circuit using Laplace methods. 10M

14. A). i) Explain the principle of operation of single-phase transformers with neat sketch. 6M

ii) A single-phase transformer working at unity power factor has an efficiency of 90% at both 3/4th load and full load of 750 W. Determine the efficiency at 50% of full load. 4M

OR

14. B). Draw the circuit diagrams for conducting OC and SC tests on a single-phase transformer. Also explain how the efficiency and voltage regulation can be estimated by these tests. 10M

15. A). Describe the constructional details of a DC Generator with neat sketch. 10M

OR

15. B). Explain the construction and principle of operation of a Synchronous Generator with neat sketch. 10M

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H.T No: | | | | | | | | | | | **R18** **Course Code: A30402**

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

B.Tech III Semester Supplementary Examinations December-2024

Course Name: Probability & Stochastic Processes

(Electronics & Communication Engineering)

Date: 21.12.2024 AN **Time: 3 hours** **Max.Marks: 70**

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions

Each question carries TWO marks. **10x2=20M**

1. Define Mutually Exclusive Events — 2 M
2. State the Baye's theorem — 2 M
3. Mention the Rayleigh density function of a random variable X. — 2 M
4. Define skew and coefficient of skewness. — 2 M
5. Define Correlation of two random variables — 2 M
6. List out the properties of joint Distribution function — 2 M
7. Define strict-sense stationary process — 2 M
8. Define Time average function — 2 M
9. Define power density spectrum. — 2 M
10. Find out the cross correlation function for the psd $S_{XY}(\omega) = \frac{1}{25 + \omega^2}$ — 2 M

PART-B

Answer the following. Each question carries TEN Marks. **5x10=50M**

11.A). i) State and analyze the Total Probability Theorem with necessary proof. 5M

ii) A lot of 100 semiconductor chips contains 20 that are defective. Two chips are selected at random, without replacement, from the lot. 5M

(a) What is the probability that first one selected is defective?

(b) What is the probability that second one selected is defective given that the first one was defective?

(c) What is the probability that both are defective?

OR

11. B). i) When two dice are thrown, find the probability of getting the sum of 10 or 11. 5M

ii) Each letter of the word 'ATTRACT' separated and shuffled. What is the probability of getting "TACT"? 5M

12. A). i) A continuous random variable X has a Probability Density Function $f(x) = 3x^2,\ 0 < x < 1$. Find 'a' and 'b' such that 6M

(a) $P\{X = a\} = P\{X > a\}$

(b) $P\{X > b\} = 0.05$

ii) Find the constant $b > 0$, so that the given function is a valid probability density function. 4M

$$f_x(x) = \begin{cases} \frac{1}{10}e^{3x} & 0 \le x \le b \\ 0 & other\ wise \end{cases}$$

OR

12. B). Find the variance of X for uniform probability density function. 10M

(P.T.O..)

13. A). The joint density function is given by 10M

$$f_{xy}(x,y) = \begin{cases} a\,x^2\,y & 0 < y < x < 1 \\ 0 & else\ where \end{cases}$$

(i) Find 'a' so that the function is a valid density function

(ii) Find marginal density function

OR

13. B). i) List out the properties of Gaussian Random Variables. 5M

ii) Consider two random variables X and Y such that $Y = -4X + 20$, the mean value and the variance of X are 4 and 2 respectively. Find out the correlation and verify that the two random variables are statistically independent and orthogonal to each other or not. 5M

14. A). A random process is described by $X(t) = A^2 \cos^2(\omega_c t + \theta)$ where A and ω_c are constants and Θ is a random variable uniformly distributed between $\pm\pi$, Verify whether X(t) is wide sence stationary process or not? 10M

OR

14. B). Consider a random process $X(t) = A\cos\omega t$, where ω is a constant and A is a random variable uniformly distributed over (0,1). Find the autocorrelation and auto covariance of X(t). 10M

15. A). The power spectral density of X(t) is given by 10M

$$S_{XX}(\omega) = \begin{cases} 1 + \omega^2 & for\ |\omega| < 1 \\ 0 & else\ where \end{cases}$$

Find out the autocorrelation function.

OR

15. B). The autocorrelation function of a WSS random process is $R_{XX}(\tau)\ a\ \exp(-(\tau/b)^2)$. Find the power spectral density and normalized average power of signal. 10M

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H.T No: | | | | | | | | | | | **R18** **Course Code: A30403**

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

B.Tech III Semester Supplementary Examinations December-2024

Course Name: Switching Theory & Logic Design

(Electronics & Communication Engineering)

Date: 24.12.2024 AN **Time: 3 hours** **Max.Marks: 70**

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions

Each question carries TWO marks. **10x2=20M**

1. Represent 0 to 9 numbers using Excess-3 code. 2 M
2. List the truth tables of AND, XOR logic gates. 2 M
3. List the applications of Demultiplexer. 2 M
4. Distinguish PROM and PAL. 2 M
5. Draw the diagram of clocked SR latch. 2 M
6. Mention the excitation table of JK, D flip-flops. 2 M
7. Differentiate state table and state diagram. 2 M
8. What is meant by a register? 2 M
9. Sketch Mealy circuit and explain. 2 M
10. Distinguish FSM and ASM charts. 2 M

PART-B

Answer the following. Each question carries TEN Marks. **5x10=50M**

11.A). i) Realize the following Boolean expression with universal gates. 5M

$f(x, y, z) = \bar{x}yz + x\bar{y} + x\bar{y}z + xyz$

ii) Convert the following Boolean expression into canonical form 5M

f(A,B,C)=AC+BA+BC

OR

11. B). Perform the subtraction between the following unsigned binary numbers using the 1's complement and 2's complement methods: 10M

(i) $(10001)_2$-$(11001)_2$ (ii) $(100100)_2$-$(10101)_2$

12. A). i) Design a full-adder with two half-adders and basic gates. 5M

ii) Design a 1-bit comparator circuit using basic logic gates. 5M

OR

12. B). Simplify the following function using tabular method: 10M

F(A,B,C,D) = Σ(1,3,4,5,6,11,13,14,15)

13. A). i) Explain the various triggering modes in sequential circuits with examples. 3M

ii) Convert JK flip-flop to SR flip-flop. 7M

OR

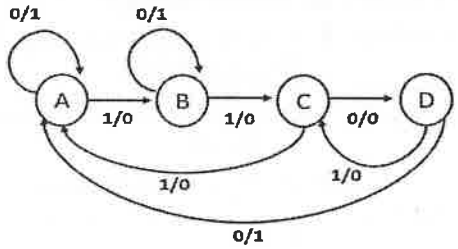
13. B). What is race around condition in JK flip-flop? How it will overcome using master-slave configuration? 10M

(P.T.O..)

14. A). Design a mod-12 Ripple counter using T flip-flop and explain its operation. 10M

OR

14. B). Design and implement a sequential circuit with state diagram represented shown below: 10M



15. A). i) Explain the capabilities and limitations of a finite state machine. 3M

ii) Explain Binary multiplier using ASM chart. 7M

OR

15. B). Convert the following Mealy machine into corresponding Moore machine. 10M

Present State	Next State, Z	
	X=0	X=1
A	C,0	B,0
B	A,1	D,0
C	B,1	A,1
D	D,1	C,0

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H.T No: | | | | | | | | | | | **R18** | **Course Code: A30401**

CMR COLLEGE OF ENGINEERING & TECHNOLOGY

(UGC AUTONOMOUS)

B.Tech III Semester Supplementary Examinations Dec-2024/Jan-2025

Course Name: Electronic Devices & Circuits

(Common for EEE & ECE)

Date: 07.01.2025 FN **Time: 3 hours** **Max.Marks: 70**

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions

Each question carries TWO marks. **10x2=20M**

1.	How V-I characteristics of diode will depend on temperature change?	2 M
2.	Recall the principle of operation of photodiode.	2 M
3.	Define ripple factor.	2 M
4.	List any two disadvantages of half wave rectifier.	2 M
5.	What is punch through or reach through?	2 M
6.	Define h-parameters of a transistor.	2 M
7.	Define stability factor.	2 M
8.	What is thermal runaway?	2 M
9.	Show the drain characteristics of N-channel Depletion MOSFET.	2 M
10.	Compare FET and BJT.	2 M

PART-B

Answer the following. Each question carries TEN Marks. **5x10=50M**

11.A).	Explain the diffusion capacitance of a semiconductor diode and derive the expression for it.	10M
	OR	
11. B).	Explain the V-I characteristics of tunnel diode with suitable diagrams.	10M
12. A).	Interpret the construction and operation of a center tapped full wave rectifier and find PIV, RMS current, Rectifier efficiency & Ripple factor.	10M
	OR	
12. B).	Explain construction and operation of full wave rectifier with π-section filter.	10M
13. A).	Illustrate the operation of common emitter configuration with input and output characteristics.	10M
	OR	
13. B).	Explain the V-I characteristics of UJT.	10M
14. A).	Determine the quiescent currents and the collector to emitter voltage for a Ge transistor with $\beta = 50$ in the self biasing arrangements. The circuit component values are VCC = 20V, RC = 2KΩ, RE = 100Ω, R1 = 100 KΩ and R2 = 5 KΩ. Find the stability factor S.	10M
	OR	
14. B).	Analyze the h-parameters equivalent circuit for a common base amplifier and derive the expression for current gain, input impedance, voltage gain, output impedance.	10M

(P.T.O..)

15. A). Explain drain and transfer characteristics of Enhancement MOSFET with suitable diagram. 10M

OR

15. B). Draw the small signal equivalent circuit of Common Gate FET amplifier and derive expressions for Input impedance, output impedance and voltage gain. 10M

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