H.T No: | | | | | | | | | | | **R18** | Course Code: A30006

CMR COLLEGE OF ENGINEERING & TECHNOLOGY

(UGC AUTONOMOUS)

B.Tech III Semester Supplementary Examinations February-2024

Course Name: NUMERICAL MATHODS & COMPLEX VARIABLES

(Common for EEE & ECE)

Date: 05.02.2024 AN | **Time: 3 hours** | **Max.Marks: 70**

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions (Compulsory)

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

1. Find $L\{sin3t + e^{-2t} + t^3\}$ 2 M
2. State Convolution in Laplace transforms. 2 M
3. Prove $\delta E^{\frac{1}{2}} = \Delta$ 2 M
4. Write Central difference formula. 2 M
5. Formula for Simpson's $3/8^{th}$ rule by taking n=6 2 M
6. $\frac{dy}{dx} = 3x^2 + 1, y(1) = 2$, find $y(1.5)$ using Euler's method, h=0.5 2 M
7. Is $f(z) = |z|^2$ is analytic? 2 M
8. Real and imaginary parts of Sinz? 2 M
9. Find the singularities of the function $f(z) = \frac{z}{(z^2+1)(z-2)}$ 2 M
10. Taylor's series of $f(z) = cosz \ \ at\ z = 0$ 2 M

PART-B

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

11.A). i) Find the Laplace transform of the full-wave rectifier, $f(t) = Esin\omega t, 0 < t < \frac{\pi}{\omega}$, having period $\frac{\pi}{\omega}$. 5M

ii) Find $L^{-1}\left\{log\left(\frac{s+a}{s+b}\right)\right\}$ 5M

OR

11. B). Using L.T method, Solve $(D^2 + \alpha^2)x = asin(\alpha t + 2), \ x = Dx = 0 \ \ at\ t = 0.$ 10M

12. A). i) Find by Gauss Backward interpolating formula the value of $y\ at\ x = 1936$ using the following data 7M

x	1901	1911	1921	1931	1941	1951
y	12	15	20	27	39	52

ii) Evaluate $f(10)$ given $f(x) = 168,192,336$ at $x = 1,7,15$ respectively. Use Lagrange interpolation. 3M

OR

12. B). Find the root of the equation $cosx = xe^x$ using the Regula-falsi method correct to four decimal places. 10M

(P.T.O..)

13. A). i) Solve $y' = x^2 - y, y(0) = 1$ Using Taylor's series method and compute $y(0.1)$ correct to 4 decimal places. 6M

ii) Evaluate $\int_0^1 \frac{1}{1+x} dx$ using Simpson's 1/3 rule and compare the result with its actual value. 4M

OR

13. B). Using R-K method of fourth order, find $y(0.2)$ & $y(0.4)$ given that $\frac{dy}{dx} = \frac{y^2-x^2}{y^2+x^2}$, with $y(0) = 1$, 10M

14. A). i) Find the analytic function, whose real part is $\frac{sin2x}{(cosh2y-cos2x)}$. 6M

ii) Find the real and imaginary parts of cotz. 4M

OR

14. B). i) Find all the values of $\left(\frac{\sqrt{3}}{2} + \frac{i}{2}\right)^{(1+i\sqrt{3})}$. 5M

ii) Show that the real and imaginary parts of an analytic function are harmonic. 5M

15. A). i) Evaluate $\int_{1-i}^{2+i} (2x + 1 + iy)dz$ along $(1 - i)$ to $(2 + i)$ 5M

ii) Expand $f(z) = \frac{1}{z^2-3z+2}$ in the range $1 < |z| < 2$. 5M

OR

15. B). Evaluate $\oint_c \frac{z-3}{z^2+2z+5} dz$, where 'c' is the circle given by (i) $|z| = 1$ 10M

(ii) $|z + 1 - i| = 2$ (iii) $|z + 1 + i| = 2$.

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

CMR COLLEGE OF ENGINEERING & TECHNOLOGY

(UGC AUTONOMOUS)

B.Tech III Semester Supplementary Examinations February-2024

Course Name: ELECTRICAL ENGINEERING

(Electronics & Communication Engineering)

Date: 07.02.2024 AN | **Time: 3 hours** | **Max.Marks: 70**

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions (Compulsory)

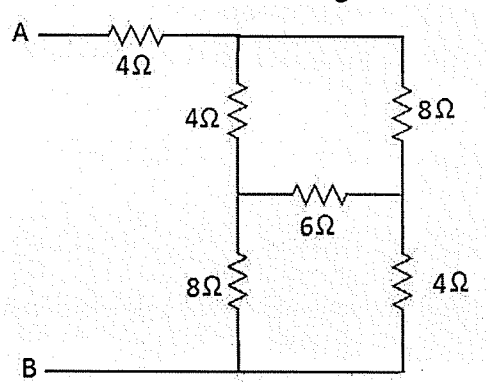
Each question carries TWO marks. **10x2=20M**

1. Define Active element and Passive element. 2 M
2. State Maximum Power transfer theorem. 2 M
3. List out the advantages of three phase system over single-phase system. 2 M
4. Draw the phasor diagram of the series RL circuit. 2 M
5. What is transient? 2 M
6. Define time constant of RL circuit. 2 M
7. Write the formulae of Eddy current and hysteresis losses of Transformer. 2 M
8. Define voltage regulation of a transformer. 2 M
9. Write the merits and demerits of slip-ring induction motor. 2 M
10. List out the application of types of DC Motor. 2 M

PART-B

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

11.A). Find the equivalent resistance between A & B in the given network. 10M



OR

11. B). State & very Superposition theorem. 10M

12. A). Derive the RMS value and average value of an alternating quantity. 10M

OR

12. B). Derive the relationship between line and phase quantities in a 3-phase balanced: 10M
i) Star connected system
ii) Delta connected system

(P.T.O..)

13. A). A series RL circuit has R= 25 Ω and L = 5 Henry. A dc voltage V of 100 V is applied to this circuit at t = 0 secs. Find: (a) The equations for the charging current, and voltage across R & L (b) The current in the circuit 0.5 secs after the voltage is applied. (c) The time at which the drops across R and L are equal. 10M

OR

13. B). Determine Y parameters interns of ABCD Parameters. 10M

14. A). Explain the working principal of a single-phase Transformer. 10M

OR

14. B). The voltage per turn of a single-phase transformer is 1.1V. when the primary winding is connected to a 220V, 50Hz A.C. supply, the secondary voltage is found to be 550V. Find i) Primary and secondary turns. ii) Core area if the maximum flux density is 1.1T. 10M

15. A). Explain the working principle of 3 phase Induction Motor. 10M

OR

15. B). A 6-pole lap wound dc shunt motor has 250 armature conductors, a flux of 0.04 wb/pole and runs at 1200 rpm. The armature and field winding resistances are 1 ohm and 220 ohms respectively. It is connected to a 220-v dc supply. Determine: i) induced emf in the motor, ii) armature current, iii) input supply current, iv) mechanical power and v) torque developed. 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 February-2024

Course Name: PROBABILITY & STOCHASTIC PROCESSES

(Electronics & Communication Engineering)

Date: 09.02.2024 AN | **Time: 3 hours** | **Max.Marks: 70**

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions (Compulsory)

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

1. What are the Axioms of probability? 2 M
2. Write short notes on classification of random variables. 2 M
3. A random variable X has PDF $(x) = e^{ax}$, Solve for its mean? 2 M
4. A random variable X has PDF $f(x) = 6x - 6x^2$ for $0 \leq x \geq 1$. Solve for the constant b such that P(X< b) = P(X > b). 2 M
5. Let X and Y be joint continuous random variable with joint pdf f(xy) = 2 for 0<x,y<1, Estimate the marginal density function of X. 2 M
6. Let X and Y be joint continuous random variable with joint pdf 2 M
   $f(xy) = \begin{cases} e^{-x} \; for \; 0 < x < y \\ 0 \; otherwise \end{cases}$ Estimate $f_Y(y)$
7. State the properties of auto correlation. 2 M
8. Define Wide Sense Stationary. 2 M
9. Define the properties of PSD. 2 M
10. What is the IFT($S_{XY}(w)$)? 2 M

PART-B

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

11.A). A diagnostic test has a probability0.95 of giving a positive result when applied to a person suffering from a certain disease, and a probability0.10 of giving a (false) positive when applied to a non-sufferer. It is estimated that 0.5 % of the population are sufferers. Suppose that the test is now administered to a person about whom we have no relevant information relating to the disease (apart from the fact that he/she comes from this population). Calculate the following probabilities: 10M

(i) that the test result will be positive;

(ii) that, given a positive result, the person is a sufferer;

(iii) that, given a negative result, the person is a non-sufferer;

(iv) that the person will be misclassified

OR

11. B). Define conditional probability and prove bayes theorem. 10M

(P.T.O..)

12. A). For real constant b > 0,c > 0 and any 'a' find a condition on constant 'a' such that the function $f_X(x) = \begin{Bmatrix} a\left\{1-\frac{x}{b}\right\} for\ 0 \le x \le c \\ 0\ otherwise \end{Bmatrix}$, is a valid probability density 10M

OR

12. B). Find the mean and mean square value of Gaussian distribution. 10M

13. A). A_1,A_2,A_3 are mutually exclusively events associated with a random experiment E1. Events B_1,B_2,B_3 are mutually exclusively events associated with a random experiment E2 the joint probabilities of occurrence of these events and some marginal probabilities are listed in the table given below (a) find the missing probabilities in the table (b) find $P(B_3/A_1)$ an $P(A_1/B_3)$ (c)are events A_1 ,B_1 are statistically independent 10M

	B1	B2	B3
A1	3/36	*	5/36
A2	5/36	4/36	5/36
A3	*	6/36	*
P(BJ)	12/36	14/36	*

OR

13. B). Two random variables X and Y having joint probability density function 10M

$f(xy) = \begin{Bmatrix} e^{-(x+y)} for\ x,y \ge 0 \\ 0\ \ otherwise \end{Bmatrix}$ find

a) marginal density function of X and Y

b) P(X≤1,Y≤1) and P(X+Y ≤1) also prove that X and Y are independent random variable

14. A). State and prove the properties of cross correlation? 10M

OR

14. B). If X(t)=Cos (wt + Y), where Y is a random variable distributed uniformly over (0, 2π) determine whether X(t) is Wide Sense Stationary. 10M

15. A). Consider a linear system with transform function $H(w) = \frac{1}{6+jw}$ X(t) is the input and Y(t) is the output of the system . the auto correlation of x(t) is RXX(τ)=3δ(t).Find the PSD ,auto correlation function and mean square value of the output Y(t) 10M

OR

15. B). State and prove the properties of Cross Power Density Spectrum. 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 February-2024

Course Name: SWITCHING THEORY & LOGIC DESIGN

(Electronics & Communication Engineering)

Date: 12.02.2024 AN | **Time: 3 hours** | **Max.Marks: 70**

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions (Compulsory)

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

1. Convert (46AD)16 to octal number system. 2 M
2. Draw AND gate using universal NAND gate. 2 M
3. What is prime implicants and essential prime implicants? 2 M
4. What is magnitude comparator? What is its advantage? 2 M
5. Compare latch and flip-flops. 2 M
6. Define flip-flop. List different types of flip-flops. 2 M
7. What is synchronous sequential finite state machine. 2 M
8. What is the importance of shift register? 2 M
9. What is the difference between mealy and moore models? 2 M
10. What is the use of minimal cover table? 2 M

PART-B

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

11.A). Solve the following: 10M
i) $(6DF2.A9C2)_H = (\ )_8$ ii) $(654)_8 = (\ )_2$ iii) $(101010) = (\ )_8$ iv) $(552)6 = (\ )8$

OR

11. B). Make Use of boolean theorems and properties to reduce the following boolean expression and draw logic circuit using AND and OR gates. 10M
(i) AB'C' + A'B'C' + A'BC' + A'B'C.
(ii) A'BC + AB'C + A'BC + ABC' + AB'C' + A'BC' + A'B'C'.

12. A). Minimize the following Boolean functions using K-map and draw the logic diagram using NAND gates. 10M
F (A,B,C,D) =Σm (1,3,5,8,9,11,15) +d (2,13)

OR

12. B). Write short notes on ROM, RAM, PROM, EPRAM and PLA. 10M

13. A). Explain the operation of JK flip-flop along with race around condition and suggest a remedy for it. 10M

OR

13. B). Convert the following flip-flops. 10M
(i) S-R flip-flop to J-K flip-flop (ii) J-K flip-flop to S-R flip-flop

(P.T.O..)

14. A). Distinguish between synchronous and asynchronous counters with an example for each. 10M

OR

14. B). Construct mod-3-bit Up-Down synchronous counter using J-K flip flops. 10M

15. A). Explain capabilities and limitations of finite state machines. 10M

OR

15. B). Explain the following: 10M

i) Silent features of ASM chart ii) Binary Multiplier

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

CMR COLLEGE OF ENGINEERING & TECHNOLOGY

(UGC AUTONOMOUS)

B.Tech III Semester Supplementary Examinations February-2024

Course Name: ELECTRONIC DEVICES & CIRCUITS

(Common for EEE & ECE)

Date: 14.02.2024 AN **Time: 3 hours** **Max.Marks: 70**

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions (Compulsory)

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

1. For what voltage will the reverse current in p-n junction Germanium diode reach 90% of its saturation value at room temperature? 2 M
2. Describe the V-I characteristics of varactor diode. 2 M
3. Explain how to reduce harmonics in rectifier circuit 2 M
4. Define peak inverse voltage and why is it important? 2 M
5. Give the advantages of h-parameter analysis 2 M
6. Explain the base spreading resistance. 2 M
7. Define operating point of a transistor and mention its purpose 2 M
8. Explain thermal stability and what does it represent 2 M
9. Define transconductance and drain resistance of a FET. 2 M
10. For a p-channel Silicon FET, with effective width 'a'=$2X10^{-4}$ cm and channel resistivity ρ =10 Ω. Solve for the pinch off voltage. 2 M

PART-B

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

11.A). i) Define and derive the expression for transition capacitance of a PN junction diode. 5M

ii) Explain two-transistor analogy of SCR with its equivalent circuit diagram and characteristics. 5M

OR

11. B). i) Explain the working of a semiconductor photo diode. Mention its applications. 5M

ii) Define and distinguish PN diode and Zener diode. Discuss different breakdown mechanisms in Zener diode. 5M

12. A). i) With the help of a circuit diagram and waveforms, explain the operation of Full wave rectifier with capacitor filter and derive the expression for its ripple factor. 5M

ii) Define and compare inductor and capacitor filters. 5M

OR

12. B). i) A half wave rectifier has a load of 3.5 KΩ. If the diode resistance and the secondary coil resistance together have a resistance of 800Ω and the input voltage has a signal voltage of 240 V, measure i) Peak, average and rms value of current flowing. ii) dc power output. iii) ac power input iv) Efficiency of the rectifier. 5M

ii) With suitable wave forms and circuit diagram explain bridge rectifier. 5M

(P.T.O..)

13. A). i) Demonstrate the construction, working and characteristics of UJT with a diagram. List its applications. 5M

ii) Draw the circuit diagram of an NPN junction transistor in CE configuration and describe its characteristics. Explain how CE acta as an amplifier. 5M

OR

13. B). i) Discuss, how the h-parameters are determined from transistor Characteristics. 5M

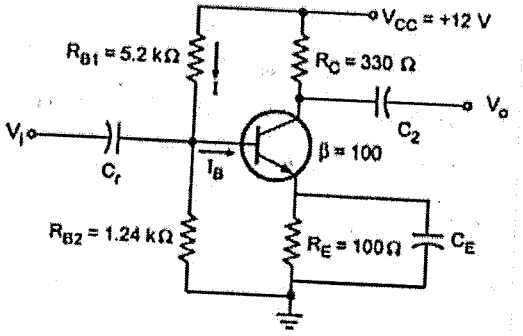
ii) Explain the input and output characteristics of the transistor in CC configuration with diagrams. 5M

14. A). i) Define and derive the stability factor 'S' for collector to base bias of BJT. 5M

ii) Explain diode compensation technique for the parameters of V_{BE} and I_{CO} 5M

OR

14. B). i) Draw the DC load line and obtain quiescent point for the transistor shown below. 5M



ii) Draw and explain the Fixed Bias Circuit. Explain why the circuit is unsatisfactory if the transistor is replaced by another of same type 5M

15. A). i) Describe the operation of common drain FET amplifier and derive the equation for voltage gain. 5M

ii) Explain the working of a depletion type MOSFET with a neat construction diagram and its characteristics. 5M

OR

15. B). i) Explain the JFET Small signal Model. What is its use? 5M

ii) Derive the expression for the width of depletion region 'W' in the case of p-channel JFET. 5M

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