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R18

Course Code: A30006



CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

B.Tech III Semester Supplementary Examinations July-2025

Course Name: Numerical Methods & Complex variable
(Common for EEE & ECE)

Date: 01.07.2025 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. Find the Laplace transform of $t \cdot \cos at$. 2 M
2. Find $L^{-1} \left\{ \frac{3s-12}{s^2+8} \right\}$. 2 M
3. Find the first approximation of a real root of the equation $x \log_{10} x = 1.2$ by using Newton-Raphson method. 2 M
4. Evaluate $\Delta \tan^{-1}x$. 2 M
5. Evaluate $\int_0^1 \frac{1}{1+x} dx$ using Simpson's 3/8 rule by taking 3 points in the interval $[0, 1]$. 2 M
6. Using Euler's method, the solution of the differential equation $\frac{dy}{dx} = 2xy, y(0) = 1, h = 0.25$, then find $y(0.25)$. 2 M
7. State Cauchy-Riemann Equations. 2 M
8. Verify whether the function $u=4xy-3x+2$ is harmonic or not? 2 M
9. State the Laurent Series Expansion. 2 M
10. Expand the function $\frac{\sin z}{z-\pi}$ about $z = \pi$. 2 M

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). i) Find the Laplace transform of the function $te^{2t} \sin 3t$. 5M
 ii) Find the inverse Laplace transform of the function $\log \left(\frac{s+1}{s-1} \right)$. 5M

OR

11. B). Using Laplace transform, solve $(D^2 + 2D - 3)y = \sin x, y(0) = y'(0) = 0$. 10M

12. A). Using Regula-Falsi method solve $x \log_{10} x - 1.2 = 0$ correct to 3 decimal places. 10M

OR

12. B). i) For the data using the Lagrange's Interpolation polynomial $f(1.5)$ is 5M

| | | | |
|---|---|---|---|
| x | 1 | 2 | 3 |
| y | 0 | 1 | 2 |

- ii) Prove that $(E^{\frac{1}{2}} + E^{-\frac{1}{2}})(1 + \Delta)^{\frac{1}{2}} = 2 + \Delta$. 5M

(P.T.O.)

13. A). Use Taylor's Series method to solve the differential $\frac{dy}{dx} = x^2 + y, y(4) = 4$ and compute $y(4.2)$ and $y(4.4)$. 10M

OR

13. B). Use RK's fourth order method to find $y(0.6)$ given $y(0) = 1$ and $\frac{dy}{dx} = \frac{y-x}{y+x}$ taking $h = 0.2$. 10M

14. A). Find an analytic function $f(z)$ whose real part is $\cos x \cosh y$. 10M

OR

14. B). Prove that the function $f(x) = \begin{cases} \frac{x^3(1+i)-y^3(1-i)}{x^2+y^2}, & (z \neq 0) \\ 0, & (z = 0) \end{cases}$ is continuous and the Cauchy-Riemann equations are satisfied at the origin, yet $f'(0)$ does not exist. 10M

15. A). i) Define Singular points. Explain different types of singular points with examples. 5M
ii) Expand $f(z) = \sin z$ in a Taylor's series about $z = \pi/4$ and determine the region of convergence. 5M

OR

15. B). Evaluate $\int_C \frac{z^3 e^{-z}}{(z-1)^3} dz$ where C is $|z-1| = \frac{1}{2}$ using Cauchy's residue theorem. 10M

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R18

Course Code: A30506



CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

B.Tech III Semester Supplementary Examinations July-2025

Course Name: Discrete Mathematics

(Common for CSE, IT, CSC & CSM)

Date: 01.07.2025 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. Define well formed formula. 2 M
2. Define Tautology and Contradiction. 2 M
3. State the pigeonhole principle. 2 M
4. Find $f \circ (g \circ h)$ if $f(x) = x + 2$, $g(x) = x - 2$ and $h(x) = 3x$. 2 M
5. Define an Abelian group. 2 M
6. Write down the dual of the following proposition $(p \wedge q) \rightarrow (p \rightarrow r) \wedge F_0$. 2 M
7. Define Semi group and Monoid. 2 M
8. State Lagrange's theorem. 2 M
9. Define Planar Graph with Example. 2 M
10. Define Hamiltonian Path and Hamiltonian Cycle. 2 M

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). i) Explain relations with an example. 5M
ii) Explain functions with an example. 5M

OR

11. B). Explain sum of product and product of sum with an example. 10M

12. A). i) In how many ways can we distribute 7 apple and 6 oranges among 4 children so that each child gets at least 1 apple? 5M

- ii) Find the number of integer solutions of $x_1 + x_2 + x_3 + x_4 + x_5 = 30$ where $x_1 \geq 2$, $x_2 \geq 3$, $x_3 \geq 4$, $x_4 \geq 2$, $x_5 \geq 0$. 5M

OR

12. B). In how many ways can 6 men and 6 women be seated in a row 10M

(i) If any person may sit next to any other?

(ii) If men and women must occupy alternate seats?

13. A). i) Prove that $p \rightarrow (q \rightarrow p) \equiv \sim p \rightarrow (p \rightarrow q)$. 5M

- ii) Prove that $(p \uparrow q) \equiv \sim(p \wedge q)$. 5M

OR

13. B). Translate the Following into logical expressions-symbolic form. 10M

"All men are mortal". ii) x is the father of the mother of y.

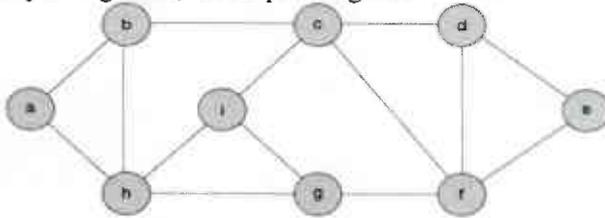
(P.T.O.)

14. A). If \circ (circle) is a binary operation on Z defined by $x \circ y = x + y + 1$ for all $x, y \in Z$. Prove that $\langle Z, \circ \rangle$ is an abelian group. 10M

OR

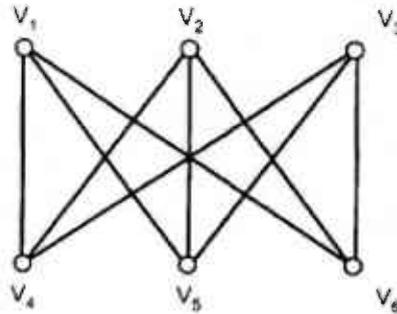
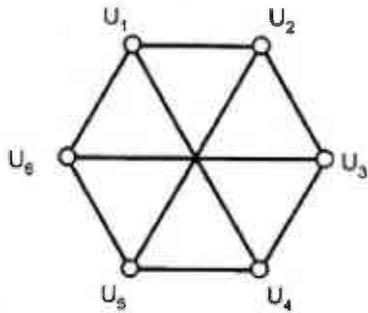
14. B). Obtain PDNF and PCNF of $p \rightarrow \{(p \rightarrow q) \wedge \sim(\sim p \vee \sim q)\}$. 10M

15. A). By using DFS, find Spanning tree 10M



OR

15. B). Prove that the two Graphs shown Below are Isomorphic. 10M





CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

B.Tech III Semester Supplementary Examinations July-2025

Course Name: Design & Analysis of Algorithms

(Common for CSC & CSD)

Date: 03.07.2025 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. Define the characteristics of an algorithm. 2 M
2. List the two different types of recurrence. 2 M
3. Differentiate between Dynamic Programming and Greedy method. 2 M
4. Write the recurrence relation for binomial distribution. 2 M
5. Write the pseudo code for N-Queens using Backtracking. 2 M
6. Define graph coloring. 2 M
7. What is the difference between DFS and BFS? 2 M
8. State the purpose of topological sorting. 2 M
9. Define the min-max search algorithm. 2 M
10. State the concept of reduction techniques in NP-complete problems. 2 M

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). Solve the following recurrence relation and find its asymptotic bound on T. 10M
1. $T(n) = 1$ if $n=1$
 $= 2T(n-1)$ if $n>1$

OR

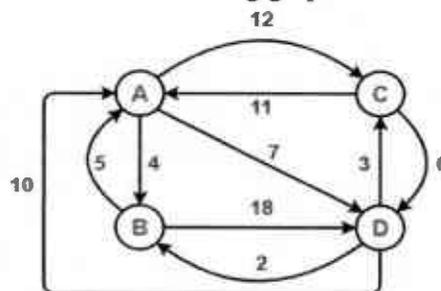
- 11.B). Describe the difference between best-case, worst-case, and average case time complexities. 10M
- 12.A). Illustrate the divide-and-conquer strategy with Strassen's Matrix Multiplication. 10M

OR

- 12.B). Solve the following job sequencing with deadlines problem. Here, $n = 4$, $(p_1, p_2, p_3, p_4) = (100, 10, 15, 27)$ and $(d_1, d_2, d_3, d_4) = (2, 1, 2, 1)$ 10M
- 13.A). Find solution for 8-queen problem using backtracking technique. 10M

OR

- 13.B). Write Travelling Salesman Problem Algorithm and Solve Travelling Salesman Problem using Backtracking Algorithm in the following graph. 10M



(P.T.O.)

14. A). Discuss the significance of minimum spanning tree algorithms in real-world applications. 10M

OR

14. B). Explain the shortest path algorithm with an example. 10M

15. A). Explain the min-max search algorithm with an example of a game tree. 10M

OR

15. B). Discuss the significance of NP-hard problems and provide examples. 10M

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R18

Course Code: A30461



CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

B.Tech III Semester Supplementary Examinations July-2025

Course Name: Analog & Digital Electronics

(Common for CSE & IT)

Date: 03.07.2025 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. Draw the characteristics of PN-Diode. 2 M
2. Define ripple factor of rectifier. 2 M
3. How the transistor acts as an amplifier? 2 M
4. Draw the characteristics of UJT. 2 M
5. What are the different types of modes in MOSFET? 2 M
6. Define Number system. 2 M
7. What is meant by combinational circuits? 2 M
8. Why NAND and NOR gates are called as a universal Gates? 2 M
9. Define counter. 2 M
10. What is meant by sequential circuits? 2 M

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). Explain the operation of Zener Diode. 10M
- OR**
11. B). Explain the break down mechanism of a semiconductor diode. 10M
12. A). With a neat sketches explain the current components of a transistor. 10M
- OR**
12. B). Draw the input and output characteristics of a Transistor in CE-Configuration. 10M
13. A). Explain the construction and working of JFET. 10M
- OR**
13. B). With a suitable example convert the 4-bit binary to gray code. 10M
14. A). Explain the working principle of Encoder and Decoder. 10M
- OR**
14. B). Explain the working principle of Multiplexer? 10M
15. A). Design a 3-bit binary up-counter using a JK-Flipflop 10M
- OR**
15. B).
 - i) Conversion of SR-Flip flop to JK-Flip flop. 5M
 - ii) Conversion of JK-Flip flop to D-Flip flop. 5M



CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

B.Tech III Semester Supplementary Examinations July-2025

Course Name: Numerical Techniques & Probability Distributions
(Common for CSM, AID & AIM)

Date: 03.07.2025 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. Using Newton-Raphson method, find the value of $\sqrt{5}$ 2 M
2. Given $y_0 = 1, y_1 = 14, y_2 = 15, y_3 = 5, y_4 = 6$. Evaluate $\Delta^4 y_0$. 2 M
3. Write the formula Picard's method. 2 M
4. State the formula of Runge-Kutta method of 4th order. 2 M
5. Find $L\{t^2 e^{-t}\}$ 2 M
6. Evaluate $L^{-1}\left\{\frac{s+3}{s^4}\right\}$ 2 M
7. Show that the mean of Poisson distribution is λ . 2 M
8. Determine the Binomial distribution for which the mean is 4 and variance is 3. 2 M
9. Define the following (i) Alternative hypothesis (ii) Level of significance. 2 M
10. Calculate tabulated value of Chi-square when number of rows equal to 3 and columns equal to 5. 2 M

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). A root of the equation $xe^x - 1 = 0$ lies in the interval (0.5, 1). Determine this root correct to four decimal places using regula-falsi method. 10M

OR

11. B). The population of a certain town in decennial census was given below. Estimate the population of the town for the year (i) 1925 (ii) 1955. 10M

| Year | 1921 | 1931 | 1941 | 1951 | 1961 |
|---------------------------|------|------|------|------|------|
| Population (in Thousands) | 46 | 66 | 81 | 93 | 101 |

12. A). i) Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by Trapezoidal rule, take $h=1$ 5M
- ii) Evaluate $\int_0^2 e^{-x^2} dx$ using Simpson's 1/3 rule $h=0.25$ 5M

OR

12. B). Using Modified Euler's method, solve for y at $x = 2$ from $\frac{dy}{dx} = 3x^2 + 1, y(1) = 2$ taking $h=0.5$ 10M

(P.T.O.)

13. A). Find the Laplace transforms of (i) $te^{-2t} \sin 4t$ (ii) $\frac{\cos 4t \sin 2t}{t}$ 10M

OR

13. B). Solve $y''' + 2y'' - y' - 2y = 0$ $y(0) = y'(0) = 0$ and $y''(0) = 6$ using Laplace transforms. 10M

14. A). In a normal distribution 31% of the items are under 45 and 8% are over 64. Find the mean and variance of the distribution. 10M

OR

14. B). If the probability is 0.05 that certain wide-flange column will fail under a given axial load. What are the probabilities that among 16 such columns (i) at most 2 will fail (ii) at least 4 will fail (iii) at least 1 and at most 7 will fail. 10M

15. A). A sample of 400 items is taken from a population whose standard deviation is 10. The mean of the sample is 40. Test whether the sample has come from a population with mean 38. Also calculate 95% confidence interval for the population. 10M

OR

15. B). A random sample from a company's very extensive files shows that that the orders for a certain kind of machinery were filled, respectively in 10,12,19,14,15,18,11 and 13 days. Use the level of significance $\alpha = 0.01$ to test the claim that on the the average such orders are filled in 10.5 days. Assume normality. 10M



CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

B.Tech III Semester Supplementary Examinations July-2025

Course Name: Computer Organization & Architecture

(Common for CSE, IT, CSC, CSM, AID & AIM)

Date: 05.07.2025 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. Explain RTL and its control function. | 2 M |
| 2. What are different addressing modes? | 2 M |
| 3. Compare fixed point and floating point representation of numbers. | 2 M |
| 4. Define division Algorithms. | 2 M |
| 5. Explain the hardwired control unit. | 2 M |
| 6. Illustrate the process of Interrupt Programming. | 2 M |
| 7. What is cache coherence? | 2 M |
| 8. What are the difficulties that cause the instruction pipeline to deviate from its normal operation? | 2 M |
| 9. Why memory hierarchy is used in systems? | 2 M |
| 10. Define miss penalty for cache memory. | 2 M |

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 11.A). i) Describe basic operational concepts of computer in detail. | 5M |
| ii) Draw the block diagram of digital computer. | 5M |
| OR | |
| 11. B). List the registers for the basic computer and write their functionality with a neat sketch. | 10M |
| 12. A). With an example, explain Booth Multiplication algorithm. | 10M |
| OR | |
| 12. B). Explain different ways of data representation in computer with example. | 10M |
| 13. A). Discuss various standard I/O interfaces. | 10M |
| OR | |
| 13. B). Compare interrupt driven data transfer scheme with DMA. Using block diagram explain interrupt driven transfer scheme. | 10M |
| 14. A). Explain four possible hardware schemes that can be used in an instruction pipeline in order to minimize the performance degradation caused by instruction branching. | 10M |
| OR | |
| 14. B). What are the hazards for instruction pipeline? How to handle these hazards? Explain with examples. | 10M |
| 15. A). Distinguish between virtual memory and cache memory. Write the merits and demerits of virtual memory. | 10M |
| OR | |
| 15. B). Discuss about memory interleaving. | 10M |

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R18

Course Code: A30507



CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

B.Tech III Semester Supplementary Examinations July-2025

Course Name: Object Oriented Programming
(Common for CSE & IT)

Date: 08.07.2025 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. List out oops concepts. 2 M
2. Define a package in Java. 2 M
3. What is the exception handling in Java? 2 M
4. Difference between anonymous inner classes and local inner classes. 2 M
5. What is thread synchronization in Java? 2 M
6. Write the methods of File class in Java. 2 M
7. What is the purpose of Generics in Java Collections? 2 M
8. List out the types of JDBC in java. 2 M
9. What is the difference between JFrame and JDialog in Swing? 2 M
10. Define the Adapter Classes. 2 M

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). Describe the concept of inheritance in Java with an example. 10M
- OR**
11. B). Write a Java program that demonstrates overloading and overriding. 10M
12. A). i) What is the exception hierarchy in Java? Explain with an example. 5M
ii) How can you create your own exception class in Java? 5M
- OR**
12. B). Explain any two types of inner classes in Java with examples. 10M
13. A). Explain the different thread states in Java with a neat diagram. 10M
- OR**
13. B). What are file streams in Java? Explain the difference between byte streams and character streams with an example. 10M
14. A). Explain how to do a query process using JDBC. 10M
- OR**
14. B). What are Enumeration and Iterator interfaces in Java Collections? How do they differ? 10M
15. A). Explain the Grid and Flow layout managers in Java Swing with examples. 10M
- OR**
15. B). How do you handle mouse events in Swing? Provide an example. 10M

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R18

Course Code: A30509



CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

B.Tech III Semester Supplementary Examinations July-2025

Course Name: Database Management Systems

(Common for CSE, IT, CSC, CSD & AID)

Date: 10.07.2025 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. Differentiate DDL and DML languages 2 M
2. What are five main functions of database administrator? 2 M
3. Define domain relational calculus. 2 M
4. What is a super key? 2 M
5. What is meant by nested queries? 2 M
6. Define lossless join decomposition with example 2 M
7. What is locking protocol? 2 M
8. What is serializability? 2 M
9. List the operations performed in file organization. 2 M
10. What is the main difference between ISAM and B+ tree indexes? 2 M

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). Define ER model and explain the following kinds of constraints that can be specified in the ER diagram, and give an example of each: 10M
i) Key constraints ii) Participation constraint
Discuss the functionality of query evaluation engine.
- OR**
11. B). What are the database languages? Explain with examples. 10M
12. A). Explain about various integrity constraints with examples. 10M
- OR**
12. B). Explain various set comparison operators with example. 10M
13. A). What are the conditions required for a relation to be in 4NF, 5NF? Explain with examples. 10M
- OR**
13. B). Discuss the relational-algebra operations with examples. 10M
14. A). How to test serializability of a schedule with an example. 10M
- OR**
14. B). What is transaction? Explain the properties of transaction. 10M
15. A). Discuss about deletion and insertion operations in ISAM with examples. 10M
- OR**
15. B). How to organize data entries using indexing? Discuss. 10M



CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

B.Tech III Semester Supplementary Examinations July-2025

Course Name: Basic Electrical & Electronics Engineering
(Common for CE & ME)

Date: 10.07.2025 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

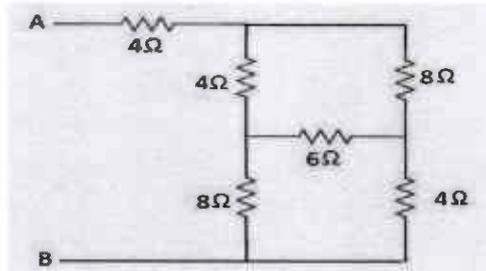
- | | |
|------------------------------------------------------|-----|
| 1. Define node and mesh. | 2 M |
| 2. Define Kirchoff's voltage law. | 2 M |
| 3. What is the principle of DC generator? | 2 M |
| 4. What are the main parts of DC motor? | 2 M |
| 5. What is the principle of operation of alternator? | 2 M |
| 6. Write the EMF equation of transformer. | 2 M |
| 7. Explain about reverse biasing of a diode. | 2 M |
| 8. List out applications of SCR. | 2 M |
| 9. Explain about deflection in CRO. | 2 M |
| 10. List out applications of CRO. | 2 M |

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). Obtain the equivalent resistance between the terminals AB in the figure shown below. 10M



OR

11. B). State and explain superposition theorem. 10M
12. A). Elaborate the operation of DC motor and derive back emf equation. 10M

OR

12. B). Explain the operation of three point starter with neat diagram. 10M
13. A). Explain the torque slip characteristics of induction motor. 10M

OR

13. B). Explain the efficiency and losses in a transformer. 10M
14. A). Discuss half wave rectifier operation with a neat diagram. 10M

OR

14. B). Elaborate the operation of a transistor as an amplifier. 10M
15. A). Explain principle of operation of cathode ray tube with neat sketch. 10M

OR

15. B). Explain any two measurements of CRO in detail. 10M



CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

B.Tech III Semester Supplementary Examinations July-2025

Course Name: Basic Electrical Engineering

(Common for CSM & AIM)

Date: 10.07.2025 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. Explain active elements and passive elements. 2 M
2. State the Thevenin's theorem. 2 M
3. Define form factor and peak factor of an alternating quantity. 2 M
4. What is phase sequence? Give relationship between line and phase voltage for star connection. 2 M
5. Explain principle and operation of DC generator. 2 M
6. With the help of neat diagram explain different types of DC motors. 2 M
7. Explain the constructional details of transformer. 2 M
8. List out the assumptions of an ideal transformer. 2 M
9. Explain the principle and operation of three phase induction motor. 2 M
10. Explain the concept of slip. 2 M

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). Find R_N , I_N , the current flowing through and load voltage across load resistor in fig. using Norton's theorem. 10M

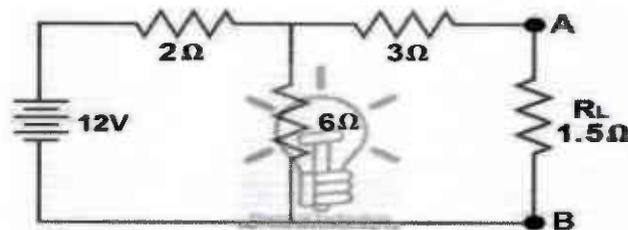
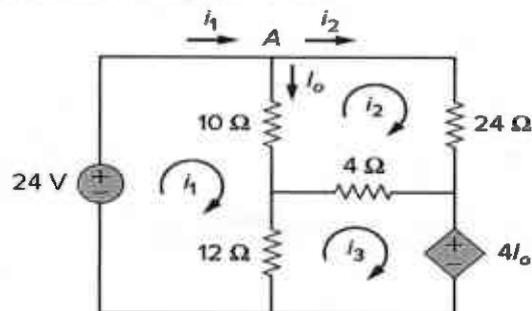


Fig.

OR

11. B). Find mesh currents i_1 , i_2 , i_3 and i_o using mesh analysis 10M



(P.T.O..)

12. A). What is a sinusoidal wave signal? With a neat sketch explain the generation of a sine wave. 10M

OR

12. B). Derive the expression for RMS and Average value of a sinusoidal wave form. 10M

13. A). An 8-pole dc generator has 500 armature conductors, and a useful flux of 0.05 Wb per pole. What will be the e.m.f. generated if it is lap-connected and runs at 1200 rpm? What must be the speed at which it is to be driven produce the same e.m.f. if it is wave-wound? 10M

OR

13. B). Explain the construction and working principle of a DC machine. 10M

14. A). Perform short circuit test on a single phase transformer. 10M

OR

14. B). A Single phase Transformer has 90 primary turns and 180 secondary turns'. The primary and secondary winding resistances are 0.067ohms and 0.233ohms respectively. Calculate the equivalent resistance of
a) The primary winding in terms of secondary winding
b) The secondary winding in terms of primary winding
c) The total resistance of the Transformer referred to primary winding? 10M

15. A). Why Induction motor is not self starting and why we need speed control in any machine? 10M

OR

15. B). Explain the relationship between torque and slip. Calculate the torque exerted by an 8-pole, 50 Hz, 3 phase induction motor operating with a 4 percent slip which develops a maximum torque of 150 kg-m at a speed of 660 rpm. The resistance per phase of the rotor is 0.5 Ω . 10M
