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**R18**

Course Code: A30006



**CMR COLLEGE OF ENGINEERING & TECHNOLOGY**  
(UGC AUTONOMOUS)

B.Tech III Semester Supplementary Examinations August-2023

Course Name: **NUMERICAL METHODS & COMPLEX VARIABLES**

(Common for EEE & ECE)

Date: 08.08.2023 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. Find  $L[\cos(at+b)]$  2 M
2. As per the convolution theorem,  $L^{-1}\{\bar{f}(s)\bar{g}(s)\} =$  2 M
3. Show that  $\mu = \sqrt{1 + \frac{\delta^2}{4}}$  2 M
4. State the Gauss backward interpolation formula. 2 M
5. State the formula for fourth order Runge – Kutta method. 2 M
6. Find  $y(0.5)$  by applying Euler method to solve  $\frac{dy}{dx} = x+y, y(0)=0$  with  $h=0.5$  2 M
7. Find the real part of  $f(z) = z^2$  2 M
8. Find the value of K so that  $x^2 + 2x + ky^2$  may be harmonic 2 M
9. Compute the singular point of  $\frac{z}{(z-2)^3}$  2 M
10. Determine the residue of  $\frac{z^2}{(z-1)(z-2)}$  at  $z=1$  2 M

**PART-B**

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). Find the Laplace transform of  $\frac{(\cos 2t - \cos 3t)}{t}$  10M
- OR**
11. B). Applying the Laplace Transforms solve  $\frac{d^2y}{dt^2} - 4\frac{dy}{dt} - 12y = e^{3t}, y(0) = 1, y'(0) = -2$  10M
12. A). Find a real root of  $f(x) = x \sin x - 1$  correct up to three decimal places starting with  $x = 1$  by Newton Raphson method. 10M
- OR**
12. B). Using Lagrange's interpolation formula find the viscosity of oil at a temperature of  $140^\circ C$  10M

Temp	110	130	160	190
Viscosity	10.8	8.1	5.5	4.8

(P.T.O..)

13. A). Evaluate  $\int_0^6 \frac{dx}{1+x^2}$  by using Trapezoidal rule 10M

**OR**

13. B). Find  $y(0.1)$  &  $y(0.2)$  using Euler's modified formula given that  $\frac{dy}{dx} = x^2 - y, y(0) = 1$  10M

14. A). Find all the values of  $k$ , such that  $f(z) = e^x(\cos ky + i \sin ky)$  is analytic. 10M

**OR**

14. B). Find the analytic function whose real part is  $\frac{\sin 2x}{\cosh 2y - \cos 2x}$  10M

15. A). Evaluate  $\int_C \frac{z^2}{(z-1)^2(z-3)} dz$  where  $C$  is  $|Z|=2$  by Residue theorem. 10M

**OR**

15. B). Find the Residue of  $\frac{z^2}{(z^4-1)}$  at those singular points which lie inside the circle  $|z| = 2$  10M

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R18

Course Code: A30201



**CMR COLLEGE OF ENGINEERING & TECHNOLOGY**  
(UGC AUTONOMOUS)

B.Tech III Semester Supplementary Examinations August-2023

Course Name: NETWORK THEORY-I

(Electrical & Electronics Engineering)

Date: 10.08.2023 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. Write an expression for energy stored by capacitor. 2 M
2. Determine the voltage across  $10 \Omega$  resistor by applying source transformation for the Figure 1. 2 M

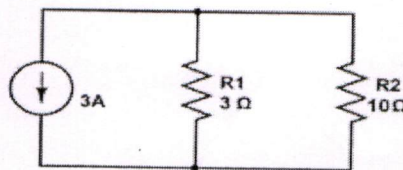


Figure 1

3. Define Apparent power, Average power and Reactive power. 2 M
4. Write average value expression for half-rectified sine wave. 2 M
5. Define: a) Magnetic Flux, b) Coefficient of coupling 2 M
6. What is the significance of bandwidth and Quality factor in inductor design? 2 M
7. What is duality? 2 M
8. Distinguish twigs and links. 2 M
9. Distinguish Thevenin's and Norton's theorems. 2 M
10. State Millman's theorem. 2 M

**PART-B**

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). i) Distinguish Network and Circuit. 2M
- ii) Find the value of dependent voltage source for the circuit Figure 2. 8M

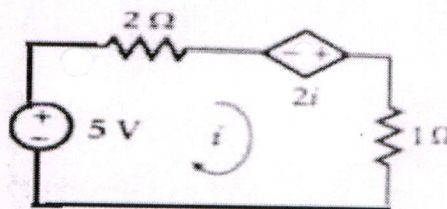


Figure 2

(P.T.O..)

OR

11. B). Determine current through  $10\ \Omega$  resistor of Figure 3 using mesh analysis.

10M

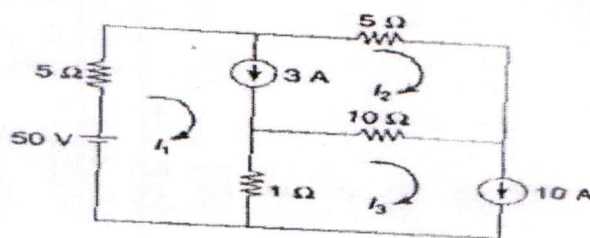


Figure 3

12. A). A resistance of  $50\ \Omega$ , inductance of  $29\text{mH}$ , capacitance of  $3.4\ \mu\text{F}$  are connected in series a  $200\text{V}, 50\text{Hz}$  AC supply. Find (i) Impedance (ii) current (iii) phase angle (iv) voltage drop across resistance (v) voltage drop across inductance (vi) voltage drop across capacitance (vii) power consumed in the circuit and also draw the phasor diagram.

10M

OR

12. B). Find the form factor for the figure shown below.

10M

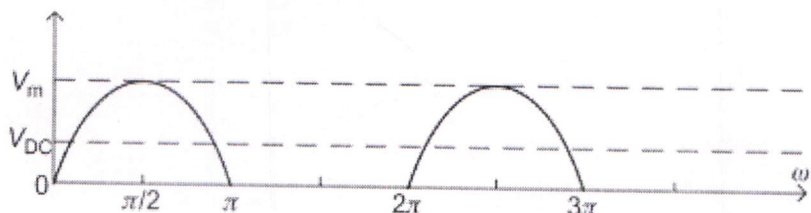


Figure 4

13. A). In a RLC series circuit, the resistance, inductance and capacitance are  $10\ \Omega$ ,  $100\ \text{mH}$  and  $10\ \mu\text{F}$ . Find  $\omega_0$ ,  $\omega_1$  and  $\omega_2$ . Also find band width and selectivity.

10M

OR

13. B). i) A coil having an inductance and resistance of  $50\ \text{mH}$  and  $100\ \Omega$  is connected in series with a capacitor and a  $100\text{V}, 1\ \text{kHz}$  source. Find the value of capacitance that will cause resonance in the circuit. Find the resulting current at resonance.

5M

ii) Two coupled coils have a coefficient of coupling  $k=0.83$ . With coil 1 open, a current of  $5\text{A}$  flows in coil 2. Given flux in coil 2 is  $0.35$  milli weber. Find  $L_1, L_2$  and  $M$ .

5M

14. A). For the graph shown in Figure 5, write the incidence matrix. Express branch voltage in terms of node voltages and then write a loop matrix and express branch currents in terms of loop currents.

10M

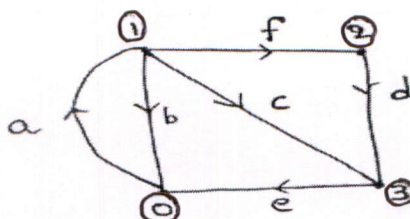


Figure 5

OR

14. B). Explain tie set matrix, cut set matrix and fundamental cut set matrix with an example.

10M

(P.T.O.)

15. A). Determine the current through the  $4\ \Omega$  resistor for the circuit shown in Figure 5 by Superposition theorem. 10M

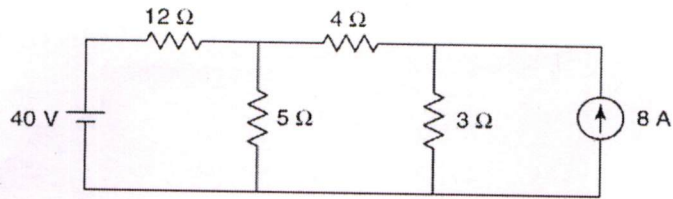


Figure 6

OR

15. B). i) State and explain Maximum power transfer theorem. 3M  
 ii) Determine the value of  $R_L$  and Maximum power for the circuit shown in Figure 6. 7M

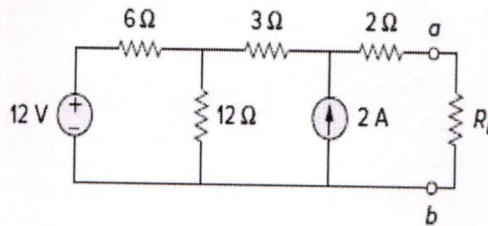


Figure 7

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**R18**

Course Code: A30202



**CMR COLLEGE OF ENGINEERING & TECHNOLOGY**  
(UGC AUTONOMOUS)

B.Tech III Semester Supplementary Examinations August-2023

Course Name: **ELECTRO MAGNETIC FIELDS**

(Electrical & Electronics Engineering)

Date: 12.08.2023 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. How two vectors behave if their dot product is zero? 2 M
2. What is the use of divergence and curl operations? 2 M
3. State coulomb's law. 2 M
4. What is an electric dipole? 2 M
5. What do you mean by convection current and conduction current? 2 M
6. What is meant by boundary condition? How they are useful? Explain. 2 M
7. Write the integral and point forms of Ampere's Circuital law 2 M
8. State Biot-Savart Law. 2 M
9. Define statistically induced emf and dynamically induced emf. 2 M
10. What is the significance of displacement current? 2 M

**PART-B**

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). Check validity of the divergence and curl theorem considering the field  $D=2xy \mathbf{a}_x+x^2\mathbf{a}_y$  10M  
 $c/m^2$  and the rectangular parallel piped formed by the planes  $x=0, x=1, y=0, y=2$  &  
 $z=0, z=3$ .

**OR**

11. B). State and explain: 10M  
i) Stokes theorem  
ii) Divergence theorem

12. A). Derive the relation between electric field and electric potential. 10M

**OR**

12. B). Define potential difference and derive the express for potential difference  $V_{AB}$ . 10M

13. A). Derive the boundary conditions of the normal and tangential components of electric field 10M  
at the Inter face of two media with different dielectrics.

**OR**

13. B). Find the expression for the cylindrical capacitance using Laplace equation. 10M

(P.T.O..)

14. A). State Amperes circuital law. Determine the magnetic field intensity due to an infinite line conductor carrying current. 10M

**OR**

14. B). Derive the magnetic field intensity developed in a square loop carrying current  $I$  in a uniform field. Also State Lorentz force equation for a moving charge and explain its applications. 10M

15. A). Write and explain the Maxwell's equation in differential and integral forms for fields varying harmonically with time. 10M

**OR**

15. B). Explain faraday's law of Electromagnetic induction and derive the expression for induced E.M.F. 10M

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**R18**

Course Code: A30182



**CMR COLLEGE OF ENGINEERING & TECHNOLOGY**  
(UGC AUTONOMOUS)

B.Tech III Semester Supplementary Examinations August-2023

Course Name: **FLUID MECHANICS & HYDRAULIC MACHINERY**

**(Electrical & Electronics Engineering)**

Date: 17.08.2023 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. What are Newtonian and Non-Newtonian fluids?                           | 2 M |
| 2. Why is mercury used in U-tube manometers?                              | 2 M |
| 3. Differentiate between uniform flow and non-uniform flow.               | 2 M |
| 4. List the various forces present in fluid flow.                         | 2 M |
| 5. What are the various losses that occur in flow through pipes?          | 2 M |
| 6. What do you mean by laminar boundary layer?                            | 2 M |
| 7. Classify hydraulic turbines based on energy available at the inlet.    | 2 M |
| 8. What is draft tube? Where is it used?                                  | 2 M |
| 9. Mention the formula to calculate monomeric head of a centrifugal pump. | 2 M |
| 10. What do you mean by 'slip' in reciprocating?                          | 2 M |

**PART-B**

Answer the following. Each question carries TEN Marks.

5x10=50M

- |   |     |
|---|-----|
| 11.A). Obtain the relationship between surface tension and difference of pressure between inside and outside of (i) liquid droplet and (ii) liquid jet.   | 10M |
| <b>OR</b>   |     |
| 11. B). An open tank contains water up to a depth of 2m and above it an oil of sp. gr. 0.9 for a depth of 1m. Find the pressure intensity at the interface of the two liquids and at the bottom of the tank.  | 10M |
| 12. A). Derive Bernoulli's equation from Euler's equation of motion. State the assumptions made.  | 10M |
| <b>OR</b>   |     |
| 12. B). A pipe of diameter 400mm carries water at a velocity of 25 m/s. The pressure at the points A and B are given as 29.43N/cm <sup>2</sup> and 22.563N/cm <sup>2</sup> respectively. While the datum heads at A and B are 28m and 30m. Find the loss of head between A and B. | 10M |
| 13. A). What do you mean by pipes in series and pipes in parallel? How is the loss of head determined in both systems?  | 10M |
| <b>OR</b>   |     |
| 13. B). Calculate the head loss due to friction using Darcy Equation and power required to maintain 60 liters per second of liquid flow through a steel pipe 0.08m radius and 900m long. Take Sp. Gravity of the liquid = 0.85 and co-efficient of friction $f=0.0025$ .          | 10M |

(P.T.O.)



14. A). Derive the expressions for the force exerted by a jet in the direction of jet on a fixed inclined flat plate. 10M

**OR**

14. B). A Pelton wheel is having a mean bucket diameter of 0.8 m and is running at 1000rpm. The net head on the pelton wheel is 400m. If the side clearance angle is  $15^\circ$  and discharge through the nozzle is  $0.15\text{m}^3/\text{s}$ , determine the hydraulic efficiency of the turbine. 10M

15. A). What are unit quantities? Obtain the expressions for unit speed, unit discharge and unit power for a turbine. 10M

**OR**

15. B). Describe with the help of diagrams, the constant speed performance curves of a centrifugal pump. 10M

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**R18**

Course Code: A30401

**CMR COLLEGE OF ENGINEERING & TECHNOLOGY**

(UGC AUTONOMOUS)

B.Tech III Semester Supplementary Examinations August-2023

Course Name: **ELECTRONIC DEVICES & CIRCUITS**

(Common for EEE &amp; ECE)

Date: 19.08.2023 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. What do you mean by transition capacitance? 2 M
2. List the application of varactor diodes. 2 M
3. What is the importance of peak inverse voltage? 2 M
4. What is transformer utilization factor? 2 M
5. Discuss the need for biasing the transistor. 2 M
6. How  $\alpha$  and  $\beta$  are related to each other? 2 M
7. What is d.c load line? 2 M
8. What is stability factor? 2 M
9. Why FET is called as a voltage-controlled device? 2 M
10. List the applications of MOSFET. 2 M

**PART-B**

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). With help of a energy band diagram explain the operation of tunnel diode. How tunneling occurs? 10M

**OR**

- 11.B). i) The diode current is 0.6 mA when applied voltage is 400 mV and 20 mA when the applied voltage is 500 mV. Find  $\eta$  5M  
ii) Explain the operation of photodiode. 5M

- 12.A). Explain the operation of Half wave rectifier and derive the expression for dc output current, dc output voltage, rectification efficiency and ripple factor, TUF. 10M

**OR**

- 12.B). i) Explain the operation of half wave rectifier with capacitive filter 5M  
ii) A sinusoidal voltage of 40 V and frequency 50 Hz is applied to a half wave rectifier.  $R_L = 200 \Omega$ ,  $R_F = \infty$ . Find  $V_{dc}$ ,  $I_{dc}$ ,  $I_m$ ,  $I_{rms}$ ,  $P_{dc}$ ,  $\eta$  5M

- 13.A). i) Explain in detail the characteristics of a transistor in common collector configuration. 6M  
ii) The following measurements were made in a particular transistor when connected in CB mode.  $I_C = 10.525$  mA,  $I_B = 100 \mu A$  and  $I_{CBO} = 5 \mu A$ . Determine  $\alpha$ ,  $\beta$ , and  $I_E$ . Also determine the new level of  $I_B$  to make  $I_C = 15$  mA. 4M

**OR**

- 13.B). Explain the characteristics of UJT and how its works as a relaxation oscillator. 10M

(P.T.O..)

14. A). Explain how compensation for  $V_{BE}$  and  $I_{CO}$  is accomplished using diodes. 10M

**OR**

14. B). Consider a germanium transistor connected in self bias. The various parameters are  $V_{CC}=16V$ ,  $R_C=3k\Omega$ ,  $R_E=2k\Omega$ ,  $R_1=56k\Omega$ ,  $R_2=20k\Omega$  and  $\alpha=0.985$ . Determine: i) the coordinates of the operating point and ii) stability factor S. 10M

15. A). Explain the operation of FET with the help and a neat diagram. Also explain its characteristics. 10M

**OR**

15. B). i) Explain how FET works as a voltage variable resistor. 4M  
ii) Explain the operation of depletion type of MOSFET. 6M

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**R18**

Course Code: A30531



**CMR COLLEGE OF ENGINEERING & TECHNOLOGY**  
(UGC AUTONOMOUS)

B.Tech III Semester Supplementary Examinations August-2023

Course Name: PYTHON PROGRAMMING

(Common for CE, EEE, ME, ECE, CSE, IT, CSC & CSM)

Date: 22.08.2023 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. Interpret the process of Reading input from the key board. 2 M
2. Distinguish between while and for loop. 2 M
3. Outline the idea of Definite Iteration. 2 M
4. What are Global Values and Global Constants? 2 M
5. Determine the need of Lists. 2 M
6. Classify the String Methods 2 M
7. Show the difference between Classes and Functions. 2 M
8. Discuss the Importance of Object Oriented programming. 2 M
9. Summarize the tkinter module. 2 M
10. Identify the need of widgets. 2 M

**PART-B**

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). i) Discuss various operators available in python with example. 5M  
ii) Compare different repetition Structures with examples 5M

**OR**

11. B). i) Illustrate the Principle of Types Conversion with an example. 5M  
ii) Discuss about Nested Decision Structures with an example. 5M

12. A). i) Classify Process of Defining and calling of Void Function. 5M  
ii) Outline the features of Value-Returning Functions. 5M

**OR**

12. B). i) Develop the steps to write a Python function that prints all factors of a given number. 5M  
ii) What is the purpose to use Math Module? 5M

13. A). i) Demonstrate the comparison between lists, tuples, dictionaries and sets. 5M  
ii) Illustrate a Python program that interchanges the first and last characters of a given string. 5M

**OR**

13. B). i) Discuss about recursive, and the Python function that recursively computes sum of elements in a list of lists. Sample Input: [1, 2, [3,4], [5,6]] Expected Result: 21 5M  
ii) Show a Python program read a word and print the number of letters, vowels and percentage of vowels in the word using a dictionaries. 5M

(P.T.O..)

14. A). i) Evaluate the implementation of Object Oriented Programming. 5M  
ii) Identify the Python program that overloads + operator, to add two objects of a class. 5M

**OR**

14. B). i) Can you Analyze inheritance class with suitable example in Python? 5M  
ii) Show the working of method overriding works in Python? Explain with an example. 5M

15. A). i) Construct the Two Dimensional Shapes in Python. 5M  
ii) Summarize the process of Display text with Label Widgets in Python. 5M

**OR**

15. B). i) Demonstrate the behavior of terminal based programs and GUI based Programs. 5M  
ii) Determine the implementation of Button Widgets and info Dialog Boxes in Python. 5M

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H.T No:

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**R18**

Course Code: A30203



**CMR COLLEGE OF ENGINEERING & TECHNOLOGY**  
(UGC AUTONOMOUS)

B.Tech III Semester Supplementary Examinations August-2023

Course Name: ELECTRICAL MACHINES-I

(Electrical & Electronics Engineering)

Date: 24.08.2023 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. Sketch the B-H curves for different materials. 2 M
2. List differences between Energy and co-energy. 2 M
3. Give the values of front –pitch and back-pitch connections for a 2-pole, 12 conductors double-layer armature wave winding. 2 M
4. Differences between simplex winding and multiplex windings. 2 M
5. A 220V DC Shunt motor takes a line current of 15A. Its field current is 1A. Compute the back EMF if its armature resistance is 1.0Ω. 2 M
6. Mention the reasons for failure of “voltage-buildup” in DC shunt generator. 2 M
7. Define the voltage regulation and efficiency of transformer. 2 M
8. Develop the equivalent circuit of a single-phase transformer. 2 M
9. List the advantages of Auto transformer. 2 M
10. List the advantages of Tap changing transformers. 2 M

**PART-B**

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). For linear magnetic circuits derive the expression for the stored energy. Hence show that the stored energy is given by expression  $\frac{1}{2} L(x)i^2$  Joules. 10M
- OR**
11. B). Show how torque can be determined in the multiply excited nonlinear system? 10M
  12. A). Explain the necessity and operation of commutator in D.C machines. 10M
- OR**
12. B). A 20 kW compound generator works on full load with a terminal voltage of 230V. The armature, series field and shunt field resistances are 0.1Ω, 0.05Ω and 115Ω respectively. Calculate the generated emf, when the generator is connected as long shunt. 10M
  13. A). A 500 V, 25 HP DC shunt motor takes a current of 2.4 A while running light. The field and armature resistances are 650 Ω and 0.57 Ω, respectively. Calculate full-load efficiency, assuming a brush drop of 2 V. 10M

**OR**

13. B). Explain the speed control of DC machine through flux and armature control methods. 10M

(P.T.O.)

14. A). An instrument obtained from open and short circuit tests on 10 kVA, 450/120 V, 50 Hz transformer is: 10M  
O.C. test:  $V_1 = 120$  V,  $I_1 = 4.2$  A,  $W_1 = 80$  W. (H.V. side open)  
S.C. test:  $V_1 = 9.65$  V,  $I_1 = 22.2$  A,  $W_1 = 120$  W. (L.V. side Short circuited)  
Compute The equivalent circuit parameters when referred to primary side. Efficiency at full load with 0.8 lagging power factor.

**OR**

14. B). With the help of circuit diagrams, explain any two types of three phase transformer connections and mention how hysteresis and eddy Current losses are minimized in transformers. 10M

15. A). Explain the principle and operation of No-load and on-load Tap changing transformer. 10M

**OR**

15. B). Explain the applications and advantages of Auto Transformer compared to two winding transformers. 10M

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