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 $(D^2 + \alpha^2)x = asin(at + 2), \ x = Dx = 0 \ \ at\ t = 0.$ 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: A30201

CMR COLLEGE OF ENGINEERING & TECHNOLOGY

(UGC AUTONOMOUS)

B.Tech III Semester Supplementary Examinations February-2024

Course Name: NETWORK THEORY-I

(Electrical & Electronics 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. Write the differences between the voltage source and current source. 2 M
2. Classify the independent and dependent voltage sources. 2 M
3. Define the Active power and reactive power. 2 M
4. Define phasor and power factor. 2 M
5. State the faraday's laws of electromagnetic induction. 2 M
6. Draw the locus diagram for series RL circuit. 2 M
7. Define tree and co tree. 2 M
8. Define link and graph. 2 M
9. State the maximum Power transfer theorem. 2 M
10. State the Norton's theorem. 2 M

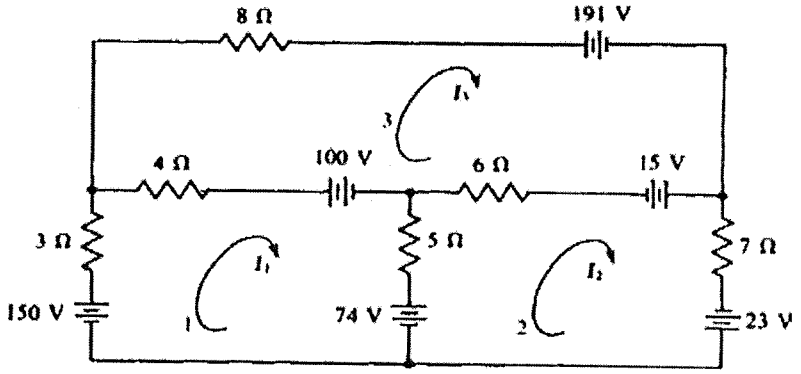
PART-B

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

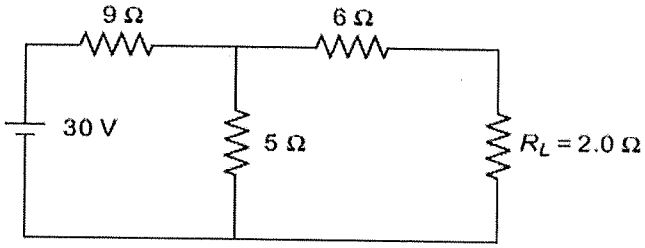
11.A). Explain about the star to delta and delta to star transformation. 10M

OR

11. B). i) Find the mesh currents in the circuit shown in below figure. 5M



ii) Find the total current supplied by source for the following fig. 5M



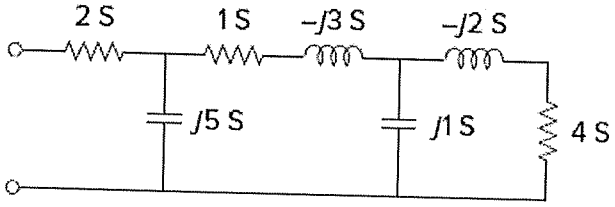
(P.T.O..)

12. A). Derive the Average, RMS and Form factor for AC sinusoidal waveform. 10M

OR

12. B). i) Derive the relations for current, active power, reactive power and power factor for a series RL circuit with sinusoidal input. 7M

ii) Find the Equivalent Admitance for following circuit. 3M



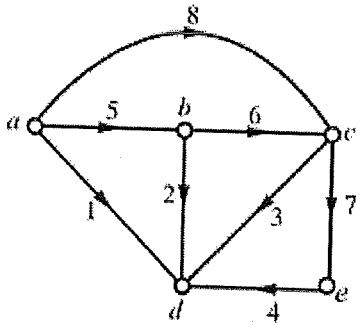
13. A). Derive the expressions for current, band width, Quality factor & resonance frequency of Series R-L-C circuit and R-L parallel Circuit with required phasor diagrams. 10M

OR

13. B). i) Derive the relation between self inductance, mutual inductance and coefficient of coupling. 6M

ii) A coil of 100 turns is wound uniformly over a wooden ring having a mean Circumference of 500mm and a uniform cross sectional area of 500mm^2. If the current through the coil is 2.0A calculate (i) the magnetic field strength (ii) the flux density (iii) the flux (iv) mmf. 4M

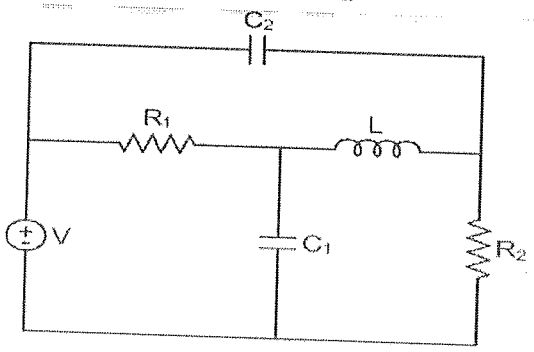
14. A). For the graph shown in Fig., write the incidence matrix. Express branch voltage in terms of node voltages and then write a loop matrix and express branch currents in terms of loop currents. 10M



OR

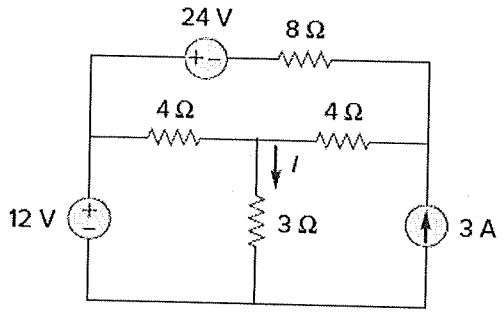
14. B). i) Define Duality and explain about Dual networks. 5M

ii) For the following network find it's dual network. 5M



(P.T.O.)

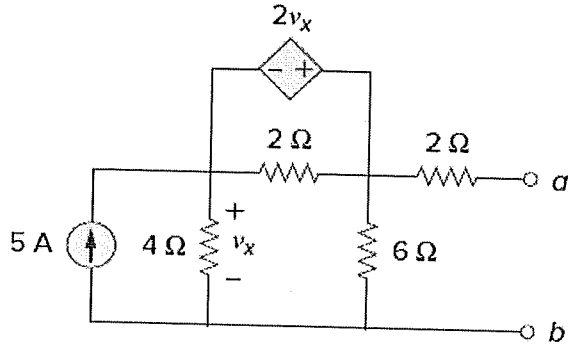
15. A). For the below circuit, find I by using superposition theorem. 10M



OR

15. B). i) Explain about Tellegan's theorem. 4M

ii) Find Thevenin's equivalent of the circuit in Fig. at terminals *a-b*. 6M



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H.T No: | | | | | | | | | | | **R18** | Course Code: A30202

CMR COLLEGE OF ENGINEERING & TECHNOLOGY

(UGC AUTONOMOUS)

B.Tech III Semester Supplementary Examinations February-2024

Course Name: ELECTRO MAGNETIC FIELDS

(Electrical & Electronics 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. Define scalar quantity and vector quantity. 2 M
2. Find the angle between the vectors, $\vec{A} = 2\vec{a}_x + 4\vec{a}_y - \vec{a}_z$ and $\vec{B} = 3\vec{a}_x + 6\vec{a}_y - 4\vec{a}_z$ using dot product. 2 M
3. Define coulomb's law of force. 2 M
4. List the properties of electric flux lines. 2 M
5. Distinguish conductors & dielectrics and name two materials for each. 2 M
6. Define ohm's law in point form. 2 M
7. Define magnetic Field Intensity and state its unit. 2 M
8. State Amperes circuital law. 2 M
9. Define Faraday's Law of Electromagnetic Induction. 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). i) Compare and contrast between Divergence and Curl. 5M

ii) Given the two points A(x=2,y=3,z=-1) and B(r=4,Θ=25,ϕ=120^0). Find the spherical co-ordinates of A and Cartesian coordinates of B. 5M

OR

11. B). i) Determine the divergence and curl of the field. 5M

$\vec{F} = (30\vec{a}_x + 2xy\vec{a}_y + 5xz^2\vec{a}_z)$ at (1,1,-0.2) and hence state the nature of the field.

ii) Discuss about Gradient in field. 5M

12. A). State and prove Gauss's law in differential forms. Using Gauss law, find the Electric Field Intensity for a uniformly charged sphere of radius 'a'. 10M

OR

12. B). i) A point charge Q_1 = 300 μc located at (1, -1, -3) is experiencing a force $\vec{F} = (8\vec{a}_x - 8\vec{a}_y + 4\vec{a}_z)$ due to a point charge Q_2 at (3, -3, -2). Determine Q_2. 5M

ii) Evaluate Electric flux density, $\vec{D}$ due to point charge Q placed at origin. Hence, obtain the relation between $\vec{D}$ and $\vec{E}$. 5M

(P.T.O..)

13. A). i) Discuss Poisson's and Laplace equations. 5M

ii) Given the potential field, $V=\frac{50sin\theta}{r^2}$ V, in free space, determine whether V satisfies Laplace's equation. 5M

OR

13. B). Formulate an expression for the capacitance of a parallel plate capacitor. 10M

14. A). Explain Biot-Savart Law. 10M

OR

14. B). Develop anexpression for the magnetic field at any point on the line though the center at a distance 'h' from the centre and perpendicular to the plane of circular loop of radius 'r' and carrying a current I. 10M

15. A). i) Determine the e.m.f. induced about the path r=0.5,z=0,t=0. If $\vec{B} = 0.01sin(377t)\ T$. 6M

ii) Explain briefly about the motional e.m.f and derive expression for it. 4M

OR

15. B). From the fundamental laws, Formulate the maxwell's equations for electric and magnetic field in integral and differential forms. 10M

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H.T No: | | | | | | | | | | | **R18** **Course Code: A30182**

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

B.Tech III Semester Supplementary Examinations February-2024

Course Name: FLUID MECHANICS & HYDRAULIC MACHINERY

(Electrical & Electronics 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. Determine specific gravity of fluid having viscosity of 0.05 poise and kinematic viscosity of 0.03 stokes. 2 M
2. What are Newtonian and non-Newtonian fluids? 2 M
3. Give any two properties of velocity potential function. 2 M
4. What is steady and unsteady flow? 2 M
5. In a pipe of diameter 350 mm and length 75 m water is flowing at a velocity of 2·8 m/s. Find the head lost due to friction using Darcy-Weisbach formula. Assume kinematic viscosity of water as 0·012 stoke. 2 M
6. Differentiate between laminar and turbulent boundary layers. 2 M
7. Differentiate between a impulse turbine and reaction turbine. 2 M
8. Explain the following terms: (a) Volumetric efficiency (b) Overall efficiency 2 M
9. Distinguish between a base load power plant and a peak load power plant. 2 M
10. What are the methods adopted to increase the efficiency of a pump? 2 M

PART-B

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

11.A). What is Newton's law of viscosity. Explain the effect of temperature on the viscosity of air and water. Calculate capillary rise in a glass tube of 2.5 mm diameter when immersed vertically in (i) water (ii) mercury. Take surface tension as 0.073N/m for water and 0.52 N/m for mercury in contact with air. The specific gravity of mercury is 13.6 and angle of contact is 130^0. 10M

OR

11. B). Prove hydro static law and give detail explanation of U-tube nano meter using hydro static law. 10M

12. A). Derive Euler's equation of motion listing all the assumptions. 10M

OR

12. B). 210 litres of gasoline (specific gravity 0.82) flow per second upwards in an inclined venturimeter fitted to a 300 mm diameter pipe. The venturimeter is inclined at 60^0 to the vertical and its 150 mm diameter throat is 1.2 m from the entrance along its length. Pressure gauges inserted at the entrance and throat show pressures of 0.141 N/mm^2 and 0.077 N/mm^2 respectively. Calculate discharge coefficient of the venturimeter. If instead of pressure gauges, the entrance and throat of the venturimeter are connected to the two limbs of a U-tube mercury manometer, determine its reading in mm of differential mercury column. 10M

(P.T.O..)

13. A). Water flows through a pipeline whose diameter varies from 30 cm to 20 cm in a length of 12 m. If the Darcy-Weisbach friction factor is assumed constant at 0·018 for the whole pipe, determine the head loss in friction when the pipe is flowing full with a discharge of 0·08 m^3/s. 10M

OR

13. B). A smooth flat plate 2 m wide and 2.5 m long is towed in oil of relative density 0.8 at a velocity of 1.5 m/sec along its length. Find the boundary layer thickness at the trailing edge of the plate and power required for towing the plate. Take kinematic viscosity of oil as 1.1 stokes. 10M

14. A). A jet of water having a velocity of 50 m/s strikes a curved vane, which is moving with a velocity of 18 m/s. The jet makes an angle of 30° with the direction of motion of vane at inlet and leaves at an angle of 90° to the direction of motion of vane at outlet. Draw the velocity triangles at inlet and outlet and determine the vane angles at inlet and outlet so that the water enters and leaves the vane without shock. 10M

OR

14. B). A reaction turbine works at 430 r.p.m. under a head of 125 m. Its diameter at inlet is 1.2 m and the flow area is 0.4 m^2. The angles made by absolute and relative velocities at inlet are 20° and 60° respectively with the tangential velocity. Determine: 10M

(i) The volume flow rate,

(ii) The power developed, and

(iii) The hydraulic efficiency.

15. A). Define centrifugal pump and explain the working procedure of a single-stage centrifugal pump with neat sketch. 10M

OR

15. B). A single acting reciprocating pump has a plunger diameter of 100 mm and a stroke of 200mm. The suction pipe is 80 mm in diameter and 6 meters long. The pump is situated at a height of 3 meters above the sump water level. If the pump runs at 30rpm, calculate the absolute pressure head in the cylinder at the beginning of the suction stroke. The atmospheric pressure head = 10.30 meters of water. 10M

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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

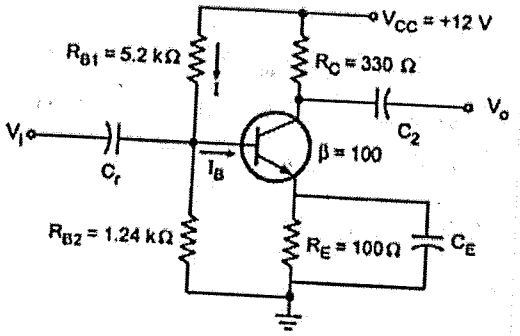
ii) Explain the input and output characteristics of the transistor in CC configuration with diagrams. 5M

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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H.T No: | | | | | | | | | | | R18 | Course Code: A30203

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

B.Tech III Semester Supplementary Examinations February-2024

Course Name: ELECTRICAL MACHINES-I

(Electrical & Electronics Engineering)

Date: 21.02.2024 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. Differentiate between linear and nonlinear magnetic circuit. 2 M
2. Illustrate the magnetization curve of a ferromagnetic material and label the different zone in the curve. 2 M
3. Differentiate simplex and multiplex winding of a DC machine. 2 M
4. Define commutation in a DC generator. 2 M
5. Identify the applications of DC shunt motors. 2 M
6. What are the losses associated with a DC machine? 2 M
7. Identify the significance of voltage transformation ratio in a single phase transformer. 2 M
8. Infer the steps of polarity test of a transformer. 2 M
9. Compare the auto transformer with single phase transformer. 2 M
10. Illustrate the Scott connection of a transformer. 2 M

PART-B

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

11.A). Apply Lorentz force equation and deduce the equation for the force developed in an electromagnetic system. 10M

OR

11. B). For a single excited magnetic field system, derive the equation for the stored energy in a magnetic field. 10M

12. A). With neat illustrations explain the construction of a DC machine and interpret the need of each component. 10M

OR

12. B). i) Analyze the cross magnetizing and demagnetizing effect of armature reaction in a DC machine. 6M

ii) Determine the cross and demagnetizing ampere turns of a DC generator having armature current of 625 A, conductor current of 104.2 A and with the brush shift of 7.5 electrical degree. 4M

(P.T.O..)

13. A). i) Illustrate the different types of motors based on the excitation and explain the torque speed characteristics of each motor. 7M

ii) Determine the gross torque of a 6 pole lap connected DC motor with 864 conductors, 0.05 Wb and the armature current of 110 A. 3M

OR

13. B). i) Analyze the procedure to derive the critical resistance and critical speed of a DC generator from the open circuit characteristics. 5M

ii) Explain the working of three point starter of a DC motor with neat diagram. 5M

14. A). Develop an approximate equivalent circuit of a single phase transformer by explaining the procedural steps. 10M

OR

14. B). Explain the various types of connection of a three phase transformer and compare their merits and demerits. 10M

15. A). Explain about No-load and On-load tap changers in transformers. 10M

OR

15. B). i) Explain the construction and working principle of auto transformer. 6M

ii) Derive an expression for copper saving in auto transformer. 4M

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