AR13 SET 01

CODE: 13CE2004

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)

II B.Tech I Sem End Examinations, January, 2015
FLUID MECHANICS
(CIVIL ENGINEERING)

Time: 3 Hours **Max Marks: 70**

PART-A

Answer all questions: **[1 X 10 = 10M]**

1. a) What do you mean by vacuum pressure?
   b) Classification of manometer.
   c) What is Total Pressure?
   d) What is path line?
   e) Distinguish between steady flow and unsteady flow.
   f) What is stream function?
   g) What is Turbulent flow?
   h) Define moment of momentum.
   i) What is the principle behind the functioning of aventurimeter?
   j) What is Total Energy Line?

PART-B

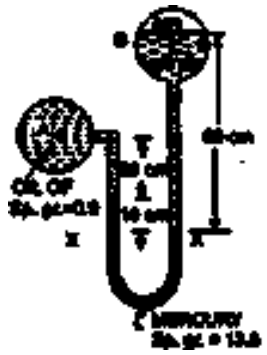
Answer one question from each unit **[5X12=60M]**

UNIT-I

2. a) State and prove Pascal's law.
   b) A pressure gauge consists of two cylindrical bulbs *B* and *C* each of 10 cm^2 cross sectional area, which are connected by a U tube with vertical limbs each of 0.25 cm^2 cross sectional area. A red liquid of specific gravity 0.9 is filled into *C* and clear water is filled into *B*, the surface of separation being in the limb attached to *C*. Find the displacement of the surface of separation when the pressure on the surface in *C* is greater than that in *B* by an amount equal to 1 cm head of water.

(OR)

3. a) How are manometers classified?
   b) A differential manometer is connected at the two points *A* and *B* as shown in Fig. At *B* air pressure is 9.81 N/cm^2 (abs), find the absolute pressure at *A*.



UNIT-II

4. a) Derive the expression for total pressure for a vertically immersed surface.
   b) A rectangular plate 2m × 4m is vertically immersed in water is such a way that 2 meters side is parallel to the water surface and 2.5 meters below it. Find the total pressure on the rectangular plate.

(OR)

5. a) Derive the expressions for the depth of centre of pressure from the free surface of liquid of an inclined plane surface submerged in the liquid.
   b) Determine the total pressure and the center of pressure on an isosceles triangular plate of base 4m and altitude 4m when it is vertically immersed in an oil of specific gravity 0.9. The base of the plate coincides with the free oil surface.

UNIT-III

6. a) Define the equation of continuity. Obtain an expression for continuity equation for a three-dimensional flow.
   b) The diameters of a pipe at sections 1 and 2 are 15 cm and 20 cm respectively. Find the discharge through the pipe if velocity of water at section 1 is 4 m/s. Determine also the velocity at section 2.

(OR)

7. a) Define the terms (i) laminar flow, (ii) turbulent flow, (iii) steady flow and (iv) uniform flow.
   b) The velocity potential function, Φ, is given by $\Phi = x^2 - y^2$. Find the velocity components in x and y direction. Also show that Φ represents a possible case of fluid flow.

UNIT-IV

8. a) Write Euler's equation of motion along a streamline and integrate it to obtain Bernoulli's equation. State all the assumptions made.
   b) A conical tube of length 2.0 m is fixed vertically with its smaller end upwards. The velocity of flow at the smaller end is 5 m/s while at the lower end it is 2 m/s. The pressure head at the smaller end is 2.5 m of liquid. The loss of head in the tube is $0.35(v_1-v_2)^2/2g$, where v_1 is the velocity at the smaller end and v_2 at the lower end respectively. Determine the pressure head at the lower end. Flow takes place in the downward direction.

(OR)

9. a) Analyze the Forces acting on a fluid in motion.
   b) Water is flowing through a taper pipe of length 100 m having diameter 300 mm and 600 mm at the bottom and upper end respectively at the rate of 50 lit/s. The pipe has a slope of 1 in 30. Find the intensity of pressure at the bottom end in N/cm^2, if the pressure at the upper end is 16.92 N/cm^2. Determine the difference in datum head if the rate of flow through the pipe is 40 lit/s.

UNIT-V

10. a) Why is coefficient of discharge of orifice meter much smaller than that of venturimeter?
    b) Briefly explain Hydraulic Gradient Line and Total Energy Line.
    c) The rate of flow of water through a horizontal pope is $0.3m^3$/sec. The diameter of the pipe is suddenly enlarged from 25cm to 50cm. The pressure intensity in the smaller pipe is $1.4Kgf/cm^2$. Determine loss of head due to sudden enlargement, pressure intensity in the large pipe and power lost due to enlargement.

(OR)

11.a) What is a pitot tube? How is it used to measure velocity of flow at any point in a pipe or channel?
   b) An oil of specific gravity 0.85 and viscosity 5CP flows through a pipe of diameter 400 mm at the rate of 50 lit/sec. Find the head lost due to friction in this pipe of length 1000 Km. Assume that $f = 0.079/Re$ where Re is Reynolds Number.

CODE: 13EE2006

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Sem End Examinations, January, 2015
ELECTRO MAGNETIC FIELDS
(ELECTRICAL & ELECTRONICS ENGINEERING)

Time: 3 Hours **Max Marks: 70**

PART-A

Answer all questions: **[1 X 10 = 10M]**

1.(a) What are the applications of Gauss's law?
(b) What are the different types of charge distributions?
(c) Define Electric dipole.
(d) Give the properties of dielectrics.
(e) What is the relation between magnetic flux and magnetic flux density?
(f) State Ampere's circuital law.
(g) Define magnetic dipole moment.
(h) Write the expression for Force on a straight and long current carrying conductor.
(i) Write the expression for inductance of a solenoid.
(j) Write the expression for modified Ampere's circuit law.

PART – B

Answer one question from each unit **[5 x 12 = 60M]**

UNIT-I

2 a) Derive an expression for Electric field intensity due to a line of charge using Coulomb's law . [6M]
b) A segment of line charge $\rho_L = 10$ nC/m exists on the y-axis from the origin to y = +3.0 m. Determine **E** at the point (3.0, 0, 0) m. [6M]

(OR)

3. a) Define Gauss's law and derive point form of Gauss's law. [6M]
b) Given $\mathbf{D} = 2\rho\mathbf{a}_\rho + \sin\phi\,\mathbf{a}_z$ C/m^2, find the electric flux passing through the surface defined by $2.0 \le \rho \le 4.0$ m m, $90.^\circ \le \phi \le 180^\circ$, and $z = 4.0$ m. [6M]

UNIT – II

4 a) Discuss about conductor – freespace boundary conditions. [6M]
b) The region with z < 0 is characterized by $\varepsilon_{r2} = 2$ and z > 0 by $\varepsilon_{r1} = 5$. If $\mathbf{D_1} = 2\mathbf{a_x} + 5\mathbf{a_y} - 3\mathbf{a_z}$ nc/m^2, find a) $\mathbf{D_2}$ b) $\mathbf{D_{n2}}$ c) $\mathbf{D_{tan2}}$ d) The angle that $\mathbf{D_2}$ makes with z-axis. [6M]

(OR)

5 a) Define the capacitance. Derive the expression for the capacitance of a co- axial cable. [6M]
b) Calculate the capacitance of a parallel plate capacitor having a micro dielectric relative permittivity = 6, a plate area of 10 cm^2, and a separation of 0.01 cm. [6M]

UNIT – III

6 a) Find the magnetic field strength **H** due to circular current loop. [6M]
b) Find the magnetic field strength **H** due to straight conductor finite length. [6M]

(OR)

7 a) Derive the expression for **H** due to infinite sheet using Ampere's circuit law. [6M]
b) A **H** due to a current source is given by, $\mathbf{H} = [y\cos(\alpha x)]\ \mathbf{a_x} + (y+e^x)\ \mathbf{a_z}$. Determine current density over the yz plane. [6M]

UNIT – IV

8 a) Derive the expression for torque on a current loop placed in magnetic field. [6M]
b) Two long parallel conductors are separated by 2 cm in air carrying current of 100 Ampere each flowing in opposite directions. Find the force per meter length of the conductor. [6M]

(OR)

9 a) Derive the expression for Energy stored in a magnetic field. [6M]
b) Two infinitely long parallel conductors are separated by a distance'd'. Find the force per unit length exerted by one of the conductor on the other if the currents in the two conductors are I_1 and I_2. [6M]

UNIT – V

10 a) Derive the continuity equation for time varying fields. [6M]
b) In a given lossy dielectric medium conduction current density Jc = 0.02 sin 10^9 t (A/m^2). Find the displacement current density if conductivity = 1000 and εr = 6.5. [6M]

(OR)

11 a) Explain the concepts of transformer e.m.f and motional e.m.f. [6M]
b) Explain about inductance in solenoid and toroid. [6M]

- **Bold letter represents vector**

AR13 SET 01

CODE: 13ME2007

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Sem End Examinations, January, 2015
THERMODYNAMICS
(MECHANICAL ENGINEERIG)

Time: 3 Hours **Max Marks: 70**

PART-A

Answer all questions: **[1 X 10 = 10M]**

1. (a) What are intensive and extensive properties?
   (b) State zeroth law of thermodynamics
   (c) What is a cyclic heat engine?
   (d) Give the Clausius statement of second law of thermodynamics
   (e) What is available energy and unavailable energy?
   (f) Define quality of steam
   (g) Write vander wall's equation of state
   (h) Define specific humidity
   (i) Define mean effective pressure
   (j) State the various process which constitute Ericssion cycle

PART-B

Answer one question from each unit **[5 x 12 = 60 M]**

UNIT – I

2. (a) An engine cylinder has a piston area $0.12m^2$ and contains a gas at a pressure of 15MPa. The gas expands according to a process which is represented by a straight line on a pressure volume diagram. The final pressure is 0.15MPa. Calculate the work done by the gas on the piston if the stroke is 0.30m.

   (b) A mass of 1.5 kg of air is compressed in a quasi - static process from 0.1 MPa to 0.7MPa for which pv= constant. The initial density of air is $1.16kg/m^3$. Find the work done by the piston to compress the air.

(OR)

3. (a) Show that energy is a property of a system
   (b) A stationary mass of gas is compressed without friction from an initial state of $0.3m^3$ and 0.105 MPa to a final state of 0.15 m^3 and 0.105 MPa, the pressure remaining constant during the process. There is a transfer of 37.6 kJ of heat from the gas during the process. How much does the internal energy of the gas change?

UNIT-II

4. A nozzle is a device for increasing the velocity of a steadily flowing stream. At inlet to a certain nozzle, the enthalpy of fluid passing is 3000 kJ/kg and velocity is 60 m/sec. At the discharge end, the enthalpy is 2762 kJ/kg. The nozzle is horizontal and there is negligible heat loss from it. Find (a) the velocity at exit from nozzle (b) if the inlet area is $0.1m^2$ and the specific volume at inlet is $0.187m^3/kg$, find the mass flow rate (c) if the specific volume at nozzle exit is $0.498m^3/kg$, and find exit area of nozzle

(OR)

5 A heat engine receives reversibly 420 kJ/cycle of heat from a source of 327^0C and rejects hear reversibly to sink at 27^0C.There are no other heat transfers. For each of three hypothetical amounts of heat rejected, in (a), (b), and (c) below, compute the cyclic integral of dQ/T. from these results show which case is irreversible, which reversible, and which is impossible. (a) 210 kJ/ cycle rejected, (b) 105 kJ /cycle rejected, (c) 315 kJ/ cycle rejected.

UNIT-III

6. (a) What is available energy and unavailable energy?

   (b) Calculate the decrease in available energy when 25 kg of water at 95^0C mix with 35 kg of water 35^0C, the pressure being taken as constant and the temperature of the surroundings being 15^0C

(OR)

7. Steam initially at 1.5 MPa, 300^0C expands reversibly and adiabatically in a steam turbine to 40^0C. Determine the ideal work output of the turbine per kg of steam.

UNIT-IV

8. Two vessels, A and B, both containing Nitrogen, are connected by a valve which is opened to allow the contents to mix and achieve an equilibrium temperature of 27^0C before mixing the following information is known about the gases in two vessels

   Vessel A : P = 1.5 MPa , t =50^0C, contents = 0.5kg mol,

   Vessel B: P = 0.6 MPa, t = 20^0C, contents = 2.5kg mol,

   Calculate the final equilibrium pressure, and the amount of heat transferred to the surroundings take $\gamma = 1.4$

(OR)

9. Consider a room that contains air at 1 atm, 35^0C and 40 percent relative humidity. Determine (a) specific humidity (b) the enthalpy (c) wet bulb temperature (d) dew point temperature, and (e) the specific volume of air.

UNIT-V

10.(a) Mention the assumptions involved in air standard cycle

   (b) Derive the expression for air standard efficiency of Diesel cycle

(OR)

11. (a) Briefly explain vapour compression refrigeration cycle with a neat sketch

   (b) Explain the P-V and T-S diagrams of Atkinson cycle and Ericssion cycle.

AR13 SET 01

CODE: 13EE2007

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Sem End Examinations, January, 2015
NETWORK ANALYSIS
(ELECTRONICS AND COMMUNICATION ENGINEERING)

Time: 3 Hours **Max Marks: 70**

PART-A

Answer all questions: **[1 X 10 = 10M]**

1. (a) Define kirchhoff's Voltage Law.
   (b) Draw the VI Characteristics Of a Practical Voltage Source.
   (c) A 250V , 50HZ Sinusoidal Signal in applied to 20KΩ in Series With 100mH Inductor. Calculate the Impedance Of the Coil.
   (d) Define Planar and non planar graph
   (e) Illustrate the Significance of Q factor of a coil.
   (f) Determine the Maximum Possible Mutual Inductance of Two Inductively Coupled Coils With Self Inductances L_1=25mH, L_2=100mH.
   (g) State Thevenin's Theorem
   (h) For a given Z_{11}=3Ω, Z_{12}=1Ω, Z_{21}=2Ω and Z_{22}=1Ω. Find Y_{11} .
   (i) Define band elimination filter
   (j) Define attenuation band.

PART-B

Answer one question from each unit **[5 X 12 = 60 M]**

UNIT-I

2.a).What are the types of sources? Explain them with suitable diagrams and characteristics?
b).Find mesh currents and determine voltage across each element in the circuit shown in Figure-1

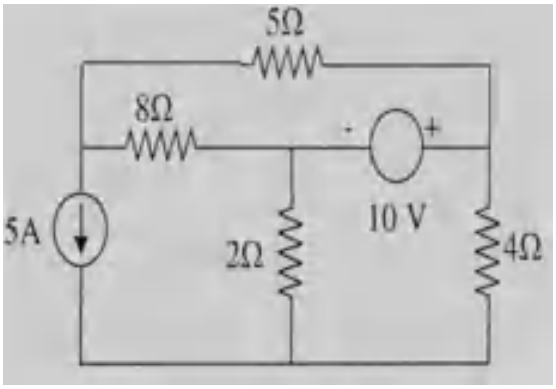


Figure-1

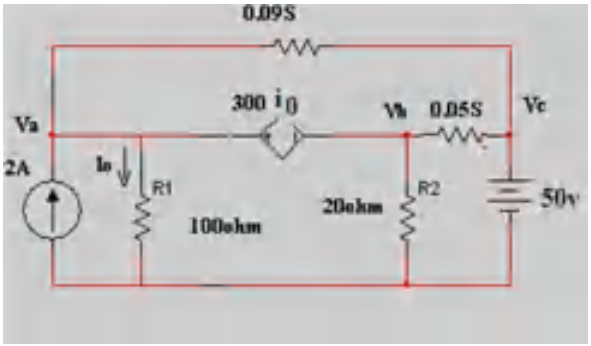


Figure-2

(OR)

3.a).State and explain Kirchhoff's laws.

b).Find the V_A, V_B and V_C of the circuit shown in Figure-2

UNIT-II

4.a).Explain the RMS value and average value of alternating quantity. Derive its necessary expressions

b). A periodic voltage waveform has been shown in Figure-3. Determine

i). R.M.S. value and ii). Average value

(OR)

5 a).Define the following terms

i) Node ii) Tree iii) oriented graph iv) Twig

b) For the electrical network shown in Figure-4 draw its connected graph and written its incidence matrix.

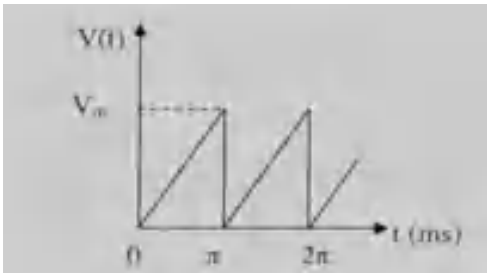


Figure-3

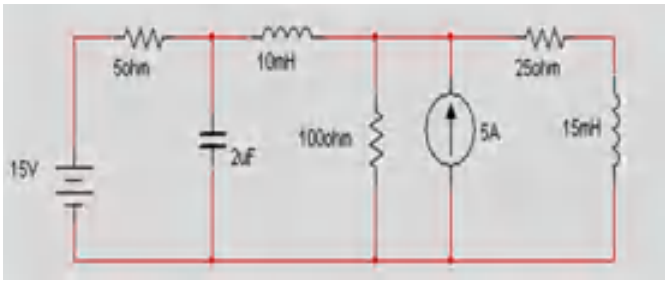


Figure-4

UNIT-III

6. In the network shown in Figure-5, determine the

a). Mesh currents

b). Power supplied by the source and

c).Power dissipated in each resistor

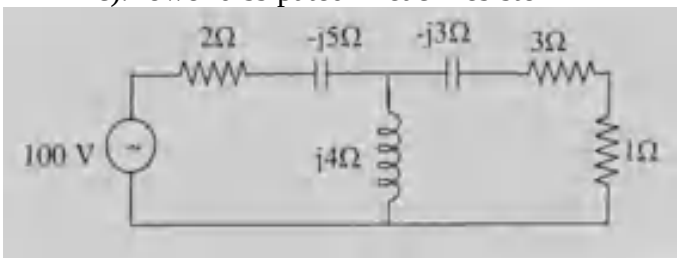


Figure-5

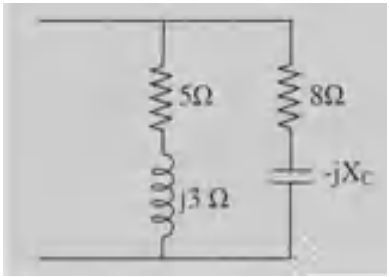


Figure – 6

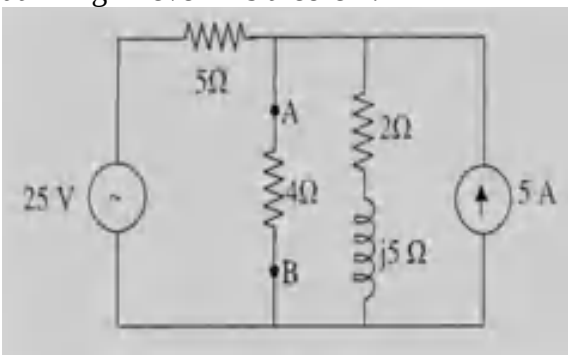
(OR)

7. a).Determine the coefficient of coupling of two magnetically coupled coils of turns N_1 and N_2

b).For the circuit shown in Figure-6, find the value of X_c in ohms at which the circuit under resonance.

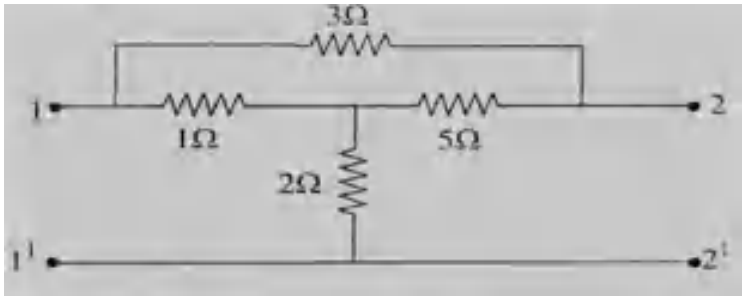
UNIT-IV

8.In the circuit shown in below figure , find the current through R_L = 4ohm resistor connected across A-B terminals by utilizing Thevenin's theorem.



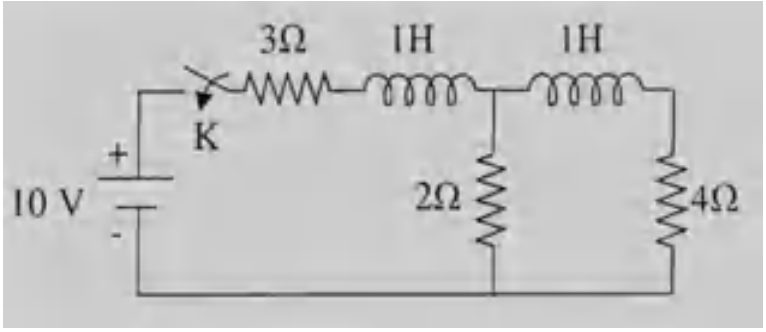
(OR)

9. For the network shown in below figure, find ABCD parameters



UNIT-V

10. Using Laplace transformation technique, find current in each loop at $t=0^+$ following switching at t=0 of switch K is shown in below figure. Assume the network previously de-energized.



(OR)

11.a).What are classifications of filters? Discuss them briefly.

b).Design a constant k-low pass filter having f_c =2kHz and design impedance R_0=600 Ω. Obtain the value of attenuation at 4 kHz.

AR13 SET 02

CODE: 13EE2003

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)

II B.Tech I Sem End Examinations, January, 2015
ELECTRICAL & ELECTRONICS ENGINEERING
(Common to CSE & IT)

Time: 3 Hours **Max Marks: 70**

PART-A

Answer all questions: **[1 X 10 = 10M]**

1.(a) Define active element?
(b) What is the difference between active element and passive element?
(c) Why inductor do not allow sudden change in current?
(d) What is a EMF equation of single phase transformer?
(e) Define the step-up transformer?
(f) Define the voltage regulation?
(g) What is the condition to obtain the maximum efficiency of a Transformer?
(h) Which method is used to obtain the speeds below the rated speed?
(i) Define the controlling torque?
(j) List out the diode applications?

PART-B

Answer one question from each unit **[5 X 12 = 60 M]**

UNIT-I

2.a) State and explain the Kirchhoff's Laws with examples? [6M]
b) Six resistors are connected as shown in fig.1. If a battery having an e.m.f of 24 volts and internal resistance of 1ohm is connected to the terminals of A and B, find (i) the current from the battery (ii) p.d across 8ohm and 4ohm resistors (iii) the current taken from the battery if a conductor of negligible resistance is connected in parallel with 8ohm resistor. [6M]

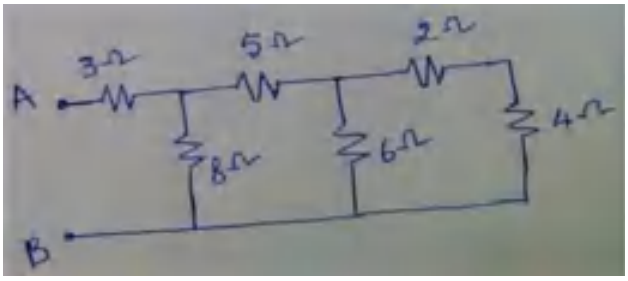


Fig. 1

(OR)

3.a) For the given network as shown in Fig.2. Find the Power absorbed by the 1ohm and 4ohm resistors and also find the current flowing through each resistor. [6M]

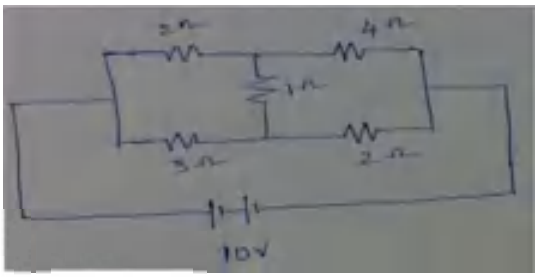


Fig. 2

b) Prove that $R_{AB} = R_A + R_B + \frac{R_A R_B}{R_C}$ [6M]

UNIT- II

4.a) Explain the different losses in a DC Machine? [6M]

b) Draw and Explain the working of three point starter? [6M]

(OR)

5.a) Derive the condition for maximum efficiency of a DC Generator? [6M]

b) A shunt generator supplies 96A at a terminal voltage of 200volts. The armature and shunt field resistances are 0.1ohm and 50ohm respectively. The iron and frictional losses are 2500watts. Find (i) e.m.f generated (ii) copper loss (iii) commercial efficiency. [6M]

UNIT-III

6.a) Derive the e.m.f equation of three phase alternator? [6M]

b) A 10KVA,2000/400V single phase transformer has R_1=5ohm,X_1=12ohm; R_2=0.2ohm, and X_2=0.48ohm Determine the equivalent impedance of the transformer referred to (i) Primary side (ii) Secondary side. [6M]

(OR)

7.Explain the construction and working of an alternator? [12M]

UNIT-IV

8.Explain the construction and working of Moving iron instruments? [12M]

(OR)

9.Explain the construction and working of PMMC instrument? [12M]

UNIT-V

10. Explain the SCR characteristics and its applications? [12M]

(OR)

11. Explain the working of half wave and full wave rectifies with suitable wave forms? [12M]