AR13 SET 01

CODE: 13CE2004

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech. I Semester Regular/Supplementary Examinations, December, 2015
FLUID MECHANICS
(Civil Engineering)

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

PART – A

Answer all questions **[1X10=10M]**

1. a) What are the S.I unit of surface tension.
   b) What is the deference between dynamic viscosity and kinematic viscosity?
   c) Define the center of pressure.
   d) Write the expression for centre of pressure for if vertically immersed surface.
   e) What is stream line.
   f) Define velocity potential.
   g) Explain Bernoulli's theorem.
   h) What is Laminar flow.
   i) List out the minor losses in pipe.
   j) What is total energy line.

PART – B

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

UNIT-I

2. (a) Discuss the influence of the following fluid properties on fluid motion
   (i) Viscosity, (ii) Specific gravity, (iii) Surface tension, (iv) Bulk modulus

   (b) If the surface tension at air water interface is 0.073 N/m, what is the pressure difference between inside and outside of an air bubble of diameter 0.01 mm?

(OR)

3. (a) Write the difference between U-tube differential manometers and inverted U-tube differential manometers? Where are they used.

   (b) A plate, 0.025m distant from a fixed plate, moves at 50 cm/s and requires a force of 1.471 N/m^2 to maintain this speed. Determine the fluid viscosity between the plates in the poise.

UNIT-II

4. (a) Derive an expression for the depth of centre of pressure from free surface of liquid of an inclined plane surface submerged in the liquid.

   (b) Find the total pressure and position of centre of pressure on a triangular plate of base 2.4m and height 3.6m which is immersed in water in such a way that the plan of the plate makes an angle of 60^0 with the free surface of the water. The base of the plate is parallel to water surface and is at a depth of 3.0m from water surface.

(OR)

5. (a) Define centre of pressure and pressure diagram.

   (b) A 6m deep tank contains 4m of water and 2m of oil of relative density 0.88. Determine the pressure at the bottom of the tank.

UNIT-III

6. (a) Describe stream line and stream tube with the help of neat sketches.

(b) For steady incompressible flow verify whether the following values of u and v are possible.

(i) $u = 4xy + y^2$, $v = 6xy + 3x$

(ii) $u = 2x^2 + y^2$, $v = -4xy$

(iii) $u = -x/(x^2+y^2)$, $v = -y/(x^2+y^2)$

(OR)

7. (a) Differentiate between laminar flow and turbulent flows, and rotational and irrotational flows.

(b) i) Derive the continuity equation from fundamentals.

ii)Determine whether the following velocity components satisfy the continuity equation. $u = cx$, $v = -cy$ $u = -cx/y$, $v = c \log xy$

UNIT-IV

8. (a) What are the surface and body forces? State the Bernoulli's equation and discuss the significance of different terms.

(b) A pipe line tapers from 1.5m in diameter at higher end to 1.0 m diameter at lower end in 400m length at a slope of 1 in 100. The pressure at the higher end is 75 KPa. If the discharge is 60 m^3 / minute, find the pressure at lower end. Neglect losses.

(OR)

9. (a) Draw neat sketch of Reynold's apparatus and explain how the laminar flow can be demonstrated with the help of the apparatus.

(b) Two parallel plates kept 100 mm apart having laminar flow of oil between them with a maximum velocity of 1.5 m/sec. Calculate discharge per meter width, shear stress at the plates and the difference in pressure between two points 20 m apart. Assume viscosity of oil to be 0.0245 poise.

UNIT-V

10. (a) Explain the working of a venturimeter with a neat sketch.

(b) Two reservoirs with a difference in water surface elevations of 10m are connected by a pipe line ABC which consists of two pipes of AB and BC joined in series. Pipe AB is 10cm in diameter, 20m long and has a value of f = 0.02. Pipe BC is of 16cm diameter, 25m long and has f = 0.018. The junctions with the reservoirs and between the pipes are abrupt. Calculate the discharge considering all minor losses.

(OR)

11. (a) List out the minor losses in closed conduit flow and discuss their significance

(b) A 6 cm diameter pipe has a discharge of 450 1/min. At a section the pipe has a sudden expansion to a size of 9 cm diameter. If the pressure just upstream of the expansion is 20 kN/m^2, calculate the pressure just after the expansion. Assume the pipe to be horizontal.

AR13 SET 02

CODE: 13EE2006

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech. I Semester Regular/Supplementary Examinations, December, 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 do you mean by equipotential surfaces?
   (b) Define Divergence theorem.
   (c) Give the expression for energy stored in static electric field.
   (d) Define relaxation time.
   (e) What is difference between scalar magnetic potential and vector magnetic potential.
   (f) Define dipole and dipole movement
   (g) State Stoke's theorem.
   (h) Define magnetic-field intensity and give its relation with magnetic flux density.
   (i) What do you mean by homogeneous and isotropic medium?
   (j) What is displacement current? Does it exist in conductor or not?

PART – B

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

UNIT-I

2. a) Explain the physical significance of dot and cross products.
   b) For a rector field **A**, Scalar field V, show explicitly that $\nabla.\nabla X\boldsymbol{A} = 0,\ \nabla X\nabla V = 0.$

(OR)

3. a) State and prove the Gauss's law. $\nabla.\vec{D} = P$
   b) The concentrated charges of 0.25 μC are placed at the vertices of an equilateral triangle whose side is 100mm.Determine the magnitude and direction of the resultant force on one charge due to others.

UNIT-II

4. Two extensive homogeneous isotropic dielectrics meet on plane z = 0. For $z \geq 0$, $\varepsilon_{r1} = 4$ and for $z \leq 0$, $\varepsilon_{r2} = 3$. A uniform electric field E1 = $5a_x$ - $2a_y$ + $3a_z$ kV/m exists for $z \geq 0$. Find
   (a) E_2 for $z \leq 0$
   (b) The angles E_1 and E_2 make with the interface
   (c) The energy densities in J/m^3 in both dielectrics
   (d) The energy within a cube of side 2 m centred at (3, 4, -5)

(OR)

5. a) Solve Laplace's equation by separation of variables in spherical coordinate systems (assuming there is no dependence on φ-azimuthal symmetry).
   b) Derive the expression for capacitance of a coaxial cable with composite dielectric.

UNIT-III

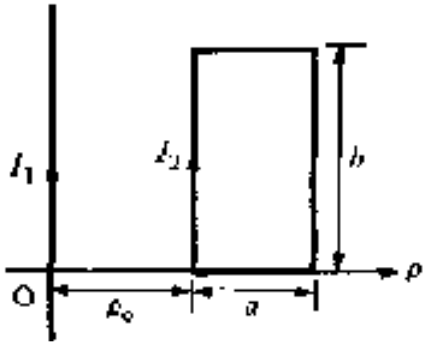
6. a) Derive an expression for magnetic field intensity at a distance 'h' above the centre of a circular loop of wire with 'r' meter radius. The loop carries a current of one ampere.
   b) A circular loop located on $x^2 + y^2 = 9$, $z = 0$ carries a direct current of 10 A along a_φ. Determine H at (0, 0, 4) and (0, 0, -4).

(OR)

7. (a) State and explain point form of Ampere circuital law
   (b) Plane $y = 1$ carries current $K = 50a_z$ mA/m. Find H at (i) (0,0,0) and (ii) (1,5,-3)

UNIT-IV

8.(a) State and explain Lorentz's force equation.
(b) A rectangular loop carrying current I_2 is placed parallel to an infinitely long filamentary wire carrying current I_1 as shown in the figure below. Find out the force experienced by the current loop.



(OR)

9. (a) Differentiate between torque and dipole moment
   (b). Determine the inductance per unit length of a two-wire transmission line with separation distance *d.* Each wire has radius *a.*

UNIT-V

10. Derive the Maxwell's equations in point and integral form for time varying fields? Define Faraday's law, co-relate the same with Maxwell's equation.

(OR)

11. What is Poynting vector? What is the significance of Poynting vector? Show that power loss in a conductor is given as product of voltage and current using Poynting theorem.

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Code: 13ME2007 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Regular/Supplementary Examinations, December, 2015
THERMODYNAMICS
(MECHANICAL ENGINEERIG)

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

PART – A

Answer all questions **[1 x 10 = 10M]**

1. a) Define control volume and control mass systems.
   b) Define Thermodynamic system and surroundings
   c) What is steady flow process?
   d) Define COP of refrigerator.
   e) Define reversible process.
   f) Define dead state and useful work.
   g) What is Helmholtz function?
   h) Define characteristic gas constant and write the units.
   i) What is DBT and WBT?
   j) Define mean effective pressure.

PART-B

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

UNIT- I

2. (a) Define thermodynamic property, state, path, process and cycle. [6M]
   (b) Given that the ice point is 0^0C and 32^0F and the steam point is 100^0C and 212^0F, set up a correlation between the Celsius and Fahrenheit scales. Determine the temperature at which Celsius and Fahrenheit scales have the same numerical value. [6M]

(OR)

3. (a) Show that stored energy is a property of the system. [6M]
   (b) 2 kg of an ideal gas is compressed adiabatically from pressure 100 kPa and temperature 220 K to a final pressure of 400 kPa. Make calculations for (i) initial volume, (ii) final volume and temperature, (iii) work performed, (iv) heat added to or subtracted from the system and (v) change in internal energy and enthalpy. Assume c_p = 1kJ/kgK and c_v = 0.707 kJ/kgK for ideal gas. [6M]

UNIT- II

4. (a) What are the limitations of the first Law of thermodynamics? [3M]
   (b) A steam turbine operates under steady flow conditions receiving steam at the pressure of 15 bar, internal energy 2700 kJ/kg, specific volume 0.17 m^3 and velocity 100 m/s and the exhaust of the steam from the turbine is at 0.1 bar with internal energy 2175 kJ/kg, specific volume 15 m^3/kg and velocity 300 m/s. The intake is 3m above the exhaust. The turbine develops 35 kW and heat loss over the surface of turbine is 20 kJ/kg. Determine the steam flow rate through the turbine. [9M]

(OR)

5. (a) State the Kelvin-Planck and Clausius statements and establish equivalence between them. [6M]

   (b) A reversible heat engine operates between reservoirs at 420K and 280K. If output from the engine is 2.5kJ, determine the efficiency of the engine and its heat interactions with the heat reservoirs. Subsequently the engine is reversed and made to operate as heat pump between the same reservoirs, Make calculations for the C.O.P of the heat pump and power input required when the heat transfer rate from the280K reservoir is 5 kW. [6M]

UNIT- III

6. (a) Derive an expression for available energy form finite energy source at temperature T, when the environment temperature is T_0.

   (b) Air at 1 bar and 27^0C is heated in a non-flow system at constant pressure to 177^0C. Heat is supplied from a constant temperature reservoir at 577^0C. The atmospheric temperature is 20^0C. what percentage of heat added per kg of air is the available energy? [6M]

(OR)

7. (a) Draw the P-V and T-S diagrams for the pure substance undergoing various phases. [6M]

   (b) Find the specific volume, enthalpy, internal energy and entropy of wet steam at 15 bar pressure and dryness fraction 0.8. [6M]

UNIT- IV

8. (a) Show that the product of gas constatnt and molecular mass has the same value for all gases. [6M]

   (b) Determine the gas constant, density and partial pressure of components of a gas mixture consisting of 10 mass fractions of air and 1 mass fractions of lighting gas. Take density of lighting gas is 0.5 kg/m^3 at 1.01325 bar and 273K temperature. [6M]

(OR)

9. (a) Define Specific humidity, Relative humidity, and Degree of Saturation, [6M]

   (b) The air supplied to an air-conditioned room is noted to be at temperature 20^0C and specific humidity 0.0085. Corresponding to these conditions, determine the partial pressure of vapour, relative humidity. Take barometric or total pressure=1.0132 bar. [6M]

UNIT- IV

10. (a) Derive an expression for the air standard efficiency and mean effective pressure of an Otto cycle. [6M]

    (b) In an air standard diesel cycle with compression ratio 14, the condition of air at the start of compression stroke are 1 bar and 300 K. After addition of heat at constant pressure, the temperature raises to 2775K. Determine the thermal efficiency of the cycle, net work done per kg of air and the mean effective pressure. [6M]

(OR)

11. In an air standard duel cycle. The pressure and temperature at the beginning of compression are 1bar and 57^0C respectively. The heat supplied in the cycle is 1250kJ/kg, two third of this being added at constant volume and rest at constant pressure. If the compression ratio is 16. Determine the maximum pressure, temperature in the cycle, thermal efficiency and mean effective pressure. [12M]

AR13

Code: 13EE2007 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Regular/Supplementary Examinations, December, 2015

NETWORK ANALYSIS

(Electronics and Communication Engineering)

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

PART – A

Answer all questions **[1 x 10 = 10M]**

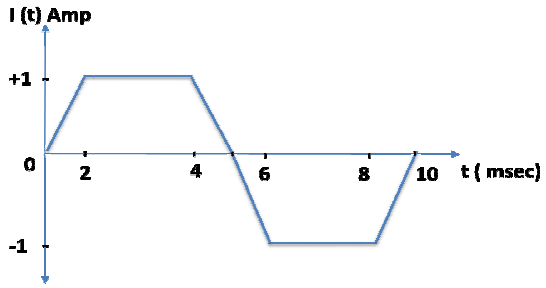
1. Define the following
   a) Ohm's Law
   b) Electromotive Force
   c) Form Factor
   d) Incidence Matrix
   e) Coefficient of Coupling
   f) Quality Factor
   g) Tellegens Theorem
   h) Transmission Parameters
   i) Steady state equivalent circuit of series RLC circuit.
   j) Band Pass Filter

PART– B

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

UNIT – I

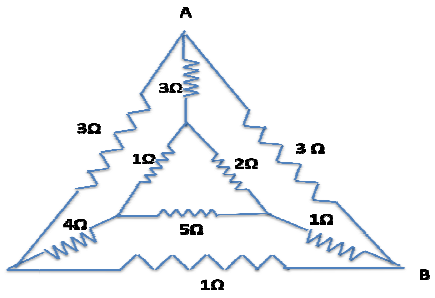
2. a. The current wave form shown is passed through an inductance of 3mH. Determine the voltage V (t) across the inductor.



b. Differentiate Ideal and Practical energy sources.

(OR)

3. Find the equivalent resistance across AB for the network shown below.



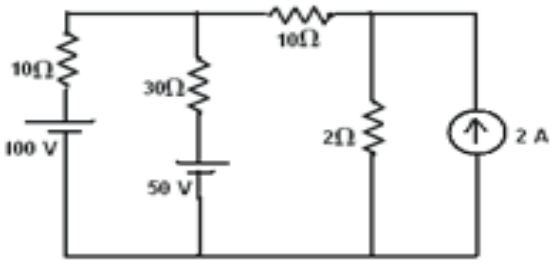
AR13

Code: 13EE2007 **SET-2**

UNIT – II

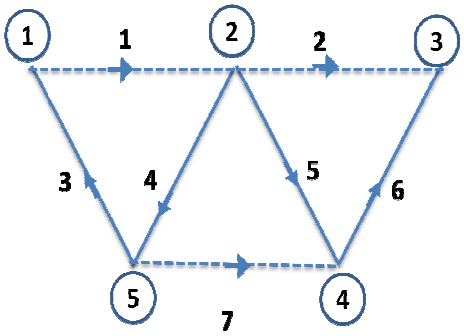
4. a. Define Average value, RMS value and significance of Phase sequence.

   b. Draw a linear oriented graph, tree and cotree circuit shown in figure. Obtain the current equations from the tie set matrix.



(OR)

5. a. For the graph shown below develop the tie set and cut set matrices. Also obtain the KCL and KVL equations. (The dotted lines represent links and bold lines twigs).



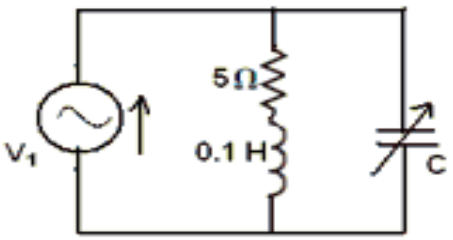
   b. Determine form factor and peak factor of a sinusoidal voltage of magnitude 100V and frequency 50Hz.

UNIT – III

6. A 50 V RMS, 500 Hz supply is applied to a capacitor in series with a 200 Ω resistor produces a 60 mA circuit current. Calculate capacitance of the capacitor, the resistor voltage, the capacitor voltage and the phase angle of the current with respect to the supply voltage. Represent the phasor diagram.

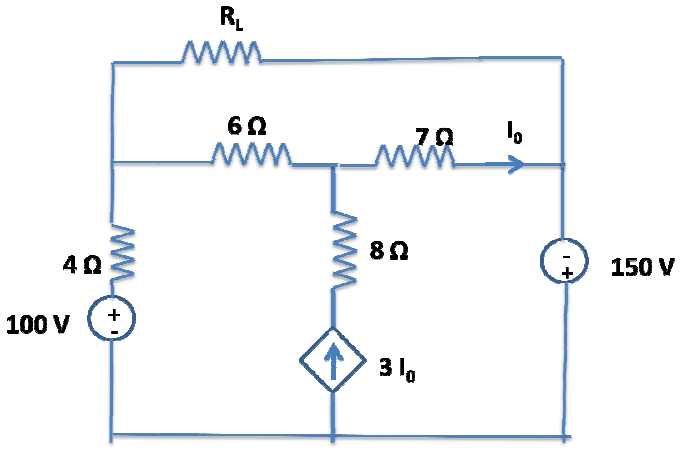
(OR)

7. The circuit shown in figure is to be tuned to resonance at frequencies ranging from 100 kHz to 900 kHz. Determine the required range of adjustment of capacitor, range of Q – factor and bandwidth.

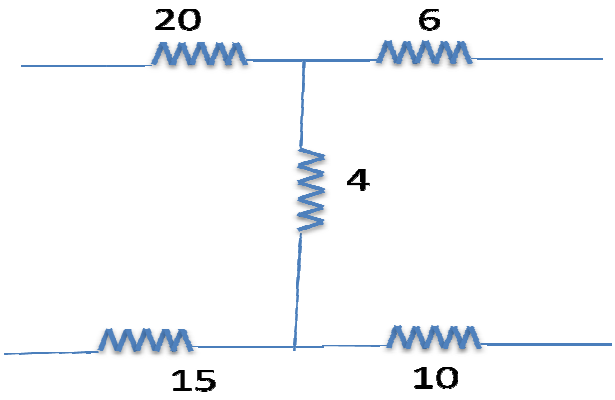


UNIT – IV

8. a. For the following circuit find the value of R_L to deliver the maximum power.

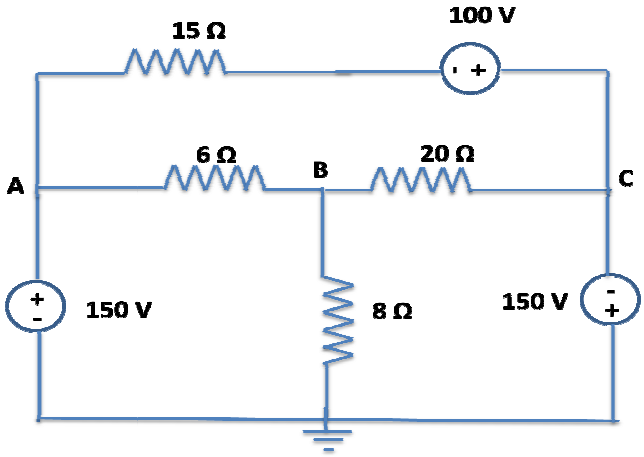


b. Find the image parameters for the following circuit. All resistors are in ohms.



(OR)

9. a. Find the current flowing through 20Ω in the following circuit by using super position theorem.



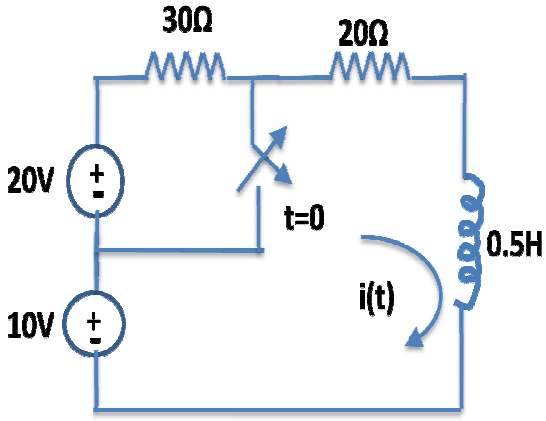
b. A two port network has the following transmission parameters A=1.5, B = 50Ω, C = 0.001 ohms, D=2. Calculate the Z-Parameters of the network.

AR13

Code: 13EE2007 **SET-2**

UNIT – V

10. The Network shown reached steady state with switch closed. Now the switch is opened at t=0. Find i(t) for t>0.



(OR)

11. A K-constant low pass filter has 2.4 kHz cut-off frequency and the design resistance R_0 = 650. Design the filter and determine at which this filter would give 20dB attenuation. Also, calculate its characteristic impedance, phase shift constant.

AR13

Code: 13EE2003 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech. I Semester Regular/Supplementary Examinations, December, 2015

ELECTRICAL AND ELECTRONICS ENGINEERING
(Common to CSE & IT Branches)

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

PART – A

Answer all questions **[1 x 10 = 10M]**

1. a) Define alternating current.
   b) Define Kirchhoff's current Law
   c) What is EMF equation of a dc generator?
   d) What are the losses present in DC motor?
   e) Condition for maximum efficiency of a 1-ϕ trans former
   f) Synchronous speed of induction motor.
   g) What are indicating instruments?
   h) Which type of meters is used for PMMC instruments?
   i) How many junctions are present in a transistor?
   j) Draw V-I characteristics of SCR.

PART – B

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

UNIT-I

2. a) Two resistances when they are in series have an equivalent resistance of 9 ohms and when connected in parallel have an equivalent resistance of 2 ohms. Find the two resistances.
   b) Calculate the value of resistance 'R' in the figure1 (b). Assume all the resistances values are in ohms. **[6M+6M]**

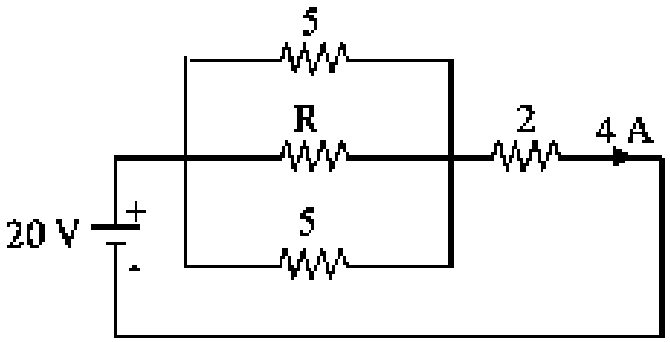


Figure 1(b)

(OR)

3.a) Derive the relationship between the star- delta transformations of a network?
   b) Three resistors of 50 Ω, 100Ω, and 150Ω are joined in parallel. If the current in 100Ω resistor is 5A. What is the current in other resistors and total current? What is the voltage across each resistor? **[6M+6M]**

AR13

Code: 13EE2003 **SET-2**

UNIT-II

4 a) List and explain different types of DC motors. Also mention their applications
. b) Calculate the e.m.f. generated by a 4-pole wave-wound generator having 65 slots with 12 conductors per slot when driven at 1200 r.p.m. The flux per pole is 0.02 Wb. **[6M+6M]**

(OR)

5. a) Derive the expression for EMF generated by DC Generator
b) What is the need of a starter? Draw and explain the operation of a three-point starter. **[6M+6M]**

UNIT-III

6. a) What is a transformer? Explain the operation of a single-phase transformer.
b) A 2000/200 V, 20 kVA transformer has 66 turns in the secondary. Calculate i) primary turns ii) primary and secondary full-load currents. **[6M+6M]**

(OR)

7 a) Explain the principle of operation of an alternator.
b) What is slip? A 6-pole, 3-phase induction motor is connected to 50 Hz supply. If it is running at 960 r.p.m., find the slip. **[6M+6M]**

UNIT-IV

8. Explain the operation of a PMMC instrument with neat sketch. **[12M]**

(OR)

9. What are the classifications of moving iron instruments? Explain the operation of attraction type of moving iron instrument with neat sketch. **[12M]**

UNIT-V

10. a) Compare half wave and full wave rectifiers.
b) Explain the operation of NPN and PNP transistors. **[6M+6M]**

(OR)

11. a) Draw and explain V-I characteristics of the SCR?
b) Explain constructional details of PN junction diode **[6M+6M]**

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