AR13

CODE: 13CE2004 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, March-2017
FLUID MECHANICS
(Civil Engineering)

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

PART-A

ANSWER ALL QUESTIONS **[1 x 10 = 10 M]**

1. a) Define vapour pressure and state its units.
   b) What is a path line?
   c) Define Gauge pressure and Absolute pressure.
   d) Differentiate between rotational and irrotational flow.
   e) State Newton's law of viscosity.
   f) What is meant by flow net?
   g) State the principle behind the functioning of venturimeter.
   h) What is a weir? How are weirs classified?
   i) What is a compound pipe?
   j) Explain the term Hydraulic gradient.

PART-B

Answer one question from each unit [5x12=60M]

UNIT-I

2. a Explain the terms Intensity of pressure and pressure head. 4
   b Convert the pressure head of 15m of water to (i) m of oil of specific gravity 0.75 (ii) m of mercury of specific gravity 13.6 8

(OR)

3. a Prove that pressure is same in all directions at a point in a static fluid. 6
   b Find the kinematic viscosity of oil having density 981 kg/m^3. The shear stress is 0.245N/m^2 and velocity gradient is 0.2 per sec at a point. 6

UNIT-II

4. a A rectangular tank of 4m long, 1.5m wide contains water up to a height of 2m. Calculate the force due to water pressure on the base of the tank. Find also the depth of centre of pressure from the free surface. 6
   b Explain how you would find the resultant pressure on a curved surface immersed in liquid. 6

(OR)

5. a Derive an expression for the depth of centre of pressure of an inclined plane surface submerged in liquid. 6
   b A rectangular plane surface 1m wide and 3m deep lies in water in such a way that its plane makes an angle of 30^0 with the free surface of water. Determine the total pressure and position of centre of pressure when the upper edge of the plate is 2m below the free water surface. 6

UNIT-III

6.	a	Explain the terms (i) Velocity potential function (ii) Stream function (iii) Steady and unsteady flow	4
	b	The velocity components in a two- dimensional flow field for an incompressible fluid are expressed as $u = 2x - x^2y + y^3/3$; $v = xy^2 - 2y - x^3/3$ (i) Show that these functions represent a possible case of an irrotational flow. (ii) Obtain an expression for stream function(Ψ)	8

(OR)

7.	a	What are the methods of describing fluid flow?	4
	b	If for a two- dimensional potential flow, the velocity potential is given by $\emptyset = 4x(3y-4)$. Determine the value of stream function (Ψ) at the point (2, 3).	8

UNIT-IV

8.	a	Explain the significance of Reynolds number in characterizing the type of flow.	4
	b	A pipe of diameter 400mm carries water at a velocity of 25m/s. The pressures at points A and B are 29.43N/cm^2 and 22.56N/cm^2 while the datum head A and B are 28m and 30m. Find the loss of head between A and B.	8

(OR)

9.	a	Derive an expression for mean velocity for laminar flow between plates.	6
	b	Water is flowing through a pipe having diameters 20cm and 10cm at sections 1 and 2 respectively. The rate of flow is 35 lt/sec. The section 1 is 6m above datum and section 2 is 4m above datum. If the pressure at section 1 is 39.24N/cm^2. Find the intensity of pressure at section 2.	6

UNIT-V

10.	a	Describe with the help of a sketch, construction, operation and use of pitot-tube.	6
	b	The rate of flow of water through a horizontal pipe is 0.3m^3/s. The diameter of the pipe is suddenly enlarged from 250mm to 500mm. The pressure intensity in the smaller pipe is 13.734N/cm^2. Determine (i) loss of head due to sudden enlargement (ii) pressure intensity in the large pipe (iii) power lost due to enlargement.	6

(OR)

11.	a	What is a venturimeter? Derive an expression for discharge through venturimeter.	6
	b	An oil of specific gravity of 0.9 and viscosity 0.06 poise is flowing through pipe of diameter 200mm at the rate of 60 lt/sec. Find the head loss due to friction for a length of 500m length of the pipe. Find the power required to maintain this flow.	6

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AR13 SET 01

CODE: 13EE2006

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Supplementary Examinations, March-2017
ELECTRO MAGNETIC FIELDS
(Electrical & Electronics Engineering)

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

PART-A
PART – B

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

UNIT-I

2

b) Using guss's law, find **E** at any point due to long infinite charged wire. [6M]

B. Infinite Line Charge

Suppose the infinite line of uniform charge ρ_L C/m lies along the z axis. To determine **D** at a point P, we choose a cylindrical surface containing P to satisfy symmetry condition as shown in Figure 4.14. **D** is constant on and normal to the cylindrical Gaussian surface; that is, $\mathbf{D} = D_\rho \mathbf{a}_\rho$. If we apply Gauss's law to an arbitrary length ℓ of the line

$$\rho_L \ell = Q = \oint \mathbf{D} \cdot d\mathbf{S} = D_\rho \int_{\text{top}} dS = D_\rho \, 2\pi\rho\ell \qquad (4.46)$$

where $\oint dS = 2\pi\rho\ell$ is the surface area of the Gaussian surface. Note that $\int \mathbf{D} \cdot d\mathbf{S}$ evaluated on the top and bottom surfaces of the cylinder is zero since **D** has no z-component; that means that **D** is tangential to those surfaces. Thus

$$\mathbf{D} = \frac{\rho_L}{2\pi\rho} \mathbf{a}_\rho \qquad (4.47)$$

as expected from eqs. (4.27) and (4.35).

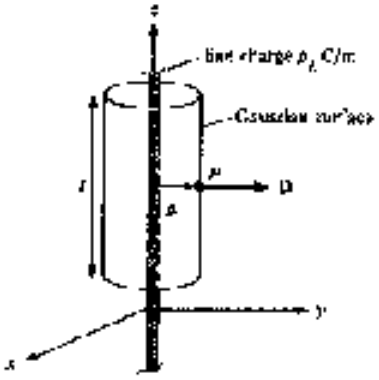


Figure 4.14 Gaussian surface about an infinite line charge.

9 Derive the expression for torque produce on a rectangular current loop, if placed in a magnetic field **B.** show that **T = m** x **B** also hold for the system [12M]

Now that we have considered the force on a current loop in a magnetic field, we can determine the torque on it. The concept of a current loop experiencing a torque in a magnetic field is of paramount importance in understanding the behavior of orbiting charged particles, d.c. motors, and generators. If the loop is placed parallel to a magnetic field, it experiences a force that tends to rotate it.

The torque T (or mechanical moment of force) on the loop is the vector product of the force F and the moment arm r.

That is,

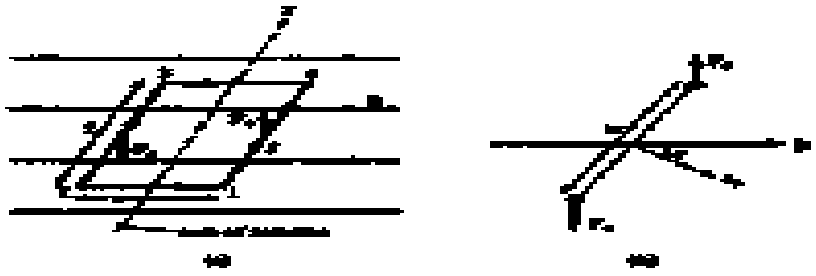
$$\mathbf{T} = \mathbf{r} \times \mathbf{F} \tag{8.14}$$

and its units are Newton-meters (N · m).

Let us apply this to a rectangular loop of length ℓ and width w placed in a uniform magnetic field **B** as shown in Figure 8.5(a). From this figure, we notice that $d\mathbf{l}$ is parallel to **B** along sides 12 and 34 of the loop and no force is exerted on those sides. Thus

$$\mathbf{F} = I \int_2^3 d\mathbf{l} \times \mathbf{B} + I \int_4^1 d\mathbf{l} \times \mathbf{B}$$

$$= I \int_0^{\ell} dz\, \mathbf{a}_z \times \mathbf{B} + I \int_{\ell}^0 dz\, \mathbf{a}_z \times \mathbf{B}$$



(a) (b)

Figure 8.5 Rectangular planar loop in a uniform magnetic field.

As

$$\mathbf{F} = \mathbf{F}_{23} - \mathbf{F}_{23} = \mathbf{0} \tag{8.15}$$

since $|\mathbf{B}_2| = |\mathbf{B}_4|$ because **B** is uniform. Thus, no force is exerted on the loop as a whole. However, $\mathbf{F}_{23}$ and $-\mathbf{F}_{23}$ act at different points on the loop, thereby causing a couple. If the normal to the plane of the loop makes an angle α with **B**, as shown in the cross-sectional view of Figure 8.5(b), the torque on the loop is

$$|\mathbf{T}| = |\mathbf{F}_{23}| = nbs\, \sin\alpha$$

or

$$T = BIS \sin\alpha \tag{8.16}$$

But $I = \mathcal{I}$, the area of the loop. Hence,

$$T = BIS \sin\alpha \tag{8.17}$$

We define the quantity

$$\mathbf{m} = I\mathcal{S}\mathbf{a}_n \tag{8.18}$$

as the *magnetic dipole moment* (in A/m^2) of the loop. In eq. (8.18), $\mathbf{a}_n$ is a unit normal vector to the plane of the loop and its direction is determined by the right-hand rule: fingers in the direction of current and thumb along $\mathbf{a}_n$.

The magnetic dipole moment is the product of current and area of the loop; its direction is normal to the loop.

Introducing eq. (8.18) in eq. (8.17), we obtain

$$\mathbf{T} = \mathbf{m} \times \mathbf{B} \tag{8.19}$$

AR13 SET 01

CODE: 13ME2007

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Supplementary Examinations, March-2017
THERMODYNAMICS
(Mechanical Engineering)

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

PART-A

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

1. a) Differentiate between extensive and intensive property.
   b) Differentiate between point function and path function.
   c) State the 'Zeroth law of Thermodynamics'.
   d) State Clausius inequality.
   e) Differentiate between refrigerator and heat pump.
   f) What is meant by latent heat of vaporization?
   g) What do you understand by critical point?
   h) Define 'Mole fraction'.
   i) Differentiate between relative and specific humidity.
   j) What is adiabatic evaporative cooling?

PART-B

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

UNIT-I

2. (a) Prove that energy is a property of the system.
   (b) A rigid container has 0.75 kg water at 300°C, 1200 kPa. The water is now cooled to a final pressure of 300 kPa. Find the final temperature, the work and the heat transfer in the process.

(OR)

3. (a) Briefly explain the following
   i. Point and path function
   ii.Quasi-static process
   (b) A constant pressure piston cylinder contains 0.2 kg water as saturated vapor at 400 kPa. It is now cooled so the water occupies half the original volume. Find the work in the process.

UNIT-II

4. (a) Explain the term 'Exergy'.
   (b) A liquid water turbine receives 2 kg/s water at 2000 kPa, 20°C and velocity of 15m/s. The exit is at 100 kPa, 20°C and very low velocity. Find the specific work and the power produced.

(OR)

5. (a) State Clausius statement of second law of thermodynamics
   (b Apply steady flow energy equation for steady flow devices.

UNIT – III

6. (a) A constant pressure piston/cylinder contains 2 kg of water at 5 MPa and 100°C. Heat is added from a reservoir at 700°C to the water until it reaches 700°C. We want to find the total irreversibility in the process. Assume ambient temperature to be 25°C.
   (b) Saturated (liquid + vapor) water at 60°C is contained in a rigid steel tank. It is used in an experiment, where it should pass through the critical point when the system is heated. What should the initial mass fraction of liquid be?

(OR)

7. A Vessel of volume 0.04 m^3 contains a mixture of saturated water and saturated steam at a temperature of 250^0C. the mass of the liquid present is 9 kg. Find the pressure, the mass, the specific volume, the enthalpy, the entropy, and the internal energy.

UNIT – IV

8. During an air-conditioning process, 27m^3/min of conditioned air at 18°C and 30 percent relative humidity is mixed adiabatically with 9m^3/min of outside air at 27°C and 90 percent relative humidity at a pressure of 1 atm. Determine (*a*) the temperature, (*b*) the specific humidity, and(*c*) the relative humidity of the mixture.

(OR)

9. The dry- and the wet-bulb temperatures of atmospheric air at 1 atm (101.325 kPa) pressure are measured with a sling psychrometer and determined to be 25 and 15°C, respectively. Determine (*a*) the specific humidity, (*b*) the relative humidity, and (*c*) the enthalpy of the air.

UNIT – V

10. Show that the efficiency of the Otto cycle depends only on the compression ratio .

(OR)

11. At the beginning of the compression process of an air-standard dual cycle with a compression ratio of 18, the temperature is 300 K and pressure is 100 kPa. The pressure ratio for the constant volume part of the heating process is 1.5. The cut-off ratio is 1.2. Determine the thermal efficiency and the mean effective pressure.

AR13

Code: 13EE2007 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Supplementary Examinations, March-2017
NETWORK ANALYSIS
(Electronics and Communication Engineering)

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

PART– A

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

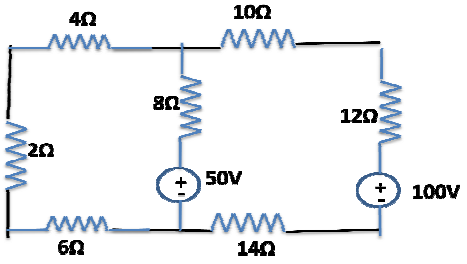
1. Define the following
   a) Ideal & Practical Voltage Source
   b) Capacitance
   c) RMS value
   d) Tree
   e) Impedance
   f) Resonance
   g) Reciprocity Theorem
   h) Open Circuit Parameters
   i) Ideal initial conditions of RL circuit
   j) Band Elimination Filters

PART– B

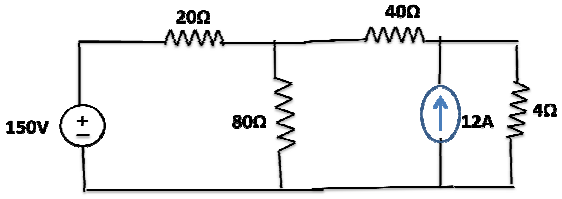
Answer one question from each Unit **[5 x 12=60M]**

UNIT – I

2. a) Using Mesh analysis, determine the current through 8Ω resistor. Also determine the power received by 12 Ω resistors.

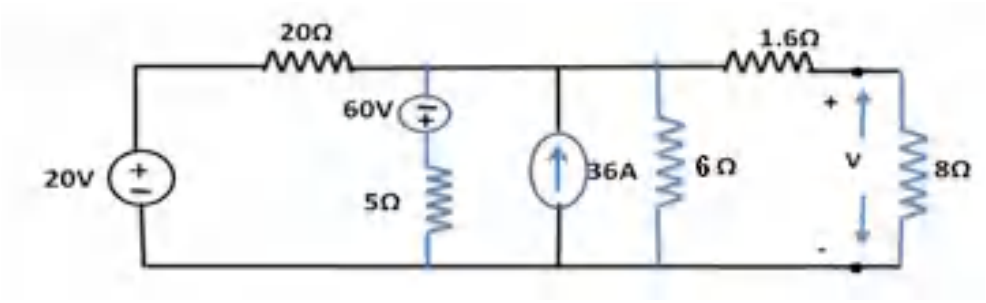


b. Use Nodal analysis to determine the current through 40 Ω resistor in the circuit given below.



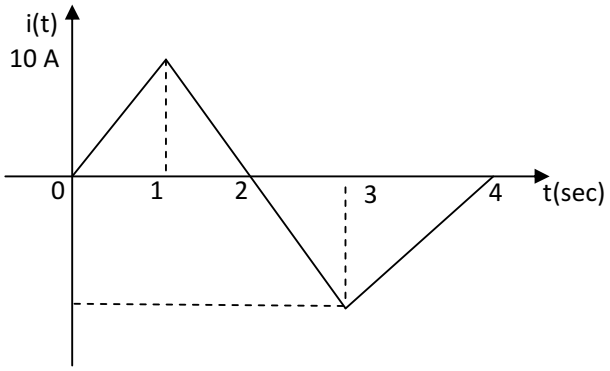
(OR)

3. Use a series of source transformations to find the voltage V in the circuit.

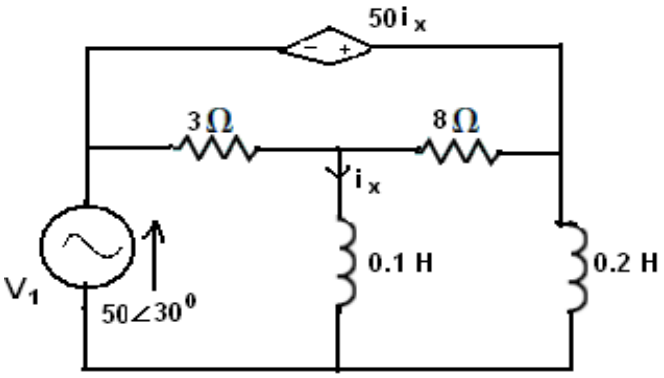


UNIT – II

4. a. Find the RMS value, average value, peak factor and form factor for the waveform shown below.

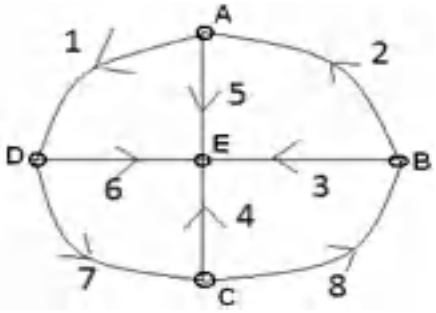


b. Draw a linear oriented graph, tree and cotree for the circuit in figure. Develop incidace matrix.



(OR)

5. For the graph shown given below, develop the cut-set & Tie set matrices



AR13

Code: 13EE2007 **SET-1**

UNIT – III

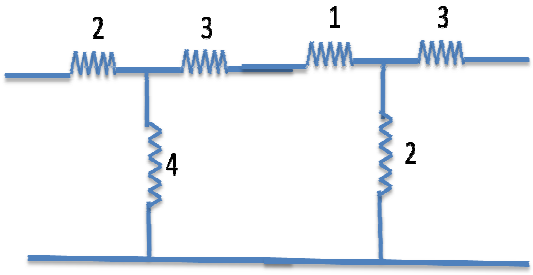
6. An inductance with L = 300 μH and R = 5 Ω is connected in parallel with a capacitor having c=300 pF. Determine circuit impedance at resonance. If circuit is excited by 100 V source find current in inductor and capacitor at resonance.

(OR)

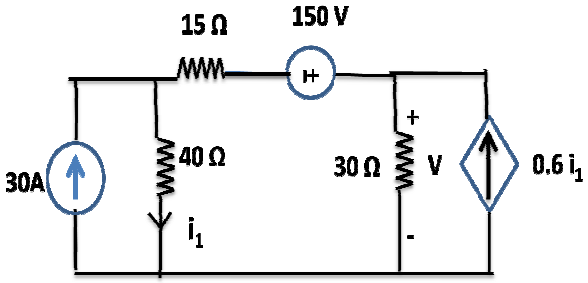
7. A 200 mH inductor is connected in series with a 2 μF capacitor and a 200 Ω resistor is excited by 230 V RMS, 50 Hz supply. Calculate the circuit current and its phase angle with respect to supply voltage. The resistor value is to be adjusted to give an inductor terminal voltage of 7.5 V. Calculate the appropriate resistor value.

UNIT – IV

8. a. Compute T parameters for the following network. All resistors are in ohms.

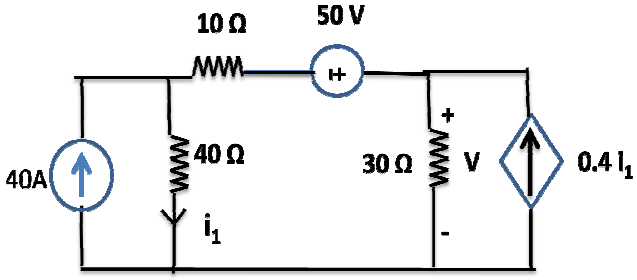


b. Find i_1 by using Thevenin's theorem for the following Network.



(OR)

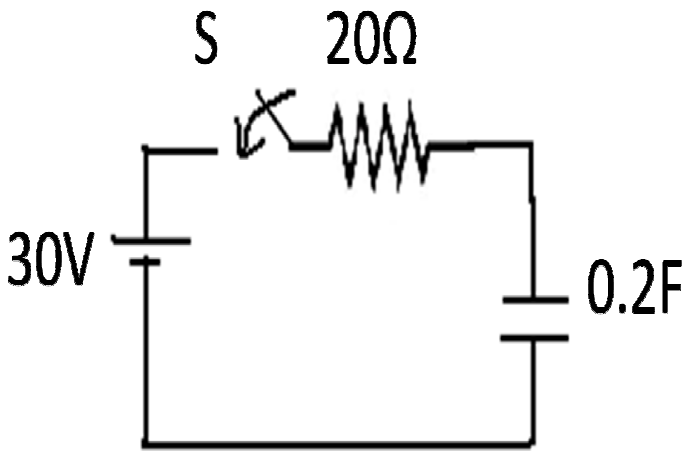
9. a. Find I for the following circuit by using superposition theorem and verify the result by using Nodal analysis.



b. Draw a 2-port network whose Y – parameters are $Y_{11} = - Y_{12} = Y_{21} = -Y_{22} = 1$ Mhos.

UNIT – V

10. A series RC circuit consists of R = 20 Ω and C = 0.2 F as shown in Fig. A constant voltage of 30V is applied to the circuit at t=0. Determine voltages across R & C. Also obtain V_c (t) at t = 1.5 sec for t>0.



(OR)

11. A K-constant high pass filter has 13 kHz cut-off frequency and the design resistance R_0 = 600 ohms. Design the T and π − section of this filter.

AR13

Code: 13EE2003 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Supplementary Examinations, March-2017

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 electric potential difference
   b) Define Kirchhoff's voltage Law
   c) What is voltage regulation of a transformer?
   d) Why do you use three point starters in D.C motor?
   e) What purpose do you use synchronous impedance method in an alternator?
   f) EMF equation of a 1-ϕ trans former
   g) What are the differences between MI&MC type instruments
   h) Which type of meters is used for PMMI instruments?
   i) Draw static characteristics of Diode.
   j) How many junctions are present in a SCR?

PART – B

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

UNIT-I

2. a) A coil takes 4 A when connected to 24 A dc supply. If this coil is connected to 40 V, 50 Hz ac supply then same amount of power is consumed. Calculate inductance of the coil And phase angle between voltage and current.
   b) If the total power dissipated in the circuit shown in figure1 (b) is 40W. Find the value of R and current through each resistor. Assume all resistances values in ohms

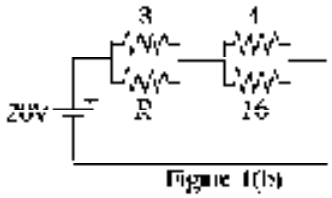


Figure 1(b)

[6M+6M]

(OR)

3 a) State and explain Kirchhoff's laws with relevant circuit diagram.
   b) Three resistances 2 ohms, 4 ohms and 6 ohms are connected in series across 24V supply. Find the voltages across three resistors and current through each resistor. **[6M+6M]**

AR13

Code: 13EE2003 **SET-1**

UNIT-II

4. a) What are the various types of generators? How they are classified? Draw their circuit diagrams.
   b) A 6-pole, lap wound armature has 840 conductors and flux per pole of 0.018 wb. Calculate the emf generated when the machine is running at 600 rpm. **[6M+6M]**

(OR)

5. a) Derive the expression for EMF generated by DC Generator
   b) Derive the expression for the torque developed by a DC motor. **[6M+6M]**

UNIT-III

6. a) Explain the various losses in a transformer.
   b) Define regulation in alternators and give the expression in synchronous impedance method. **[6M+6M]**

(OR)

7. Describe the principle of operation of a 3- phase induction motor. Derive the relation between stator supply frequency and rotor induced E.M.F.Frequency. **[12M]**

UNIT-IV

8. What is a PMMC instrument? Explain the working of such instrument when used as Ammeter with neat sketch. **[12M]**

(OR)

9) Explain the Principle operation of PMMI type instrument with neat sketch. **[12M]**

UNIT-V

10. a) Compare the working of PNP and NPN transistors?
    b) Give the physical arrangement of a PNP transistor and discuss how it provides current amplification. **[6M+6M]**

(OR)

11. a) Compare half wave and full wave rectifiers.
    b)Draw the V-I characteristic of an P-N Junction diode? **[6M+6M]**

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