DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE — OCTOBER, 2018

FUNDAMENTALS OF AC SYSTEMS

[*Time* : 3 hours

(Maximum marks : 100)

PART — A

(Maximum marks : 10)

Marks

I   Answer *all* questions in one or two sentences. Each question carries 2 marks.

1.   Define form factor of an alternating current.

2.   What will be the power when ac passes through a pure inductance circuit ?

3.   Define phase sequence.

4.   An emf e0 = 230 sin(377t). The frequency of supply is ..... ?

5.   Write the name of two p.f. correction equipments.

(5×2 = 10)

PART — B

(Maximum marks : 30)

II   Answer any *five* of the following questions. Each question carries 6 marks.

1.   Explain the advantages of AC supply system.

2.   What is RMS value in ac ? Derive the equation for RMS value by analytical method.

3.   Draw the voltage, current and power wave forms (wave diagrams) when an alternating current passes through RC series circuit.

4.   Explain the advantages of poly phase system.

5.   Prove that using two wattmeters power in a three phase circuit can be measured.

6.   Explain any one method for improving power factor in an ac circuit.

7.   Define admittance, susceptance and conductance in an ac circuit.   (5×6 = 30)

PART — C

(Maximum marks : 60)

(Answer *one* full question from each unit. Each full question carries 15 marks.)

Unit — I

III   (a)   Derive the equation of alternating voltage.   7

(b)   Define the following terms in alternating current.

(i)   instantaneous value   (ii)   maximum value

(iii)   cycle   (iv)   time period   8

Or

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[P.T.O.

Marks

IV (a) What is Average value in ac ? Derive the average value in ac by analytical method. 7

   (b) An AC series circuit consists of two elements 6 + j0Ω and 12 + j20Ω connected across 100v, 50Hz supply. Calculate current and power comsumption of the circuit in polar form. 8

Unit — II

V (a) Draw and explain the impedance triangle in an ac RLC series circuit and compare with voltage vectors. 7

   (b) An RLC series circuit takes 0.5A current, Voltage drop across inductance 240 V, voltage drop across capacitance is 170V and voltage drop across resistance is 175V, when applying 230V 50Hz supply. Compute inpedance, resistance, inductance and capacitive reactance of the circuit. 8

Or

VI (a) Explain resonance in ac circuit and it's behavior. 7

   (b) An RLC series circuit connected with a source of e (t) = 325sin (314t) consist of a non - inductive resistance of 70Ω, an inductive coil of 500 mh and a capacitor of 10μf. Determine the circuit current, power factor, active power and reactive power of the circuit. 8

Unit — III

VII (a) Prove the relation between line voltage and phase voltage in a 3 phase star connection using vectors. 7

    (b) Compare star and delta connections. 8

Or

VIII (a) Prove the relation between line current and phase current in a 3 phase delta connection using vectors. 7

     (b) In a three phase motor each coil having an impedance of 12 + j16Ω is connected in delta across balanced 400V, 50Hz three phase supply. Calculate power, power factor and current taken by the motor. What will be the current if the motor, connected in star ? 8

Unit — IV

IX (a) Explain one wattmeter method for power measurement in an ac 3 phase circuit with circuit diagram. 7

   (b) Derive an equation to compute reactive power in a three phase circuit using two wattmeters with vector diagram. 8

Or

X (a) Explain the disadvantages of low pf in an ac circuit. How it improved from lag to unity ? 7

   (b) Draw the circuit diagram to measure power in a three phase DELTA connected load using three wattmeter method. What is the difficulty of this method and where it is used ? 8