

ELECTRICAL TECHNOLOGY

(Common to ECE & EIE)

Time: 3 hours

Max. Marks: 70

PART – A

(Compulsory question)

- 1 Answer the following: (10 X 02 = 20 Marks)
- What is meant by floating point neutral?
 - What is meant by phase sequence in poly phase systems?
 - Give the classification of DC Generators?
 - What is the significance of back emf in dc motors?
 - Why OC test conducted on LV side by opening the HV side?
 - Why transformer rating is in KVA not in KW?
 - Define slip and express its relation to rotor frequency?
 - What are the differences between squirrel cage and slip ring induction motor?
 - Define pitch factor and distribution factor.
 - Define Voltage regulation in an Alternator?

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT - I

- 2 (a) Derive the relative expressions between line and phase values of voltage and current in balanced 3-phase 4-wire star connected system.
- (b) A balanced delta-connected 3-phase load has an impedance of $(12 + j16) \Omega$ across each phase. If a 3-phase, 400v source feeds the load, Calculate
- The phase current.
 - The total power consumed.
 - The vector sum of the three currents.

(OR)

- 3 (a) Explain how the three phase power is measured using two wattmeter method and derive the relevant expression.
- (b) A 3-phase, 400 V load has a power factor of 0.4. Two wattmeters connected to measure the power consumed shows the input power to be 24 kW. Find the reading of the individual wattmeters.

UNIT - II

- 4 (a) Explain the magnetization characteristics of dc shunt generator.
- (b) The resistance of the field circuit of a shunt wound dc generator is 200Ω . When the output of the generator is 100 kW, the terminal voltage is 500 V and the generated emf is 525 V. Calculate:
- the armature resistance.
 - the value of the generated emf when the output is 60 kW with a terminal voltage of 520 V.

(OR)

- 5 Explain in detail about the speed control of DC Motors.

UNIT - III

- 6 (a) Explain the principle of operation of a single phase transformer.
(b) A 100 kVA, 11000 V / 400 V, 50 Hz single phase transformer has 40 secondary turns. Calculate number of primary turns, primary and secondary currents.
(OR)
- 7 (a) From fundamentals, derive the expression for EMF of a single phase transformer.
(b) A 7.5 kVA, 2400 V / 120 V transformer was tested by short-circuiting the low voltage side and applying 100 V to the high voltage side. The measured power input was 145 W. Determine the regulation when the load has 0.8 lagging power factors.

UNIT - IV

- 8 (a) Explain the constructional details of three phase induction motor.
(b) If a 3-phase induction motor with 6-poles runs at 970 rpm when connected to a 50 Hz supply, Calculate : (i) The percentage slip. (ii) Frequency of the rotor currents.
(OR)
- 9 (a) Explain the torque-slip characteristics of three phase induction motor.
(b) Derive the expression for maximum torque in induction motor.

UNIT - V

- 10 (a) Derive the emf equation of the Alternator.
(b) A 550 V, 55 kVA, single-phase alternator has an effective resistance of 0.2Ω . A field current of 10 A produces an armature current of 200 A on short-circuit and an emf of 450 V on open circuit. Calculate: (i) the synchronous impedance and reactance. (ii) the full-load regulation when the power factor is 0.8 lagging.
(OR)
- 11 (a) Explain how the voltage regulation is determined using synchronous impedance method.
(b) A 3 phase star connected alternator driven at 900 rpm is required to generate a line voltage of 460 Volts at 60 Hz on open circuit. The slots has 2 slots/pole/phase and 4 conductors/slot. Calculate: (i) the number of poles. (ii) the useful flux per pole.
