

B. CSE 2ND YEAR 2ND SEM. EXAMINATION, 20 15(4th/2nd Semester/Regular/Repeat/Supplementary/Spl. Supplementary/Old/Annual/Bi-Annual)SUBJECT ELECTRICAL TECHNOLOGY - B
(Name in full)

PAPER

Time : ~~Two hours~~/Three hours/~~Four hours~~/Six hoursFull Marks 30/ 100
(15/50 marks for each part)

Use a separate Answer-Script for each part

No. of questions	Answer any five questions (5 × 20)	Marks
Q1 (a)	What is the physical significance of Hysteresis loop of a magnetic characteristics?	6
(b)	An iron ring of mean diameter of 60 cm and a circular cross sectional area of 4cm ² , is wound with a coil of 1200 turns. An air gap of 1.5 mm width is cut in the ring. Determine (a) the current required in the coil to produce a flux of 0.48 mWb in the air gap if the relative permeability of iron under this condition is 800. (b) the flux in the ring if current through the winding is 5A. Neglect leakage and fringing.	10
(c)	Explain how laminating magnetic cores reduces Eddy-current loss.	4
Q2 (a)	A balanced three phase star connected load of (6+j8)Ω per phase is connected to a three phase supply of 400V, 50Hz. Find (i) total active and reactive power consumed (ii) Line and phase currents	8
(b)	A balanced three phase star-connected impedances each with a resistance and a capacitance is connected across a 3-phase 400V, 50Hz supply. The power delivered to the load is measured by two wattmeter method. The readings of the two wattmeters are 800W and 2000W. Find (i) line current (ii) power factor of the circuit (iii) values of the resistance and capacitance (iv) total reactive power in the circuit.	12
Q3 (a)	Explain the principle of generating rotating magnetic field in three phase AC machines. How does this help in the operation of an induction motor?	8
(b)	Derive and explain the torque-speed characteristics of a 3-phase induction machine. Mention various modes of operation over different ranges of speed. What do you mean by breakdown torque in a 3-phase induction motor?	8
(c)	"In a three phase slip ring induction motor external resistances are put in the rotor circuit at start. But when the motor has speeded up this external resistances are shorted out"- Nullify or justify the statement with proper explanation.	4
Q4 (a)	Deduce the induced emf per phase of a synchronous generator. Also explain pitch factor for a short pitched coil.	8
(b)	Why the starting torque in a synchronous motor is zero? What are the steps taken to start a synchronous motor?	5
(c)	Explain the operation of a synchronous motor connected to a constant voltage source and with constant shaft load. In this relation describe the construction of V-curves briefly.	7
Q5 (a)	Draw the phasor diagram of a single phase transformer on no-load. How does this differ in similar characteristics of an ideal transformer?	6
(b)	Open circuit test has been performed on a 2.2KV/ 200 V, 50 Hz single phase	10

transformer. Readings are: 220 V, 0.6A, 361 W. Calculate the two components of the exciting current. If the transformer supplies a load current of 60 A at 0.8 power factor (pf) lagging on its low voltage side then calculate the primary current and its pf. Ignore leakage impedance.

- (c) “When two transformer coils are to be connected in parallel, same polarities should be shorted” –justify or nullify with explanation. 4
- Q6 (a) Establish the relationship between speed and torque in a DC series motor. Draw the torque-speed curve from the deduction. 5
- (b) A DC shunt generator running at rated speed is generating negligible voltage. What are the possible problem(s)? 5
- (c) A 110V DC series motor takes 20A when delivering its rated output at 1600 rpm. Armature resistance plus field resistance is 0.25Ω . What is the value of resistance that should be inserted to reduce the speed by 25%. 10
- Q7 (a) A current of $(10-j7)\text{A}$ flows through a circuit when the voltage applied is $(80+j60)\text{V}$. Find (a) impedance of the circuit (b) power factor (c) power consumed by the circuit (c) reactive power in the circuit (d) elements connected in the circuit (the circuit has only two elements connected in series) 8
- (b) Two branches, with impedances of $(10-j15)\Omega$ and $(6+j8)\Omega$ are connected in parallel. The AC voltage source connected across this parallel combination supplies 16A current. Find the power drawn by each branch. 7
- (c) Explain the half power frequencies of a R–L–C series circuit at resonance. Determine Q-factor in this respect. 5
- Q8 (a) Describe the working principle of a moving coil instrument. Why is it suitable for DC only? 6
- (b) What are the different types of damping provided in electrical measuring instruments? Which one of them is most efficient and why? 7
- (c) A moving coil instrument shows full scale deflection at 20mA. The resistance of the coil is 4Ω . The instrument is to be used as an ammeter to read 10A full scale. How this could be achieved? How this instrument can be used to read up to 150V? 7
- Q9 Write short notes on any two 10x2
- (a) Gravity control and spring control of indicating instruments
- (b) Speed control of DC shunt and series motor
- (c) Synchronizing a synchronous generator to grid