Total No. of Questions—**12**] [Total No. of Printed Pages—**4+1**

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S.E. (Mech./Prod./MS/W/PS/W) (II Sem.) EXAMINATION, 2009

ELECTRICAL TECHNOLOGY

(2003 COURSE)

Time : Three Hours **Maximum Marks : 100**

N.B. :— (*i*) Answers to the two Sections should be written in separate answer-books.

(*ii*) Answer Question No. **1** *or* **2**, Q. No. **3** *or* **4**, Q. No. **5** *or* **6** from Section I and Question No. **7** *or* **8**, Q. No. **9** *or* **10**, Q. No. **11** *or* **12** from Section II.

(*iii*) Figures to the right indicate full marks.

(*iv*) Use of non-programmable pocket size scientific calculator is permitted.

(*v*) Neat diagrams must be drawn wherever necessary.

(*vi*) Assume suitable additional data, if necessary.

SECTION I

1. (*a*) Draw a neat sketch of four pole d.c. machine. Label all the parts and state function of each. [10]

(*b*) Draw and explain electrical and mechanical characteristics of

(*i*) D.C. shunt motor

(*ii*) D.C. series motor. [8]

P.T.O.

Or

2. (*a*) A 200 V d.c. series motor is running at a speed of 800 rpm and draws 100 Amp. Calculate the speed of the motor when it develops half the torque. The armature resistance is 0.06 ohm and that of field is 0.04 ohm and magnetic field is unsaturated. [8]

(*b*) Why is starter necessary for d.c. shunt motor ? Draw a neat diagram and explain working of Three Point Starter. [10]

3. (*a*) Write a short note on "Flood Lighting". [6]

(*b*) Why is power factor improvement necessary ? Explain any *one* method of power factor improvement. [6]

(*c*) State basic requirements of a good lighting scheme. [4]

Or

4. (*a*) What is reactive power ? Explain with the help of circuit diagram and phasor diagram, how single-phase wattmeter is used to measure three-phase reactive power of a balanced load. [10]

(*b*) Three identical coils, each having a resistance of 10 Ω and reactance of 10 Ω are connected in delta across 3-phase 400 V, 50 Hz A.C. Supply. Find the readings of two wattmeters connected to measure the power. [6]

5. (*a*) Derive the expression for distribution factor for alternator. [6]

(*b*) Write a short note on Welding Transformer. [5]

(*c*) Write a short note on Current Transformer. [5]

Or

6. (*a*) For a 3-phase, 4 pole, 50 Hz star connected alternator has 36 slots and there are 20 conductors per slot. If the flux is distributed and sinusoidal, having value of 0.05 Wb, calculate the speed and open circuit line and phase voltage. [8]

(*b*) Write short notes on : [8]

(*i*) Potential transformer

(*ii*) Coil span factor.

SECTION II

7. (*a*) Compare squirrel-cage and slip-ring type rotor construction for three-phase induction motor. [6]

(*b*) A 3-phase 400 volts 8-pole 50 Hz induction motor has full load slip of 4%. The rotor resistance is 0.001 Ω per phase and standstill reactance of 0.005 Ω per phase. Find the ratio of maximum to full load torque and speed at which the maximum torque occurs. [6]

(*c*) List speed control methods of 3-phase induction motor and explain any *one* of them. [6]

Or

8. (*a*) Sketch the following for 3-phase induction motor :

(*i*) Torque slip character is with effect of variation in rotor resistance

(*ii*) Rotor-resistance starter. [8]

(*b*) The rotor of a 440 V, 50 Hz 6-pole induction motor has a power input of 50 kW. The rotor emf makes 90 cycles per min. Calculate :

(*i*) Slip

(*ii*) Rotor speed

(*iii*) Rotor Cu loss

(*iv*) Gross mechanical power developed

(*v*) Rotor resistance per phase if rotor current is 50 Amp. [10]

9. (*a*) With a neat sketch explain the working of shaded pole single phase induction motor. [8]

(*b*) State *two* applications each for the following motors :

(*i*) Reluctance motor

(*ii*) Hysteresis motor

(*iii*) Universal motor

(*iv*) Stepper motor. [8]

Or

10. (*a*) Explain with neat diagram, construction, characteristics, advantages, disadvantages and applications of Universal motor. [8]

(*b*) Explain with neat circuit diagram difference between a.c. and d.c. Servo motor. [8]

11. (*a*) Explain various methods of electric heating. State advantages of electric heating over other. [8]

(*b*) Explain the process of Dielectric heating. State its advantages and disadvantages and applications. [8]

Or

12. (*a*) Explain in detail, how length and diameter of resistive heating element used in resistance ovens, are designed in practice. [8]

(*b*) Explain in detail various selection criterion used while selection of motor for particular application. [8]