[4758]-50

T.E. (Electrical)
ELECTRICAL MACHINES-II
(2008 Course) (Semester-I) (303142)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:
1) *Answer 3 questions from Section-I and 3 questions from Section-II.*
2) *Answers to the two sections should be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right indicate full marks.*
5) *Use of electronic pocket calculator is allowed.*
6) *Assume suitable data, if necessary.*

SECTION-I

Q1) a)   A 3 phase, 12 pole, 600 rpm, star connected alternator has single layer winding housed in 180 slots. There are 10 conductors per slot and the coil pitch is 2 slots less than full pitch. The flux per pole is 0.5 wb distributed sinusoidally. Determine the emf per phase and line value of EMF.   **[6]**

b)   Why zero power factor method is considered to be most accurate method for determining voltage regulation of alternator?   **[6]**

c)   Draw and explain power flow diagram of 3 phase alternator.   **[6]**

OR

Q2) a)   Determine voltage regulation of a 3 phase star connected alternator rated 2400 kVA, 8000 $\sqrt{3}$ volt. The synchronous impedance of this alternator is (1.5 + j30)Ω per phase. Calculate full load voltage regulation up at 0.866 log, 0.866 lead power factor.   **[6]**

b)   What is short circuit ratio of alternator? Elaborate its significance?   **[6]**

c)   Compare EMF method and MMF method of determining voltage regulation of alternator (minimum 6 points).   **[6]**

Q3) a)   A 1000 kVA, star connected 2300 volt 3 phase salient pole alternator has direct axis reactance of 1.95Ω and quadrature axis reactance of 1.4Ω. The losses are negligibly small. Find excitation voltage for operation at rated kVA with 0.6 power factor lag.   **[8]**

b) Draw connection diagram of dark lamp method for synchronizing alternator. Explain how this method is useful for synchronisation. State its drawbacks. **[8]**

<div align="center">OR</div>

Q4) a) State need of parallel operation. State conditions for satisfactory parallel operation. Also explain what may happen if conditions are not satisfied. **[8]**

b) Explain how synchronous motor is made to operate at different power factors by keeping mechanical load on motor constant. **[8]**

Q5) a) Compare 3 phase synchronous motor with 3 phase induction motor (minimum 8 points). **[8]**

b) With suitable diagram explain construction and working of 3 phase induction regulator. **[8]**

<div align="center">OR</div>

Q6) a) Explain V/F method of speed control of 3 phase induction motor. **[8]**

b) State type tests and routine tests on 3 phase induction motor. **[8]**

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SECTION-II

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Q7) a) Explain operation of d.c series motor on a.c. supply. What are the problems associated with a.c. operation. **[8]**

b) What are the types of compensated a.c. series motor? Describe each with neat diagram. **[8]**

<div align="center">OR</div>

Q8) a) Draw the phaser diagram of plain series motor and show the different drops with transformer and rotational emfs. **[8]**

b) Draw and describe the procedure to draw circle diagram of a.c. series motor. **[8]**

Q9) a) What are the effects of harmonics on performance of induction motor. State the remedies. **[8]**

b) Describe the construction & working of permanent magnet D.C. motor. **[8]**

<div align="center">OR</div>

*Q10)*a) Explain the construction & working of linear induction motor. State its applications. **[8]**

b) Explain the construction & working of permanent magnet type stepper motor. **[8]**

*Q11)*a) With neat diagram explain the construction & working of single phase capacity start induction motor. Draw its phasor diagram state applications of this motor. **[10]**

b) Explain no load & blocked rotor test in case of single phase induction motor. Draw equivalent circuit diagram in each case. **[8]**

OR

*Q12)*a) A 220 V, 50 Hz single phase induction motor gave following test results.

No load test	220 V	4.6 A	125 W
blocked rotor test	120 V	9.6 A	460W

The stater winding resistance is 1.5Ω and during the blocked rotor test, the starting winding is open. Determine the equivalent circuit parameters. Also find the case, frictional & windage losses. **[10]**

b) Explain construction & working of shaded pole induction motor. **[8]**

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