[5669]-532
T.E. (Electrical Engineering)
ELECTRICAL MACHINES - II
(2015 Pattern) (End Sem.)

Time : 2½ Hours] [*Max. Marks : 70*

Instructions to the candidates:

1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
2) Neat diagrams must be drawn wherever necessary.
3) Figures to the right indicate full marks.
4) Use of non-programmable scientific calculators is allowed.
5) Assume suitable data if necessary.

Q1) a) Derive the emf equation of alternator. **[6]**

b) What is significance of short circuit ratio, explain **[7]**

c) A 3-ph, 3300V 50Hz delta connected synchronous motor has synchronous reactance $X_s = 18 \, \Omega$/ph and negligible resistance, It draws 800 kw while working at pf = 0.8 leading. Calculate **[7]**

i) Excitation emf &

ii) Power angle δ

OR

Q2) a) Why synchronous motor is not self starting? How to make it self starting, explain. **[6]**

b) Why rotating magnetic field is preferred over stationary field of alternator. **[7]**

c) Using OCC & SCC of alternator, explain the mmf method of finding voltage regulation at lagging, leading and unity p.f. **[7]**

Q3 a) State the various methods of speed control of 3-ph induction motor on stator and rotor side. explain v/f method. **[8]**

b) Why the name variable reluctance stepper motor? Explain the principle of operation with neat schematic diagram, switching circuit and truth table for 1-ph on mode, 2-ph on mode & half stepping. **[10]**

OR

P.T.O.

Q4) a) Explain the construction, principle of operation and characteristics of PMDC motor. Also state its applications. **[8]**

b) Compare variable reluctance stepper motor & permanent magnet stepper motor. **[6]**

c) A single stack, 3-ph, variable reluctance stepper motor has step angle 7.5°. Find its number of stator and rotor poles. **[4]**

Q5) a) Why d.c. series motor does not work satisfactorily on a.c. supply. Suggest suitable modifications to improve its performance. **[8]**

b) Explain construction and principle of working of universal motor. **[8]**

OR

Q6) a) Compare conductively and inductively compensated ac series motor. State the applications of compensated ac series motor. **[8]**

b) Universal motor has R = 30 Ω, L = 0.5H, when connected to 250v dc supply, draws 0.8 A & run at 2000 rpm. Find speed, torque, p.f. and efficiency, when connected to 250v, 50Hz, ac supply, drawing the same current. Assume rotational losses = 15W. **[8]**

Q7) a) Why 1-ph induction motor is not self starting? Prove the same using double field revolving theory **[8]**

b) Explain the operation of single value capacitor start and run 1-ph induction motor. State its advantages. How to reverse its direction of rotation? Show by circuit diagram. **[8]**

OR

Q8) a) With neat schematic diagram, explain the working of shaded pole induction motor. State its applications. **[8]**

b) A 500w, 230v, 50Hz 1-ph induction motor has winding parameters Zm = 4.5 + j3.7 Ω (main winding impedance) and auxiliary winding impedance Zs = 9.5 + j 3.5 Ω. Calculate the value of starting capacitor required to have maximum starting torque. **[8]**

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