

Total No. of Questions : 8]

SEAT No. :

P2943

[Total No. of Pages : 2

[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 $X_s = 18 \Omega/\text{ph}$ and negligible resistance, It draws 800 kw while working at $\text{pf} = 0.8$ 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 $R = 30 \Omega$, $L = 0.5H$, 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 $Z_m = 4.5 + j3.7 \Omega$ (main winding impedance) and auxiliary winding impedance $Z_s = 9.5 + j 3.5 \Omega$. Calculate the value of starting capacitor required to have maximum starting torque. [8]

