

Total No. of Questions :6]

SEAT No. :

P5683

[Total No. of Pages :2

TE/INSEM./OCT.-129

T.E. (Electrical)

ELECTRICAL MACHINES - II

(2015 Course) (Semester - I)

Time : 1 Hour]

[Max. Marks :30

Instructions to the candidates:

- 1) Answer Q.No-1 or Q.No-2, Q.No-3 or Q.No-4, Q. No-5 or Q. No-6.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Use of electronic pocket calculator is allowed.
- 5) Assume suitable data if necessary.

Q1) a) Derive the mathematical expression for coil span factor (K_c) for an alternator. [4]

b) A 5 kVA 200V star connected 3 phase salient pole alternator with direct axis and quadrature axis reactance of 12Ω & 7Ω respectively. Delivers full load current at unity p.f. Calculate direct axis current, quadrature axis current, excitation emf and full load voltage regulation neglecting armature resistance. [6]

OR

Q2) a) Explain advantages of rotating field system over rotating armature system in case as synchronous generator. [4]

b) A 3 phase 4 poles star connected alternator has 60 slots and 02 conductors per slots. The pitch of the coil is 3 slots less than the pole pitch. The flux per pole is 125 mwb sinusoidally distributed. Calculate the phase value of induced emf. for 50 Hz frequency. [6]

Q3) a) Define voltage regulation of alternator. If the alternator is loaded using resistive load, weather its terminal voltage will increase or decrease? Why? [4]

P.T.O.

- b) A 100 kVA 3000 V 50 Hz 3 phase star connected alternator has effective armature resistance of $0.2 \Omega/\text{ph}$. The field current of 40 Amp produces short circuit current I_{sc} of 200 A and an open circuit emf of 1040 V (line) calculate the full load voltage regulation at 0.8 pf lag. [6]

OR

- Q4)** a) Define short Circuit Ratio (SCR) in case of alternator. Hence explain its significance. [4]
- b) A 2 MVA, 3 phase 8 pole alternator is connected to 6000 V, 50 Hz bus-bar and has synchronous reactance of $6 \Omega/\text{phase}$. Calculate synchronizing power & torque per mechanical degree of rotor displacement at no load. Consider normal excitation condition. [6]

- Q5)** a) Draw 'V' curve and inverted 'V' curve of synchronous motor at [4]
- i) no load
- ii) half full load condition
- b) Explain any two methods of starting 3 phase synchronous motor. [6]

OR

- Q6)** a) Explain operation of synchronous motor at constant excitation and variable load condition. [4]
- b) A 2.3 kV, 3 phase star connected synchronous motor has $Z_s = (0.2 + j 2.2)\Omega/\text{phase}$. The motor is operating at 0.5 p.f. leading with a line current of 200 A. Determine the generated emf per phase. [6]

