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 sclient pole alternator with direct axis and quadrature axis reactance of 12 Ω & 7Ω respectively. Delivers full load current at unity p.f. Calculate direct axis current, quadrature axis current, excitation emf and full load voltage regulation neglecing 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]**

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b) A 100 kVA 3000 V 50 Hz 3 phase star connected alternator has effective armature resistance of 0.2 Ω/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 log. **[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 Ω/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 $Z_s = (0.2 + j\ 2.2)\Omega$ /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]**

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