Total No. of Questions : 10]

SEAT No. :

P3289

[Total No. of Pages : 3

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T.E. (Electrical)

ELECTRICAL MACHINES - II

(2012 Pattern)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Q.1 or Q.2 & Q.3 or Q.4 & Q.5 or Q.6 & Q.7 or Q.8 & Q.9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Compare salient pole type construction with non-salient pole construction of alternator. **[4]**

b) A three phase 100KVA, 3300V, star connected alternator has effective resistance of 0.25Ω. A 50 A field current produces a 200 A short circuit current and 1050 V open circuit line voltage. Find the voltage regulation at unity and 0.8 power factor lagging. **[6]**

OR

Q2) a) Explain effect of armature reaction at leading power factor load condition for alternator. Draw phasor diagram. **[4]**

b) A three phase 415V, 50Hz salient pole alternator has delta connected stator winding. It supplies a load of 1000 A at 0.8 power factor lagging. The direct axis reactance is 0.09Ω and quadrature axis reactance is 0.068Ω. Determine emf of the alternator. Neglect armature resistance.**[6]**

Q3) a) Explain the working of synchronous condenser. **[4]**

b) Two identical three phase alternators are running in parallel and sharing a load of 1200 kW at 3300V and 0.8 power factor lagging. The field excitation of first machine is so adjusted that the armature current is 120 A at the lagging power factor. Find the armature current of second alternator. **[6]**

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OR

Q4) a) Explain how mechanical power develops in synchronous motor. **[4]**

b) A three phase 415V star connected synchronous motor has an efficiency of 96% when drawing 25A current at full load and unity power factor. What will be the induced emf and total mechanical power developed at full load and 0.9 power factor leading? The synchronous inpedance is $(0.3 + j2)\ \Omega$. **[6]**

Q5) a) Explain construction and working of three phase induction voltage regulator. **[8]**

b) Explain the operation of three phase induction motor as Induction generator. State its advantages and applications. **[8]**

OR

Q6) a) Describe with neat diagram, construction and working of variable reluctance stepper motor. **[8]**

b) Describe with neat diagram construction and working of linear induction motor. State its applications. **[8]**

Q7) a) Explain the procedure to plot circle diagram of a.c. series motor. How full lood efficiency, torque scale and speed scale can be determined. **[10]**

b) Explain modifications necessary in the construction of d.c. series motor to operate satisfactorily on a.c. supply. **[6]**

OR

Q8) a) Compare compensated a.c. series motor with uncompensated a.c. series motor. **[8]**

b) Two pole uninersal motor operates on 230V a.c. supply drawing a current of 5.2A. It runs at 3900 rpm and draws a power of 300W. Calculate the maximum value of flux per pole. Assume armature resistance of 4.2Ω and number of conductors as 360. **[8]**

Q9) a) Explain double field revolving theory for single phase induction motor with suitable diagram. Also plot torque speed characteristics. **[8]**

b) A 4 pole, 220V, 50Hz single phase induction motor gave the following test results :

No load test : 220V, 4 A, 190W

Blocked rotor test : 85V, 9.5A, 400W

Find the equivalent circuit parameters with stator winding resistance being 3Ω. **[10]**

OR

Q10) a) With neat diagram explain the construction and working of resistance split phase single phase induction motor. Draw the phasor diagram. **[6]**

b) A 1/3 H.P., 230 V, 50 Hz single phase induction motor has the following parameters : **[12]**

R_1 = 1.5Ω, R_2 = 3Ω, X_1 = 2.5Ω, X_2 = 1.6Ω and X_m = 60Ω. The core losses of machine are 40W, the frictional and windage losses are 15W, the slip is 5%. Find for the motor :

i) Speed in rpm

ii) Stator current

iii) Stator power factor

iv) Input power

v) Output power and

vi) Efficiency

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