B.TECH. SEM -IV ELECTRICAL 2014 COURSE (CBCS) : SUMMER - 2018

SUBJECT: ELECTRICAL MACHINES – II

Day: **Tuesday** Time: **10.00 AM TO 01.00 PM**

Date: **05/06/2018** Max Marks. 60

S-2018-2287

N.B.

1) All questions are **COMPULSORY**.
2) Figures to the right indicate **FULL** marks.
3) Use of non – programmable calculator is **ALLOWED**.
4) Assume suitable data, if necessary.

Q.1 **a)** Compare salient pole type alternator with non salient pole type alternate on any five points. **(05)**

b) With suitable phasor diagram, explain effect of armature reaction under leading power factor condition in case of 3 phase alternator. **(05)**

OR

Q.1 **a)** A 5 kVA 200 volt star connected, 3 phase salient pole alternator with direct and quadrature axis reactance of 12 Ω and 7 Ω respectively, delivers full load current at unity power factor. Calculate the excitation voltage and full load regulation neglecting resistance. **(05)**

b) With suitable phasor diagram derive the expression for distribution factor in case of alternator. **(05)**

Q.2 **a)** A 3 phase stat connected alternator rated 1600 kVA, 13500 volt delivers output power of 1280 kW. The synchronous impedance of alternator is **(1.5 + j 30 Ω)** per phase. Calculate % regulation at full load condition for following power factors – unity, 0.8 leading. **(05)**

b) With suitable diagram explain dark lamp method of synchronous alternators. State the draw back of this method. **(05)**

OR

Q.2 **a)** Compare – EMF method, MMF method of finding voltage regulation of alternator. (Minimum 5 points of comparison expected). **(05)**

b) State the necessary conditions for parallel operation of alternator. **(05)**

Q.3 **a)** With suitable phasor diagrams explain inverted V curves in case of synchronous motor **(05)**

b) A 400 volt, 3 phase star connected synchronous motor has armature resistance of 0.2 Ω / ph, synchronous reactance 2 Ω / phase. It takes a current of 25 Amp from supply. Calculate the back emf induced in the motor if it works at 0.9 power factor leading. **(05)**

OR

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Q.3 **a)** Draw power stage diagram of 3 phase synchronous motor. Write expressions of power loss in respective blocks. **(05)**

b) State the applications of synchronous motor. Draw power load angle characteristics of synchronous motor. **(05)**

Q.4 **a)** Draw the torque – speed characteristics of poly-phase induction motor and clearly indicate the effect of change in rotor resistance. **(05)**

b) For a 3 – phase induction show that power input to rotor : Mechanical power developed by rotor : Rotor cu loss : **(05)**

i.e. P_2 : P mech : P_{cu} : : 1: (1-S) : S

OR

Q.4 **a)** The power input to the rotor of 440V, 50Hz, 6 – pole, 3 – phase induction motor is 80 kW. The rotor emf is observed to make 100 complete alternations per minute. Calculate - **(06)**

i) The slip

ii) The rotor speed

iii) The mechanical power developed

iv) The rotor cu loss per phase

v) The rotor resistance per phase if the rotor current is 65A

b) Explain the principle of operation of a 3ϕ induction motor. **(04)**

Q.5 **a)** Describe with construction diagram the working of Auto – transformer starter used for 3 phase induction motor **(05)**

b) How are the parameters of equivalent circuit determined from no – load and blocked rotor tests on a 3 phase induction motor. **(05)**

OR

Q.5 **a)** What is the purpose of using deep – bar cage rotors? Explain the working of deep – bar cage induction motor. **(05)**

b) Describe the phenomenon of crawling in a 3 – phase induction motor. **(05)**

Q.6 **a)** Discuss the working of induction generator. Mention its advantages and disadvantages. **(05)**

b) Why should a AC series motor never be operated on no – load? Describe it with characteristics. **(05)**

OR

Q.6 **a)** Describe the constructions, working and uses of a reluctance motor . **(05)**

b) Describe the construction of a synchronous hysteresis motor and show that it develops a running torque both at synchronous and asynchronous speed of the rotor. **(05)**

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