

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

WINTER - 2017

SUBJECT: ELECTRICAL MACHINES – II

Day: **Tuesday**
Date: **21/11/2017**

Time: **02.30 PM TO 05.30 PM**
Max Marks. 60

W-2017-2079

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.

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- Q.1 a)** With suitable diagram explain construction, and working of brushless alternator. **(05)**
- b)** With suitable phasor diagram explain effect of armature reaction under lagging power factor condition in case of 3 phase alternator. **(05)**

OR

- Q.1 a)** With suitable diagram explain construction of salient pole alternator. **(05)**
- b)** With suitable phasor diagram explain Blondel's two reaction theory. **(05)**

- Q.2 a)** With suitable diagram explain one dark, two equally bright lamp method. **(05)**
- b)** A 3 phase star connected alternator rated 1600 kVA, 13500 volt delivers output power of 1280 kW. The synchronous impedance of alternator is $(1.5 + j 30 \Omega)$ per phase. Calculate % regulation at full load condition for following power factors – unity, 0.8 lagging. **(05)**

OR

- Q.2 a)** Compare – EMF method, MMF method and Potier triangle method of finding voltage regulation of alternator. (Minimum 5 points of comparison expected). **(05)**
- b)** What is short circuit ratio in case of alternator. Explain its significance. **(05)**

- Q.3 a)** What is hunting in case of synchronous motor? How this effect is eliminated? **(05)**
- b)** A 400 volt, 3 phase star connected synchronous motor has armature resistance of $0.2 \Omega / \text{ph}$, synchronous reactance $2 \Omega / \text{phase}$. It takes a current of 25 Amp from supply. Calculate the back emf induced in the motor if it works at 0.8 power factor lagging. **(05)**

OR

- Q.3 a)** With suitable phasor diagrams explain constant load, variable excitation mode of synchronous motor. **(05)**
- b)** Why synchronous motor is not self starting? Explain any one method of making synchronous motor self start. **(05)**

P.T.O.

Q.4 a) Why does the rotor of a 3 – phase induction motor rotate in the same direction as the rotating field. **(03)**

b) A 25 hp, 6 – pole, 50 Hz, 3 – phase induction motor has stator /rotor phase voltage ratio of $\frac{6}{5}$. The stator and rotor impedances per phase are $(0.25 + j 0.75)$ ohms and $(0.173 + j 0.52)$ ohms respectively. **(07)**

Find the starting torque excreted by the motor when an external resistance of 1.0Ω is inserted in each phase of rotor winding, the motor being started directly on the 400V supply system.

Assume star-star connections.

OR

Q.4 a) For an induction motor, derive a relationship between the starting torque and maximum torque explaining clearly the notations used. **(04)**

b) Compare cage and wound 3 phase induction motor with reference to construction performance and applications. **(06)**

Q.5 a) With suitable diagram explain the working of direct on line (DOL) starter. **(04)**

b) Explain the procedure of drawing the circle diagram of an induction motor. **(06)**

OR

Q.5 a) Describe the construction of double – cage induction motor & explain its working. **(05)**

b) Explain the phenomenon of cogging in a 3 phase induction motor. **(05)**

Q.6 a) Describe the working principle and explain the characteristics of AC series motor. **(05)**

b) When and how a 3 – phase induction machine can operate in following modes-motoring, generating, braking. **(05)**

OR

Q.6 a) Draw and describe the performance characteristics of synchronous induction motor. **(05)**

b) Describe the construction features and principle of operation of a LIM. **(05)**

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