YMCA UNIVERSITY OF SCIENCE & TECHNOLOGY, FARIDABAD
B. TECH. 5TH SEMESTER (UNDER CBS)
ELECTRIC MACHINES III (EL-301)

Time: 3 Hours
Max. Marks:60

Note: 1. It is compulsory to answer the questions of Part -1. Limit your answers within 20-40 word in this part.
2. Answer any four questions from Part -2 in detail.
3. Different parts of the same question are to be attempted adjacent to each other.
4. Assume suitable standard data wherever required, if not given.

PART -1

Q1 (a) Define the term synchronous impedance of an alternator. (2)
(b) State the necessary conditions for parallel operation of alternators. (2)
(c) Why alternators are operated in parallel? Give reasons. (2)
(d) What are the various characteristics of infinite bus? (2)
(e) Why are modern alternators designed for high Short circuit ratio? (2)
(f) What are the common applications of a Hysteresis motor? (2)
(g) What are the main features of a stepper motor which are responsible for its widespread use? (2)
(h) Define hunting of a synchronous machine. (2)
(i) Enlist various methods of starting of synchronous motor (2)
(j) Write the names of common essential features of rotating machines (2)

PART -2

Q2 (a) Explain the concept of Armature reaction in a synchronous machine with suitable phasor diagram. (5)
(b) A 3 phase, 10 KVA, 400 V, 50 Hz star connected alternator supplies the rated load at 0.8 power factor lagging. If the armature resistance is 0.5 ohm and synchronous reactance is 10 ohm. Find the torque angle and voltage regulation. (5)

Q3 (a) Why synchronous motor is not self starting? What mehods are generally used to start the synchronous motors? (5)
(b) The efficiency of a 3 phase,400 V star connected synchronous motor is 95% and it takes 24 A at full load and unity power factor. What will be the induced emf and total mechanical power developed at full load and 0.9 p.f. leading? The synchronous impedance per phase is (0.2+j2)ohm. (5)

Q4 (a) What do you mean by synchronizing of alternators? Describe any one method of synchronizing. (5)
(b) A 3 phase 11000 V, star connected turbo alternators, having synchronous reactance of 6 ohm per phase and negligible resistance has an armature current of 200 A at unity power factor.when operating on constant frequency and constant voltage busbars. If the steam admission remains the same and the emf is raised by 25%, determine the new values of current and power factor. (5)

Q5 (a) Describe the constructional features of a reluctance motor using a neat diagram. (5)

(b) Explain the operating principle of a linear induction motor. Draw its characteristics. (5)

Q6 (a) Discuss the concept of Kron's primitive machine in detail. (5)
(b) Deuce Park's transformation relating the 3 phase currents of a synchronous machine to its corresponding d-q axes currents. (5)

Q7 Writ short note on:
(i) V curves of synchronous motor (10)
(ii) Zero power factor method of synchronous generators