Subject Code: R14A31EE03

ANURAG GROUP OF INSTITUTIONS
(Autonomous)
(Formerly CVSR College of Engineering)
School of Engineering
III B.Tech -I Semester Supplementary Examinations, April 2017
Subject: Electrical machines-III
(EEE)

Time : 3 Hours   **Max.Marks: 75**

Section—A (Short answer type questions)   (25 Marks)

• Answer **All** questions

1. What is the purpose of airgap in an Alternator?   2M
2. What is the advantage of having distributed winding in a 3-ph alternator?   3M
3. What is the significance of Voltage regulation of salient pole alternator compares to cylindrical alternator   3M
4. Which parameters are varied in case of slip test?   2M
5. What are the conditionsfor parallel operation of alternators?   3M
6. What do you understand by sub transient reactance of an alternator?   2M
7. Why does the power factor of Industrial installation tend to be low?   3M
8. What is a synchronous condenser?   2M
9. Write the principle of operation of shaded pole motor?   3M
10. What are the applications of BLDC motor?   2M

Section—B (Essay questions)

• **Answer All questions, each question carries equal marks   (5 x 10 =50 Marks)**

11. A) i)Describe the main constructional features of cylindrical and salient pole rotor alternators.   5M

 ii)Calculate the phase and line voltages of a 3-ph star connected 4-pole small alternator having a total flux per pole of 0.3 Wb.Each phase has a concentrated winding of 10 full pitched turns and the relative velocity between armature winding and field flux is 1500 RPM.   5M

                                                OR

B)i) Derive an expression for the EMF generated in the armature winding of a synchronous machine.   5M

ii) A 3-ph, 16 pole, star connectors alternator has 192 stator slots with eight conductors per slot and the conductors of each phase are connected in series. The coil span is 150 electrical degrees. Determine the phase and line voltage if the machine runs at 375 rpm. and the flux per pole is 64 mWb distributed sinusoidally over pole.   5M

                                                                                    P.T.O

12. A)i) Explain the phenomena of Two Reaction analysis.   5M
   ii)A 3-ph , 50 Hz, 6000kVA, 6000 V star connected alternator has an effective
   resistance of 0.2 Ω.A field current of 10 A produces 480 V on open circuit and
   a field current of 5 A gives armature current of 105 A. Calculate the voltage
   regulation of this alternator at 0.8 lagging power factor.   5M

                              OR

   B)Why the modern alternators are designed with a high ratio of armature
synchronous reactance to armature resistance? Explain why additional external
reactors are provided in series with each phase of an alternator Derive an
expression for power developed in a salient pole type synchronous generator.
                                                                    10M

13. A)Two 800 Kw alternators operate in parallel. The speed regulation of one set is
100% to 103% from full load to no load and that of the other is 100% to 104%.
How will the two alternators share a load of 1200 kW and at what load will
one machine cease to supply any portion of the load?   10M

                              OR

   B) Bring out the characteristics of Two alternators working in parallel. What is the
effect of change in excitation and change in mechanical power input on load
sharing?   10M

14. A) i)Draw and explain the phasor diagram of a synchronous motor operating at
   leading power factor.   5M
   ii)A 2500 V, 3 phase star connected Synchronous Motor has a synchronous
   reactance of5 ohms / ph. The motor input is 1000 KW at rated voltage and an
   excitationemf of 3600 V(line). Calculate the line current and power factor. 5M

                              OR

   B) Why is it so that a synchronous motor develops torque only at synchronous
      speed, whereas an Induction Motor develops torque at all speeds, except
      synchronous speed? Discuss in detail.   10M

15. A) i)Write the principle of operation of universal motor.   5M
   ii) Draw and explain the performance characteristics of shaded pole Motor. 5M

                              OR

   B) Write the principle of operation of BLDC motor.   10M