

ANURAG GROUP OF INSTITUTIONS

(Autonomous)

School of Engineering**III-B.Tech-I-Semester End Examinations, November 2017****Subject: Electrical Machines-III**

(Only for EEE)

Time: 3 Hours**Max.Marks:75****Section – A (Short Answer type questions)**

(25Marks)

- Answer all questions

1. What are the advantages of Distributed over Concentrated winding? 3M
2. What are the functions of a damper winding in a synchronous generator? 2M
3. Which method is the best in determining the regulation of alternator? Give the reasons 3M
4. Draw the phasor diagram of a Salient Pole alternator for lagging load. 2M
5. What is synchronising torque when alternators are connected in parallel? Explain 2M
6. What is an infinite bus? How do you synchronize an alternator with infinite bus? 3M
7. List all the possible methods of starting of 3-phase synchronous motor? 2M
8. Write the expression for Power developed of a Salient Pole Synchronous motor and hence name the terms of this expression. 3M
9. Write any three important applications of Shaded Pole Induction motor and Reluctance motor? 3M
10. Write an abbreviation for BLDC motor and justify its name. 2M

Section – B (Essay Type questions)

(5x10 = 50 Marks)

- Answer all questions. All questions carry equal marks

11. A.i) What are causes of harmonics in an alternator and how they are suppressed. 5M
 ii) 3-phase, 16-pole star connected alternator has 144 slots on the armature periphery. Each slot contains 10 conductors. The line value of emf available across terminals is observed to be 2.657KV. Find frequency of induced emf. Assume flux per pole is 0.064 Wb and alternator has double layer winding 5M
 OR
 B.i) In a 4-pole, 3-phase alternator, armature has 36 slots. It is using an armature winding which is short pitched by one slot. Calculate its coil span factor. 3M
 ii) A 3- ϕ , star connected, 4 pole, 1500rpm alternator has 72 slots on its periphery. Each slot has 10 conductors and double layer winding is short pitched by 3 slots. Find the pitch and distribution factor. Also, calculate the induced EMF between lines, if the flux of 0.025 wb is distributed sinusoidally. All the conductors in a phase are connected in series. 7M
12. A.i) Explain the effect of armature reaction on the EMF induced. Is it possible to obtain load voltage more than EMF induced? If yes, how? 5M
 ii) The no-load excitation of an alternator required to give rated voltage is 160A. In a short circuit test with full current flowing in the armature, the field excitation is 135A. Determine the approximate excitation that will be required to give full load current at 0.8 pf lagging at the rated terminal voltage. 5M

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OR

- B.i) With proper explanation & diagram, Justify the statement 'MMF method for finding voltage regulation is optimistic and EMF method for finding voltage regulation is pessimistic'. 5M
- ii) A 3-phase, star connected salient pole synchronous generator is driven at a speed near Synchronous with the field circuit open and the stator is supplied from a balanced 3phase supply. Voltmeter connected across the line gave minimum and maximum readings of 1196V & 1217 Volts. The line current fluctuated between 120 & 225 Amp. Find the direct and quadrature axis reactances per phase. Neglect armature resistances. 5M
13. A.i) Explain, how alternators working in parallel share a load if their steam input is varied with neat diagrams? 5M
- ii) A 5MVA, 10KV, 1500rpm, 3- ϕ , 50Hz alternator is operating on infinite bus bar. Find synchronizing power and synchronizing torque per mechanical degree of angular displacement at Full-load at rated voltage and 0.8pf lagging. The synchronous reactance per phase is 0.6 ohms 5M
- OR
- B.i) Explain the effect of change in excitation on the parallel operation of two Alternators with neat diagrams. 5M
- ii) Two identical 3 MVA alternators are running in parallel. The frequency drops from no load to full load for the two alternators are 50 Hz to 47 Hz and 50 Hz to 48 Hz respectively. How they will share a load of 4000 kW? 5M
14. A.i) With neat diagram explain the 'constant excitation with variable load' operation of synchronous motor. 5M
- ii) A synchronous motor absorbing 60 KW is connected in parallel with a factory load of 240 KW having a lagging pf of 0.8. If the combined load has a pf of 0.9, what is the value of the leading KVAR supplied by the motor and at what pf is it working? 5M
- OR
- B.i) Explain the operation of synchronous motor at constant load and variable excitation with related curves. 5M
- ii) An industrial load of 4MW is supplied at 11KV, the power factor being 0.8 lagging. A synchronous motor is required to meet an additional load of 1103.25 KW and at the same time to raise the resultant power factor to 0.95 lagging. Determine the KVA capacity of the motor and the power factor at which it must operate. The efficiency of motor is 80%. 5M
15. A.i) Describe the construction and principle of working of a shaded pole motor. 5M
- ii) Explain working and applications of a stepper motor and give its applications. 5M
- OR
- B.i) Describe the operation of BLDC motor with neat diagrams. 5M
- ii) Explain in briefly about reluctance motor principle with necessary diagrams. 5M