R15, R14 & R12

Subject Code: R15A31EE05

ANURAG GROUP OF INSTITUTIONS

(Autonomous)

School of Engineering

III-B.Tech -I-Semester Supplementary Examinations, April - 2018

Subject: Electrical Machines-III

(Only for EEE)

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

Section – A (Short Answer type questions) **(25 Marks)**

- **Answer all questions**

1. What is working principle of AC generator? 2M
2. Compare Cylindrical and Salient Pole Synchronous Machines in any three aspects.3M
3. Show the phasor diagram of a salient Pole Synchronous Generator at lagging power factors. 3M
4. Define direct axis Synchronous reactance and give its value (approximately) 2M
5. What do you mean by Synchronizing Power? 3M
6. Show the Power Angle characteristics of a Cylindrical Synchronous Machine. 2M
7. Mention any two special features of Synchronous Motor. 2M
8. Are Dampers are provided in Cylindrical Synchronous Machine? Why? 3M
9. Justify the name of BLDC motor when compared to DC motor 2M
10. Specify the applications of Stepper Motor. 3M

Section—B (Essay questions)

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

11. A) i) Derive the expression for Pitch Factor for fundamental and third harmonic component of space harmonic 5M
    ii) Explain the effect of Armature Reaction in a Synchronous generator at different load power factors. 5M

    OR

    B) i) Explain the Load characteristics of an Alternator at different power factors. 5M
    ii) What is Synchronous Impedance and explain the experimental procedure of determining it. 5M

12. A) A 220 V, 50 Hz,6 pole, Star connected alternator with ohmic resistance of 0.06 ohm per phase gave the following open circuit and short circuit characteristics.

I_f (amps)	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.8	2.2	2.6	3
OCC (V) line	29	58	87	116	146	172	194	232	261.5	284	300
Isc (A)	6.6	13.2	20	26.5	32.4	40	46.3	59.0	--	--	--

Find % voltage Regulation at full load of 40 A, 0.8 pf lagging using MMF method.

P.T.O

OR

B) i) How Two Reaction Theory is useful to analyze the salient pole Synchronous Machines? 5M

ii) Explain the procedural steps involved in obtaining Potier Triangle 5M

13. A) i) Explain the Lamps Dark Synchronization method with the help of neat sketches. 5M

ii) A 3 MVA,6 pole Alternator runs at 1000 rpm on 3.3 kV busbars. The synchronous reactance is 25%. Calculate the synchronous power and torque per mechanical degree of displacement when the alternator is supplying full load at 0.8 pf lagging. 5M

OR

B) i) What is the effect of change of fuel input to an Alternator connected to infinite busbars? Explain. 5M

ii) Differentiate between Sub-transient, Transient and Steady-state Reactances of a Synchrnous Machine. 5M

14. A) i) Explain the operation of Synchronous Motor. . 5M

ii) A 3300 V, Star connected Synchronous motor has synchronous impedance of 0.4+j5 Ohm per phase. For an excitation emf of 4000 V and motor input power of 1000 KW at rated voltage, Compute line current and Power factor. 5M

OR

B) i) Explain V curves and show that the field current required to maintain unity power factor increases with load on the motor. 5M

ii) Explain the phenomenon of Hunting in synchronous motors. 5M

15. A) Explain the construction and working of Shaded Pole Machines. 10M

OR

B) Explain the operation and applications of AC Series motors. 10M