

ANURAG GROUP OF INSTITUTIONS**Autonomous****School of Engineering****III B.Tech-I-Semester Regular Examinations, March / April - 2021****Subject: Electrical Machines -III****(Only for EEE)****Time: 3 Hours****Max Marks: 75****Section – A (Short Answer type questions)****(25Marks)**

- Answer all questions**

- Show the differences between round rotor and salient pole machines. 2M
- Recall the definitions of distribution, pitch and winding factors. 3M
- Define voltage regulation of an alternator. 2M
- Relate the EMF and MMF method of determining regulation of synchronous alternator. 3M
- Restate the definition of synchronizing power and synchronizing torque. 2M
- Illustrate sub transient, transient and steady state periods in short circuit waveform 3M
- Explain the principle of synchronous motor. 3M
- Recall the purpose of damper windings in synchronous motors. 2M
- Memorize the principle of variable reluctance stepper motor 3M
- Label the differences between AC series motor and DC series motor. 2M

Section—B (Essay questions)

- Answer all questions, each question carries 10 marks and may contain two or more bits.**
(5x 10 =50 Marks)

- Summarize the differences between round rotor and salient pole machines with neat sketch. 5M
 - A 4 pole 50 Hz. Synchronous generator has 24 slots. It has two-layer winding with full pitch coils of 6 turns each. The flux per pole is 0.02 wb. Calculate the induced emf if the coils connected in star. 5M

OR

- Develop EMF equation of alternator from basics. 5M
- Summarize the effect of armature reaction in alternators. 5M

- Explain MMF method of determining the voltage regulation of alternator. 5M

- A 30 kVA, 40 V, 50 Hz, 3 ϕ star connected alternator gave the following results

If(A)	2	4	6	7	8	10	12	14
Vt(V)	155	287	395	440	475	530	570	592
Isc(A)	11	22	34	40	46	57	69	80

Resistance between any two terminals is 0.3Ω . Calculate the regulation at full load 0.8 pf lead by synchronous impedance method. 5M

OR

- Discuss briefly about two reaction theory in synchronous generators. 5M
- Describe how slip test can be conducted in the laboratory, for measuring X_d and X_q . 5M

P.T.O

13. A) i) Recall the conditions required for parallel operation of two alternators. 5M
 ii) What is the effect of change excitation and mechanical power input in parallel operation of two alternators. 5M

OR

- B) i) A two pole 3 phase 50 Hz. Turbo alternator is expected to generate the bus bar voltage of 11kV on no load. Calculate the synchronizing power per degree of mechanical displacement of the rotor and the corresponding synchronizing torque the machine is star connected with short circuit current of 1000 A. 5M
 ii) Demonstrate the procedure for synchronizing a 3 phase alternator with bus bar by one bright and two dark lamp method. 5M

14. A) i) Reproduce and explain inverted V curves of synchronous motors with appropriate diagrams. 5M
 ii) A 3300 V star connected synchronous motor works at a constant terminal voltage and constant excitation. Its synchronous impedance is $(1+j10) \Omega$ per phase. It operates at p.f. of 0.8 lead when taking 600 kW from the mains. Find the p.f. when the input is increased to 900 kW. 5M

OR

- B) i) Derive the mechanical power developed /phase in synchronous motor. 5M
 ii) A 2000 V 3 phase star connected synchronous motor has a synchronous reactance of 8 ohms/phase. The motor input is 800 kW.at rated voltage and excitation of 3000 V (line). Calculate the line current and power factor. 5M

15. A) Explain the principal of operations of the following motors with neat schematic diagrams i) stepper motor ii) shaded pole motor 10M

OR

- B) Explain the principle of operation of BLDC motor with neat circuit diagram and waveforms. 10M

BL	MARKS
L1	37
L2	18
L3	20

