MAR ATHANASIUS COLLEGE OF ENGINEERING, KOTHAMANGALAM

(Government Aided Autonomous Institution)

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

First Sessional Examination August 2026

B24EE3T03: ELECTRICAL MACHINES II

S5 EEE

Max. Marks :40 Time : 1 hr 30 min

Answer all questions

PART A (3 x 4=12 Marks)

1. Compare Salient pole and Non-Salient pole synchronous machines. (3 Marks) [CO1]
2. Calculate the distribution factor for a 3-phase distributed single layer winding of the armature of an alternator. The alternator has 2 poles and a total of 18 slots. (3 Marks) [CO1]
3. Emf method is called Pessimistic method. Justify (3 Marks) [CO2]
4. Explain the phasor diagram of a cylindrical-type alternator on upf and lagging pf load. (3 Marks) [CO2]

PART B (2 x 14=28 Marks)

5. a) Develop an expression for EMF equation of alternator. (4 Marks) [CO1]
   b) A 4-pole, 50 Hz star-connected alternator has a flux per pole of 0.12 Wb. It has 4 slots per pole per phase, conductors per slot being 4. If the winding coil span is 150°, calculate open circuit line voltage and open circuit phase voltage (10 Marks) [CO1]

6. a) A 3.5 MVA, Y connected alternator rated at 4160 V at 50 Hz has open circuit characteristics given by the following data:

Field current (A):	50	100	150	200	250	300	350	400
Line EMF (V)	1620	3150	4160	4750	5130	5370	5550	5650

   A field current of 200 A is found necessary to circulate full load current on short circuit of the alternator. Calculate by (i) Synchronous Impedance method and (ii) Ampere -turn method, the full load voltage regulation at 0.8 pf lagging. Neglect armature resistance.
   (Draw the necessary graphs in the answer booklet itself) (12 Marks) [CO2]
   b) Explain the advantage of determining voltage regulation by ASA method over other methods. (2 Marks) [CO2]

Students will be able to:
CO1: Explain the construction and operating principles of synchronous generators. (Cognitive Knowledge Level: Understand)
CO2: Evaluate voltage regulation and efficiency of alternators using standard methods and to demonstrate understanding of synchronization techniques. (Cognitive Knowledge Level: Apply)