**Exam. Code: 0934**
**Sub. Code: 6661**

**2023**
**B.E. (Electrical and Electronics Engineering)**
**Fourth Semester**
**PC-EE-401: Electric Machine - II**

**Time allowed: 3 Hours** **Max. Marks: 50**

***NOTE:*** ***Attempt five questions in all, including Question No. I which is compulsory and selecting two questions from each Part.***

*x-x-x*

1. (a) Discuss nature of armature reaction.
   (b) What is role of synchronous condenser in synchronous machines?
   (c) Differentiate between V-curves and O-curves of synchronous machines.
   (d) Explain physical significance of synchronizing power coefficient.
   (e) Why synchronizing motor cannot run at seed other than synchronous speed?

   (5*2)

**PART-A**

2. (a) Discuss determination of voltage regulation of cylindrical rotor type alternator using ampere-turn method.

   (b) A 550 V, 55 kVA, 1-Φ alternator has an effective resistance of 0.2 Ω. A field current of 10A produces an armature current of 200 A on short circuit and an emf of 450 V on open circuit. Calculate synchronous reactance and voltage regulation at full load with 0.8 pf lagging.

   (5, 5)

3. A 30 kVA ,440 V, 50 Hz, 3-Φ, Y-connected alternator gave following test results:

| Field current (A) | 2 | 4 | 6 | 7 | 8 | 10 | 12 | 14 |
|---|---|---|---|---|---|---|---|---|
| Terminal voltage (V) | 155 | 287 | 395 | 440 | 475 | 530 | 570 | 592 |
| Short circuit current (A) | 11 | 22 | 34 | 40 | 46 | 57 | 69 | 80 |

   Resistance between any two terminals is 0.3 Ω. Find voltage regulation at full load, 0.8 pf lagging by (i) synchronous impedance method (ii) mmf method

   (5, 5)

4. (a) Describe slip test method for determination of $X_d$ and $X_q$ of synchronous machines.

   (b) Explain hunting of synchronous machines. How it can be reduced?

   (5, 5)

**PART-B**

5. Two, 1000kVA, 3-Φ alternators are running in parallel. Settings of governors are such that rise in speed from full load to no load is 2% in one machine and 3% in other, the speed-load characteristics being straight lines in both cases.
   (i) If each machine is fully loaded, when total load is 2000 kVA, what would be the load on each machine when total load is 1166.6 kVA?
   (ii) Also, find the load at which one machine ceases to supply any load.

   (10)

6. (a) What is capability curve of synchronous machines? What information is available from these curves?

   (b) What is infinite bus? State characteristics of infinite bus. What are operating characteristics an alternator connected to infinite bus?

   (5, 5)

7. (a) Explain operation and working of permanent magnet stepper motor.
   (b) Explain construction and working of hysteresis motors. Also, explain its torque-speed characteristics.

   (5, 5)

*x-x-x*