

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-VI • EXAMINATION – WINTER • 2014****Subject Code: 160901****Date: 26-11-2014****Subject Name: Electrical Machine - III****Time: 02:30 pm - 05:00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1 (a)** Explain Hopkinson's test for determination of efficiency of DC shunt machine. **07**
- (b)** A 3 phase, 8 pole, 750 rpm, star connected alternator has 72 slots, on the armature. Each slot has 12 conductors and winding is shorted by 2 slots. Find the pitch factor and distribution factor for the winding and calculate the induced e.m.f. between the lines if the flux per pole is 0.06 webers. **07**
- Q.2 (a)** Why synchronous motor is not self starting? Explain the methods of starting of synchronous motor. **07**
- (b)** List different methods for finding voltage regulation of an alternator and explain any one method. **07**
- OR**
- (b)** Explain Armature reaction and its effects at different power factor in Alternator. **07**
- Q.3 (a)** A 3 phase star connected 1000KVA, 11000V alternator has rated current of 52.5 A. The ac resistance of the winding per phase is 0.45 ohm. The test results are given below: **07**
- O.C. Test: field current = 12.5 A, voltage between lines = 422 V
- S.C. Test : field current = 12.5A, line current = 52.5A
- Determine the full load voltage regulation of the alternator for (i) 0.8 p.f. lagging and (ii) 0.8 p.f. leading loads by synchronous impedance method.
- (b)** Explain the slip test for measurement of  $X_d$  and  $X_q$  of synchronous machines. **07**
- OR**
- Q.3 (a)** Explain brake test for DC machine. **07**
- (b)** Explain the two reaction theory of salient pole machine in detail with phasor diagram. **07**
- Q.4 (a)** State the conditions necessary for paralleling alternators. Explain one dark and two bright lamp method with necessary electrical circuit diagram. **07**
- (b)** Derive the expression for the input and output power developed by synchronous motor. Also derive the maximum input and output power developed by synchronous motor. **07**
- OR**
- Q.4 (a)** Explain V and inverted V curve of synchronous motor. **07**
- (b)** A 3.5 MVA, 3-phase synchronous generator rated at 6.6 KV has 32 poles. Its direct and quadrature axis synchronous reactance as measured by the slip test are  $9.6 \Omega$  and  $6 \Omega$  respectively. Neglecting armature resistance, determine the regulation and excitation emf needed to maintain 6.6 KV at the terminals when supplying a load of 2.5 MW at 0.8 p.f. lagging. What maximum power can generator supply at the rated terminal voltage, if the field becomes open circuited? **07**
- Q.5 (a)** Explain 3 phase induction regulator. **07**
- (b)** Write short note on Auto Synchronous motor. **07**

**OR**

