

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-VI (OLD) EXAMINATION – WINTER 2018****Subject Code: 160901****Date: 07/12/2018****Subject Name: Electrical Machine - III****Time: 02:30 PM TO 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 Field's test on two mechanically coupled similar motors with their fields connected in series and with one machine running as motor and the other as a generator gave the following data: **07**  
**Motor:** Armature current 40A, armature voltage 200V, the drop across its field winding 15V.  
**Generator:** Armature current 32A, armature voltage 160V, the drop across its field winding 15V.  
 The resistance of each armature is 0.4  $\Omega$ . Calculate the efficiency of each machine at this load.
- Q.2** (a) List different methods for finding voltage regulation of an alternator and explain Potier method. **07**  
 (b) Derive the equation of induced emf for a synchronous generator and explain pitch factor as well as distribution factor. **07**
- OR**
- (b) Explain Armature reaction and its effects at different power factor in alternator. **07**
- Q.3** (a) Explain the two reaction theory of salient pole machine in detail with phasor diagram. **07**  
 (b) A single phase 1500 r.p.m., 4 pole alternator has 8 conductors per slot with total of 24 slots. The winding is short pitched by 1/6 th of full pitch. Assume distributed winding with flux per pole as 0.05 Wb. Calculate the induced e.m.f. **07**
- OR**
- Q.3** (a) Explain V and inverted V curve of synchronous motor **07**  
 (b) A 3-phase salient pole synchronous generator is rated at 3.5 MVA, 6.6 kV. It's direct and quadrature axis reactances are 9.6  $\Omega$  and 6  $\Omega$  per phase. The winding is star connected and resistance is negligible. If the generator is supplying 2.5 MW at rated voltage and at 0.8 p.f. lagging to an infinite bus. Find the voltage regulation. **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) Draw and explain the capability curve of a synchronous generator. **07**
- OR**
- Q.4** (a) Explain the effect of varying the excitation and torque of the prime-mover of synchronous machine connected to infinite bus-bar **07**  
 (b) Briefly describe the short circuit ratio and its significance **07**
- Q.5** (a) Write a short note on Switched Reluctance Motor **07**  
 (b) Explain the construction and working of an induction regulator **07**
- OR**
- Q.5** (a) Explain construction, working & applications of SRM (Switched Reluctance Motor) **07**  
 (b) Explain the operation of d.c servo motor **07**

\*\*\*\*\*