Seat No.: _____ Enrolment No._____

# GUJARAT TECHNOLOGICAL UNIVERSITY

**BE - SEMESTER–VI • EXAMINATION – WINTER 2013**

**Subject Code: 160901** **Date: 27-11-2013**

**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.**

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|---|---|---|---|
| **Q.1** | **(a)** | Write short note on Field test for DC series machines. | **07** |
| | **(b)** | On Swinburne's test following results were obtained when the machine was run at rated speed and rated voltage on no load. Motor voltage is 500 volts, current is 5 Amp, Armature resistance is 0.22 ohm, Field resistance is 250 ohm. Calculate the efficiency when the motor current is 100 Amp. Estimate the % change in speed between no load and full load. | **07** |
| **Q.2** | **(a)** | What are the causes of harmonics in the voltage waveform of an alternator? How can these be minimized? | **07** |
| | **(b)** | Explain brake test for DC machine. | **07** |
| | | **OR** | |
| | **(b)** | Explain hunting of synchronous machines and methods of its prevention. | **07** |
| **Q.3** | **(a)** | Describe slip test for determining $X_d$ and $X_q$ of salient pole synchronous machine. Draw circuit diagram. | **07** |
| | **(b)** | In a 50 KVA , star connected, 440 V, 3 phase, 50 Hz alternator, the effective armature resistance is 0.25 ohm per phase. The synchronous reactance is 3.2 ohm per phase and leakage reactance is 0.5 ohm per phase. Determine at rated load and unity power factor. (a) Internal e.m.f. $E_a$, (b) no-load e.m.f. $E_o$ . (c ) percentage regulation on full – load (d) value of synchronous reactance which replaces armature reaction. | **07** |
| | | **OR** | |
| **Q.3** | **(a)** | Why synchronous motor is not self starting? Explain the methods of starting of synchronous motor. | **07** |
| | **(b)** | Explain the two reaction theory of salient pole synchronous machine. | **07** |
| **Q.4** | **(a)** | Explain construction and working principle of hysteresis motor. | **07** |
| | **(b)** | Explain an experimental method of determining of 'V' curves for a synchronous motor. | **07** |
| | | **OR** | |
| **Q.4** | **(a)** | What is armature reaction? Explain the effect of armature reaction on the terminal voltage of an alternator. | **07** |
| | **(b)** | State the conditions necessary for paralleling alternators. Explain one dark and two bright lamp method with necessary electrical circuit diagram. | **07** |
| **Q.5** | **(a)** | Explain construction, working and applications of switched reluctance motor. | **07** |
| | **(b)** | Explain the working of synchronous phase modifier. | **07** |
| | | **OR** | |
| **Q.5** | **(a)** | Explain the operation of A. C. servo motor. | **07** |
| | **(b)** | Explain brushless DC motor. | **07** |

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