B.TECH. ELECTRICAL ENGINEERING (BTELVI)

Term-End Examination

June, 2013

BIEE-012 : ELECTRO-MECHANICAL ENERGY CONVERSION - II

Time : 3 hours   *Maximum Marks : 70*

Note :   (i)   *Answer **any seven** questions out of **ten** questions.*

(ii)   *All questions carry **equal** marks.*

1. Derive expressions for power output and power   10 generated of a synchronous generator in terms of load and impedance angles.

2. In a 3-phase alternator, the normal field current   10 required to give rated voltage on open-circuit is 8A. In a short circuit test, a field current of 5A causes the full load current to flow through the winding. Estimates the field current required when the alternator is delivering full-load current at 0.8 pf lagging and at rated terminal voltage. Also find the load angle.

3. What do you mean by synchronising of   10 Alternators ? State the conditions and describe with detail diagram, the 'one dark and two light' method of synchronising two alternators with the help of three synchronising lamps.

4. Find the synchronous impedance and reactance of a 3-phase alternator in which a given field current produces a current of 250A on short circuit and a generated emf of 1500 V on open circuit. The effective winding resistance is 0.2 ohm per phase. Calculate the terminal voltage and voltage regulation when a load of 250 A at 6.6 kV and at 0.8pf lagging is switched off. **10**

5. Explain how a synchronous motor can be operated as condenser. **10**

6. Discuss briefly why synchronous motors are inherently not self-starting. Explain the different methods for starting of synchronous motors. **10**

7. Explain the procedure of drawing the circle diagram of an Induction motor. What information can be obtained from the circle diagram and how ? **10**

8. A 3-phase, 415V, star connected Induction motor has a star connected rotor winding with a stator to rotor turn ratio of 6. The rotor winding resistances and stand still reactance per phase are 0.05Ω and 0.26Ω respectively. Find approximately the value of external resistance per phase to be added in the rotor circuit to obtain maximum torque at starting. What will be the stator current ? **10**

9. Draw a typical torque-speed curve of a single - phase Induction motor on the basis of double field revolving theory. **10**

10. Write short notes on *any two* of the following : **10**

    (a) Compare the value of regulation obtained by EMF, MMF and ZPF methods.

    (b) Cogging and Crawling

    (c) Construction and operation of stepper motor.

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