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BIEE-012

B.Tech. – VIEP – ELECTRICAL ENGINEERING (BTELVI)

00112

Term-End Examination

December, 2017

BIEE-012 : ELECTRO-MECHANICAL ENERGY CONVERSION – II

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt any **five** questions. All questions carry equal marks. Assume missing data suitably (if any). Use of scientific calculator is allowed.*

1. (a) Discuss the Power-angle characteristics for a cylindrical rotor synchronous machine. 7

(b) A synchronous generator is running overexcited with $E_f = 1{\cdot}40$ p.u. This machine, with a synchronous reactance of 1·20 p.u., is delivering a synchronous power of 0·5 p.u. to the bus.

If the prime-mover torque is increased by 1%, by how much will the synchronous power P and reactive power Q change ? 7

2. (a) With the help of a neat diagram, explain the construction of a three-phase synchronous machine. 7

(b) Explain and discuss the open circuit and short circuit characteristics of a synchronous machine. 7

3. (a) Explain the magneto-motive force (mmf) method of voltage regulation of an alternator. 7

(b) Draw the equivalent circuit and phasor diagrams of a cylindrical rotor synchronous motor. 7

4. (a) Discuss the significance of cogging and crawling in a three-phase induction motor. 7

(b) Explain the construction and working principle of a stepper motor. 7

5. (a) Explain the concept of revolving magnetic field theory for a three-phase induction motor. 7

(b) A three-phase, 50 Hz induction motor has a full load speed of 1440 rpm. For this motor, calculate the following : 7

(i) Number of poles

(ii) Full load slip and rotor frequency

(iii) Speed of stator field with respect to

(1) Stator structure

(2) Rotor structure (in rpm and rad/sec)

6. (a) Explain the torque – slip characteristic of an Induction motor for different range of slip. 7

(b) Explain the starting methods of a single-phase induction motor with the help of a neat diagram. Also discuss the capacitor start single-phase induction motor. 7

7. Write short notes on any ***two*** of the following : *2×7=14*

(a) Hunting of a Synchronous Machine

(b) Starting of a Synchronous Machine

(c) No Load and Block Rotor Test of Induction Motor