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BIEE-012

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

Term-End Examination

00313

June, 2018

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) Explain the concept of double revolving field theory for single-phase induction motor. 7

(b) Explain the construction and working of universal motor with neat diagram. 7

2. (a) Prove that in a 3-phase induction motor, the ratio of maximum to starting torque is $\frac{(1+k^2)}{2k}$, where k is the ratio of rotor resistance to rotor reactance. Neglect stator impedance. 7

(b) A 3-phase, 50 Hz, 4-pole induction motor has rated output of 10 kW at 1425 rpm and maximum torque is developed at 1200 rpm. Calculate the starting torque. Neglect stator resistance and rotational losses. 7

3. (a) Derive the expression for torque-angle characteristic of a salient pole synchronous machine. 7

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

4. (a) Explain the parallel operation of synchronous generators. 7

(b) Determine the voltage regulation of alternator using Synchronous Impedance method. 7

5. (a) What do you mean by Potier Triangle ? Discuss zero power factor characteristics of cylindrical rotor alternator. Also draw a neat phasor diagram for this. 7

(b) Explain two-reaction theory of salient-pole machine with the help of neat phasor diagram. 7

6. (a) Explain the starting method of three-phase induction motor in detail. 7

(b) A 3-phase induction motor has a starting torque of 150% and maximum torque of 250% of the full load torque. Neglect stator resistance and assume constant rotor resistance. Compute

(i) The slip at maximum torque

(ii) Full load slip

(iii) Rotor current at starting in terms of full load rotor current. 7

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

(a) Power Factor Control of Synchronous Motor

(b) Torque-Slip Characteristic of Induction Motor

(c) Single-Phase AC Series Compensated Motor