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BIEE-011

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

00052 **Term-End Examination**

December, 2017

BIEE-011 : ELECTRICAL MACHINES – II

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt any **seven** questions. All questions carry equal marks. Missing data may be suitably assumed. Use of scientific calculator is allowed.*

1. What are the advantages of a Rotating Field Alternator ? Derive the relation between synchronous speed (N_s) and frequency (f). Calculate the maximum speed at which a 60 Hz alternator can be operated. *5+3+2=10*

2. Draw the equivalent circuit of a synchronous generator and phasor diagram for the following :

(a) Lagging power factor cos ϕ

(b) Unity power factor

(c) Leading power factor cos ϕ *4+2+2+2=10*

3. Explain the following methods for measuring synchronous impedance : *5+5=10*

   (a) Open-circuit test

   (b) Short-circuit test

4. For a 3-phase induction motor prove the following relations :

   (a) Percentage slip = $\frac{n_s - n_r}{n_s} \times 100$

   (b) $f_r = sf_s$

   A 12-pole, 3-phase alternator is coupled to an engine running at 500 rpm. It supplies an induction motor which has full load speed of 1440 rpm. Find slip and number of poles of the motor. *3+3+4=10*

5. Derive the following for a 3-phase induction motor : *5+5=10*

   (a) Torque of an induction motor

   (b) Condition for maximum torque.

6. What are Synchronous Condensers ? Compare 3-phase synchronous and induction motors.

   2+8=10

7. Draw the phasor diagram of a single-phase AC series motor and explain its operation and construction. *3+4+4=10*

8. What are Stepper Motors ? Explain the construction and operation of a Variable Reluctance (VR) type stepper motor. *3+4+4=10*

9. Write short notes on any ***two*** of the following : *5+5=10*

   (a) Blondel's Two Reaction Concept

   (b) Starting of Squirrel Cage Motors

   (c) Switched Reluctance Motors