No. of Printed Pages : 3

BIEE-011

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

Term-End Examination

00416

June, 2014

BIEE-011 : ELECTRICAL MACHINES – II

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt any **seven** questions. All questions carry equal marks.*

1. Explain the working principle of 3-phase induction motor. The rotor of induction motor cannot run at synchronous speed. Explain why. *10*

2. For a 3-phase induction motor, prove the relation $P_2 : P_{Cu} : P_{mech} = 1 : S : (1 - S)$, where P_2 is power input to rotor; P_{Cu} is rotor copper loss and P_{mech} is mechanical power developed by rotor, and S is slip of motor. *10*

3. The starting and maximum torques of a 3-phase induction motor are 1·5 times and 2·5 times its full load torque. Determine the percentage change in rotor circuit resistance to obtain a full load slip of 0·03. Neglect starter impedance. *10*

4. A 12 kW, 3-phase, 6-pole, 50 Hz, 400 V, delta connected induction motor runs at 960 rpm at full load. If it takes 85 A on direct starting, find the ratio of the starting torque to full load torque with a star delta starter. Full load efficiency and power factor are 88% and 0·85 respectively. *10*

5. Write short notes on the following : *10*

   (i) Cogging

   (ii) Crawling

   (iii) Hunting

   (iv) Synchronous Condenser

6. Consider a 3300 V delta-connected synchronous motor having a synchronous reactance per phase of 18 Ω. It operates at a leading p.f. of 0·707 when drawing 800 kW from mains. Calculate the excitation emf and the rotor angle (δ). *10*

7. Explain the following : *5+5=10*

   (a) Why are synchronous motors not self starting ?

   (b) What is synchronous impedance ? Why is it called so ?

8. Determine the voltage regulation of a 2000 V, 1-phase alternator giving current of 100 A at 0·8 p.f. lagging. Use the test data given below : Full load current of 100 A is produced on short current by field excitation of 2·5 A, an emf of 500 V is generated on open circuit by same excitation. The armature resistance is 0·8 Ω. *10*

9. (a) Discuss double revolving field theory of a single-phase induction motor. How can the single-phase induction motor be started ? *5*

(b) What will happen if a resistance start induction motor is started with a heavy load and fails to accelerate to a sufficient speed to cause the centrifugal switch contacts to open ? *5*

10. (a) Explain why regenerative braking cannot be applied to a squirrel cage induction motor. Name various types of braking of induction motors. *5*

(b) Write short note on Stepper motor. *5*