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BIEE-012

**B. TECH. VIEP-ELECTRICAL  
ENGINEERING (BTELVI)**

**Term-End Examination**

**June, 2019**

**BIEE-012 : ELECTRO-MECHANICAL ENERGY  
CONVERSION—II**

*Time : 3 Hours*

*Maximum Marks : 70*

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*Note : Attempt any five questions. All questions carry equal marks. Assume any missing data. Draw neat diagrams where required. Use of scientific calculator is allowed.*

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1. (a) Draw and explain the equivalent circuit of a three-phase induction motor. 7
- (b) A 6-pole, 50 Hz, 3-phase induction motor running on full load develops a useful torque of 160 Nm when the rotor emf makes 120 complete cycles per minute. Calculate the shaft power output. If the mechanical torque lost in friction and copper loss is 10 Nm, compute (a) copper loss in rotor winding (b) input to motor and (c) efficiency. Stator losses are 800 watts. 7

(A-35) P. T. O.

2. (a) Explain parallel operation of synchronous generator. 7
- (b) Explain the working and constructional details of three-phase synchronous machine. 7
3. (a) Derive the power flow transfer equations for a synchronous generator. Also draw the relevant power-angle characteristics. 7
- (b) A 400 V, 30-phase, delta connected synchronous motor has an excitation emf of 600 V and synchronous impedance per phase of  $0.3 + j6 \Omega$ . Calculate the net power output, efficiency, line current and power factor when the machine is developing maximum mechanical power (gross). Windage, friction and core losses may be assumed to be 2.4 kW. 7
4. (a) What are various methods for speed control of a three-phase induction motor? Explain any *one* of them. 7
- (b) Explain the similarities and dissimilarities between a three-phase induction motor and a three-phase transformer. 7
5. (a) Explain the effect of armature reaction in a synchronous machine. 7

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- (b) Explain double revolving field theory for single-phase induction motor. 7
6. (a) Explain the working of single-phase induction motors based upon the starting and operating principle. 7
- (b) Explain the construction and working principle of stepper motor. 7
7. Write short notes on any *two* of the following :

7×2=14

- (a) V-curves and Inverted V-curves
- (b) Induction Generator
- (c) Deep-bar and double cage rotor