

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

00518

**Term-End Examination**

**December, 2015**

**BIEE-016 : ELECTRO-MECHANICAL ENERGY  
CONVERSION - III**

*Time : 3 hours*

*Maximum Marks : 70*

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

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1. Write short notes on any *two* of the following :  $2 \times 7 = 14$ 
  - (a) Single phasing of 3-phase Induction Motor
  - (b) Hysteresis Motors
  - (c) Brushless D.C. Motor
  
2. (a) Derive the steady state voltage and current equations for a 1- $\phi$  induction motor from fundamentals. 7
  - (b) Explain the steady state behaviour of a d.c. machine. 7

3. (a) Deduce Park's transformations relating the 3-phase currents of a synchronous machine to the corresponding d-q axes currents. 7
- (b) Draw and explain the power angle characteristics of a 3-phase synchronous machine. 7
4. (a) Draw the basic two-pole schematic diagram of a separately excited d.c. generator. Derive the expressions for generated emf and motional inductance. 7
- (b) A separately excited d.c. motor is applied with a sudden inertial load. Obtain the expression for the motor speed as a function of time. 7
5. (a) Enumerate the assumptions pertaining to the use of generalised mathematical model of d.c. machine. 7
- (b) Using transient analysis for an alternator, ignoring all resistances, derive the expression for transient field current. 7
6. (a) Discuss the effect on electromagnetic torque developed in a 3- $\phi$  induction motor due to (i) variable voltage, constant frequency and (ii) constant voltage, variable frequency, using torque - slip characteristics. 7

(b) Draw the equivalent circuit of an induction motor, for (i) positive sequence voltage ( $V_p$ ), and (ii) negative sequence voltage ( $V_n$ ). 7

7. (a) Explain the principle of operation of a linear induction motor. Derive the expression for linear force developed. 7

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

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