

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

00686

Term-End Examination

June, 2015

**BIEE-008 : ELECTRO-MECHANICAL ENERGY
CONVERSION - I**

Time : 3 hours

Maximum Marks : 70

Note : Attempt any *five* questions. All questions carry equal marks. Use of scientific calculator is allowed.

1. (a) Define and explain the terms 'energy' and 'co-energy'. Also show that energy and co-energy are numerically equal for a linear system. 7

(b) Discuss briefly the general analysis of electromechanical system, and derive an expression for the mechanical force developed in a singly excited system. 7

2. (a) Describe the working of a four point starter for a d.c. shunt motor, with the help of a neat diagram. 7
- (b) Explain what would happen if the d.c. motor is directly switched on to the supply, without any starter. 7
3. (a) A d.c. shunt motor draws 80 A at 220 V on full-load. The armature and field resistances are 0.2 ohm and 110 ohms respectively. If the stray losses amount to 800 W, determine the following : 8
- (i) Output power
- (ii) Electrical efficiency
- (ii) Mechanical efficiency
- (iv) Overall efficiency
- (b) Explain the torque-current characteristics of a d.c. series motor. 6
4. (a) Explain with circuit diagrams, the open-circuit and short-circuit test to be carried out for the determination of the parameters of a single phase transformer. 8
- (b) Derive the condition for maximum efficiency of a single phase transformer. 6

5. (a) Draw and explain complete phasor diagram of a single phase transformer for capacitive load. 7
- (b) Explain the construction and working of an auto-transformer. 7
6. (a) What are the conditions for parallel operation of two 3-phase transformers ? Also write the advantages of a 3-phase transformer over a single-phase transformer. 7
- (b) Draw and explain the open delta connections of a transformer. Also write the applications and disadvantages of it. 7
7. Write short notes on any *two* of the following : $2 \times 7 = 14$
- (a) Hopkinson's Test
- (b) Interpoles and Compensating Windings
- (c) Harmonics in three-phase transformer
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