

No. of Printed Pages : 4

BIEE-008

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

Term-End Examination

June, 2019

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

Time : 3 Hours

Maximum Marks : 70

Note.: Attempt any seven questions out of ten. All questions carry equal marks. Use of scientific calculator is permitted. Make suitable assumptions, if needed.

1. (a) Define field energy and co-energy. What is the significance of co-energy ? 5
- (b) Prove that field energy and co-energy in a linear magnetic system are given by identical expressions. 5

2. Derive an expression for the torque in a doubly-excited system having salient-pole type of stator as well as rotor. State the assumptions made. 10
3. Explain the following : $4 \times 2 \frac{1}{2} = 10$
- (i) Period of commutation
 - (ii) Reactance voltage during commutation
 - (iii) e. m. f. commutation
 - (iv) Resistance commutation
4. Distinguish between self-excited and separately excited d. c. generators. How are self-excited d. c. generators classified ? Give their circuit diagrams. 10
5. Explain the speed-current, torque-current and speed torque characteristics of d. c. series motor. 10
6. (a) Why is the starting current very high in a d. c. motor ? 5
- (b) Discuss the general methods of speed control of d. c. motors. 5

7. Define power efficiency and all day efficiency of a transformer. Obtain the condition for maximum power efficiency of a single-phase transformer. 10
8. A 50 Hz, 1-phase transformer has a turn-ratio of 6. The resistances are 0.90Ω and 0.03Ω and the reactances 5Ω and 0.13Ω for high voltage and low voltage windings respectively. 10

Find :

- (a) the voltage to be applied to the high voltage side to obtain full-load current of 200 A in the low voltage winding on short circuit.
- (b) the power factor on short circuit.
9. Draw and explain the circuit diagram of a transformer arrangement for converting from a 3-phase to a 2-phase supply. 10

10. What are the conditions for satisfactory parallel operation of 1- ϕ transformer ? Deduce expressions for the load shared by two transformers in parallel when no-load voltages of these transformers are not equal. What will be the load distribution if the voltage ratio is exactly equal ?

10