

**B.Tech. IN ELECTRICAL ENGINEERING
(BTELVI)**

Term-End Examination

December, 2012

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

Time : 3 hours

Maximum Marks : 70

Note : Attempt any seven questions out of ten.

1. (a) Give the examples of singly excited and doubly excited electromechanical energy conversion devices. **5x2=10**
(b) Explain the principle of energy conversion. Draw the general representation of electro-mechanical conversion device.

2. (a) Define field energy and co-energy. **5x2=10**
(b) Elaborate the statement "In a round rotor machine (uniform air gap) with exciting coil placed in stator slots no reluctance torque is developed".

3. (a) State the various losses which take place in a transformer. On what factors do they depend ? Explain the steps taken to minimise these losses. **5x2=10**
- (b) Define voltage regulation of a single phase transformer. Deduce the expression for the voltage regulation.
4. (a) Discuss briefly the essential and desirable conditions to be fulfilled for operating two 3 phase transformers in parallel. **5x2=10**
- (b) Show physical connections and phasor diagrams of
- (i) DZO (ii) YdII
5. (a) Draw the scott connection of transformers and mark the terminals and find out the turn ratio **5x2=10**
- (b) What is inrush phenomenon in transformer ?
6. (a) Sketch the external characteristic of a shunt generator and explain the reason for its special nature i.e. part of it is two valued.
- (b) A dc series motor has the following rating : 200v, 20A and 1000 rpm. Armature and series field resistances are 0.1Ω and 0.2Ω respectively. Magnetic circuit assumed to be linear. At what speed the motor will run at rated torque if a resistance of 20Ω is placed in parallel with the armature ? **5x2=10**

7. (a) Derive the emf equation of a single phase transformer and also draw its complete equivalent circuit and full-load phasor diagram at lagging pf. **5x2=10**
- (b) Explain magnetic hysteresis . Also prove that the area of BH loop is directly proportional to hysteresis loss.
8. (a) Describe various 3ϕ transformer connections and compare them. **5x2=10**
- (b) A transformer on no load has a core loss of 50W, draws a current of 2A and has induced emf of 230V. Determine
- (i) No-load pf
 - (ii) Coreloss component
 - (iii) Magnetizing current
9. (a) Explain speed-load characteristic of shunt, series and compound motors. **5x2=10**
- (b) Derive the torque equation of a dc machine.
10. Write short notes on **any two** of the following : **5x2=10**
- (a) Field flashing
 - (b) Armature reaction in dc generators.
 - (c) Magneto striction
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