

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

Term-End Examination

00306

June, 2016

**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 allowed. Make suitable assumptions, if needed.*

1. Write short notes on any **two** of the following : $2 \times 5 = 10$
 - (a) Autotransformer
 - (b) Open Delta Connection
 - (c) Three Point Starter

2. (a) Discuss the mechanical work done by differential movement of armature limb in case of a relay. 5

- (b) Explain the construction of a 1- ϕ reluctance motor. Explain its working principle also. 5

3. (a) Explain the no-load phasor diagram of a transformer. 5
- (b) Explain how no-load parameters are estimated in a transformer by open circuit test. 5
4. (a) Discuss four conditions for the parallel operation of a transformer. 5
- (b) With the help of a phasor diagram of parallel operation of transformers under no-load condition, discuss the effect of core loss component of current. 5
5. (a) Explain commutation in a d.c. machine. 5
- (b) Derive the expression for torque in a d.c. machine. 5
6. (a) Discuss net reduction in the main field flux per pole due to armature reaction. 5
- (b) Explain the effect of cross-magnetizing armature reaction on iron losses. 5
7. (a) Draw a schematic diagram of a d.c. compound machine fitted with interpole and compensating windings. 5
- (b) A commutator with a diameter of 50 cm rotates at 1000 rpm. For a brush width of 1.5 cm, find the time of commutation. 5

8. (a) Draw the circuit diagram of a compound generator with diverter. Explain the use of diverter in d.c. compound generators. 5
- (b) A 15 kW, 230 V, 80 A, 1000 rpm d.c. series motor has the following full load losses expressed in percentage of motor input :
- Armature circuit ohmic loss (including brush loss) = 2.8%
- Field ohmic loss = 2.6%
- Rotational loss = 2.2%
- If the motor draws half the rated current at rated voltage, determine the speed in rpm.
- Make necessary assumptions. 5
9. (a) Discuss series-parallel field control for a d.c. series motor. 5
- (b) Discuss Hopkinson's method on two d.c. shunt machines. 5
10. (a) Explain the condition for zero voltage regulation of a transformer. 5
- (b) Derive the condition for maximum efficiency of a transformer. 5
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