

**DIPLOMA IN ELECTRICAL ENGINEERING  
(DELVI) / ADVANCED LEVEL CERTIFICATE  
COURSE IN ELECTRICAL ENGINEERING  
(ACELVI)**

00282

**Term-End Examination**

**December, 2017**

**BIEE-027 : ELECTRICAL MACHINES – I**

*Time : 2 hours*

*Maximum Marks : 70*

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**Note :** Attempt any **five** questions. Use of scientific calculator is allowed. Missing data, if any, may be suitably assumed.

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1. (a) Derive the emf equation for a dc machine. 7
- (b) Explain the methods of improving commutation in dc machines. 7
  
2. Explain the voltage build-up process in a dc shunt generator. Define critical field resistance, critical speed and critical load resistance for a dc shunt generator. 14

3. A 6-pole dc machine has 300 conductors and each conductor is capable of carrying 80 A without excessive temperature rise. The flux per pole is 0.15 Wb and the machine is driven at 1800 rpm. Compute the total current, emf, power developed in the armature and electromagnetic torque, if the armature conductors are
- (a) Wave-connected,
  - (b) Lap-connected. 14
4. (a) Draw the torque-speed characteristics of dc shunt, series and compound motors in one figure and compare them. 7
- (b) Explain Swinburne's test with a neat schematic diagram. 7
5. (a) Describe the operation of a single phase transformer. Explain clearly the functions of different parts. 7
- (b) What are the various losses in a transformer ? How can the core losses be separated into its components ? 7

6. A single phase, 250/500 V transformer gave the following results :

Open circuit test :

250 V, 1 A, 80 W on l.v. side

Short circuit test :

20 V, 12 A, 100 W on h.v. side

Calculate the circuit constant and show them on an equivalent circuit. 14

7. (a) Discuss the advantages, disadvantages and applications of an autotransformer. Compare it with a two-winding transformer. 7

- (b) Explain three-phase to single-phase conversion for three-phase transformers. 7

8. (a) Discuss the phenomenon of Inrush Current in three-phase transformers. 7

- (b) Distinguish between Power and Distribution transformers. 7
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