# DIPLOMA IN MECHANICAL ENGINEERING (DME)

01453

## Term-End Examination

## December, 2012

## BEE-031 : ELECTRICAL TECHNOLOGY

*Time : 2 hours* *Maximum Marks : 70*

***Note :*** *Attempt **four** questions in all. Question no. **1** is **compulsory**. Attempt **any three** of the remaining questions. Use of calculator is allowed.*

**1.** State ***true*** or ***false*** for the following statements : **10x1=10**

(a) The passive elements are those elements which are capable of supplying energy to the network elements.

(b) Maximum power is delivered from a source to a variable load when the load resistance is maximum.

(c) As per Faraday's law, the induced emf in a conductor is directly proportional to rate of change of flux linked with the conductor.

(d) Due to cross-magnetising effect, DC machines have poor commutation.

(e) The transforms oil should poses low dielectric strength.

(f) Ideally, the voltage regulation of a transformer should be unity.

(g) When running normally, the slip-rings of an induction motor kept short-circuited.

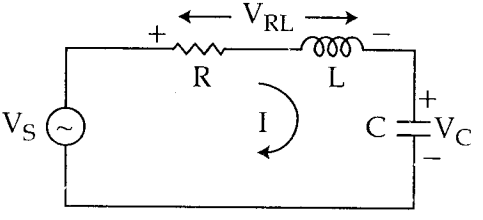
(h) Direct on-line (DOL) starters are not suitable for all types of induction motors.

(i) The short-circuit characteristic of an alternator is the B-H curve of the complete magnetic circuit of the alternator.

(j) When a balanced three phase supply is given to a balanced three phase winding of an ac motor, a rotating magnetic field will be developed.

2. (a) What are the merits of three phase system relative to single phase system ? **10**

(b) A practical lossy inductor coil which has $R = 10\Omega$ and $L = 200mH$ is series with a 10 uF capacitor is connected across a 200V, 50Hz source. Find current in circuit and draw phasor diagram using voltages across each element. **10**



3. (a) Derive the expression for torque developed in a DC machine. **10**

(b) A shunt wound motor runs at 500 rpm from a 200 volt supply. Its armature resistance is 0.5 ohm and the shunt field resistance is 100 ohms and takes 32 amperes line current from the supply. What resistance must be added to armature circuit so that the speed is reduced to 300 rpm ? The armature and field currents remaining the same. Neglect brush drop. **10**

4. (a) What are different types of losses in a transformer ? How are they measured ? **10**

(b) A single phase transformer has 2% resistive drops and 5% reactive drop. Calculate its VR at full load. (a) 0.8 lagging PF and (b) 0.8 leading PF. **10**

5. (a) Derive the expression for EMF equation of an alternator considering the effect of distribution (distribution factor) and coil throw (pitch factor). **10**

(b) An induction motor is rated at 5 kW at 1440 rpm, 50 Hz, 400 V line to line voltage. The rotational losses due to friction and windage are 279 watts. If maximum torque is developed at 900 rpm, determine the maximum torque developed. **10**

6. State and explain *any two* of the following : **2x10=20**

(a) Norton's Theorem

(b) Maximum Power Transfer Theorem

(c) Reciprocity Theorem