No. of Printed Pages : **4**

BEE-031

01705

Diploma in Electrical and Mechanical Engineering

Term-End Examination

June, 2012

BEE-031 : ELECTRICAL TECHNOLOGY

Time : 2 hours *Maximum Marks : 70*

Note : *Attempt **four** questions in all. Questions 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 active elements are those elements which are capable of supplying energy to the network elements like voltage and current sources.

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

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

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

(e) The transforms oil should possess high dielectric strength.

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

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

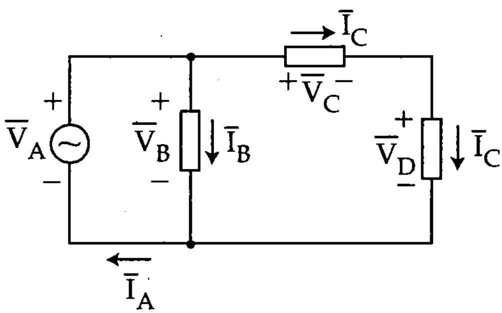
(h) Direct on - Line (DOL) starters are suitable for all types of induction motors.

(i) The open - circuit characteristic of an altternator 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 static magnetic field will be developed.

2. (a) Derive the expressions for average and effective value of a sinusoid. **10**

(b) In the following network, If $\overline{V}_A = 10 + ja$, $a>0$, $\overline{V}_B = 26 \angle\theta$, $\overline{V}_C = 20 + jb$, $\overline{V}_D = C + j4$, $\overline{I}_A = 6 + j8$, $\overline{I}_B = 4 + jd$ and $\overline{I}_C = e + j2$, then calculate θ, a, b, c, d and e. **10**



3. (a) Derive the expressions for emf induced in a DC machine for lap and wave wound armature. **10**

(b) A long shunt compound generator delivers a load current of 50A at 500V and has armature, series - field and shunt field resistance of 0.05 Ω, 0.03 Ω and 250 Ω respectively. Calculate the generated emf and the armature current. Allow 1.0volt per brush for contact drop. Also draw the circuit diagram of this arrangement. **10**

4. (a) Derive the emf equations on primary and secondary sides of the transformer and, write, the relationship between RMS values of induced emf on both sides. **10**

(b) The magnetising current on the HT side of a 440/220V single phase transformer is 2.8A. Determine the HT current and the power factor for the following loads on the LT side: **10**

(i) 25 amperes at unity power factor

(ii) 25 amperes at 0.85 power factor lagging

Neglect iron-loss component of no-load current.

5. (a) Derive the expression for torque and draw Torque - slip characteristic of a 3-phase induction motor. **10**

(b) The stator of a 12 pole, 600 rpm alternator has single layer winding with 12 slots per pole wound with full pitch coils of 40 turns each. The flux per pole is 0.029 weber and the current per conductor is 45 amperes. Assuming sinusoidal flux distribution, calculate the KVA output of the stator with single phase and 3-phase connections. **10**

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

(a) Superposition Theorem

(b) Thevenin's Theorem

(c) Reciprocity Theorem