01395

Diploma in Electrical and Mechanical Engineering

Term-End Examination

June, 2010

BEE-031 : ELECTRICAL TECHNOLOGY

Time : 2 hours *Maximum Marks : 70*

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

1. State **true** or **false** for the following statements : **14x1=14**

(a) If a metallic conductor is stretched to 4 times of its original length, its resistivity will decrease four times however its resistance would remain unchanged.

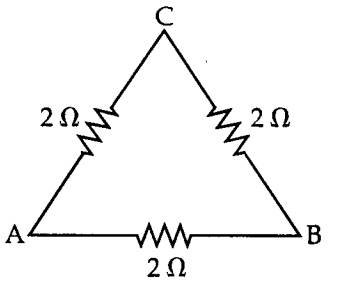
(b) The core of the transformer is made of soft iron in order to minimize Hysteresis losses.

(c) A transformer is based on the principle of self induction.

(d) Coercivity of material should be high for using it to make core of a choke coil or transformer.

(e) If an inductor is connected to a single phase a.c. supply, the current flowing through it lags behind the applied voltage by 90°.

(f) Equivalent resistance for the given network between terminals A and B is 1.33 Ω.



(g) Commutator is made of wedge shaped segment of drop forged and hard drawn copper.

(h) Speed control by means of an adjustable voltage generator connected across armature terminals of the motor is called ward Leonard system.

(i) A voltmeter is always connected in series with the circuit as its resistance is very large.

(j) The frequency generated by a 6 pole alternator that rotates at 1000 rpm is 50 Hz.

(k) Nortons theorem results in current source in series with an impedance.

(l) Transformation ratio for an ideal transformer is unity.

(m) Use of Autotransformer starters reduces the power factor of the circuit.

(n) Salient pole construction is suitable for slower machines.

2. (a) With the help of diagram explain the working of a synchronous motor. 7

(b) Make comparison in Induction motor and synchronous motor. 7

3. (a) Derive an expression for the emf generated per phase in an Alternator. 7

(b) Explain the concept of Armature Reaction in Alternators. 7

4. Discuss the various methods of starting a 3 phase induction motor along with their merits and demerits. 14

5. (a) With the help of a diagram explain the working of a current transformer. 7

(b) A single phase transformer has a core whose cross sectional area of 150 cm^2, operates at a maximum flux density of 1.1 Wb/m^2 from 50 Hz supply. The secondary winding has 66 turns. Determine output in kVA when connected to a load of 4Ω impedance. Assume all voltage drops to be negligible. 7

6. (a) Draw a labelled exact equivalent circuit of a real transformer. 7

(b) Discuss the various losses taking place in a transformer. 7

7. (a) Derive the expression for Back EMF in D. C. motor. 7

(b) The emf induced in the armature of a 450 kW, 250 volt shunt generator is 258.8 volts when the field current is 20 amp. and the generator is supplying power to a load at rated terminal voltage. The armature circuit resistance is 0.005Ω. Determine : 7

(i) Load current

(ii) Power generated

(iii) Power output

(iv) Electrical efficiency

(v) Neglect brush contact drop

8. Explain ***any two*** of the following : **2x7=14**

(a) Thevenins theorem

(b) Reciprocity theorem

(c) Norton theorem

(d) Superposition theorem