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BEE-031

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Diploma in Electrical and Mechanical Engineering

Term-End Examination

December, 2011

BEE-031 : ELECTRICAL TECHNOLOGY

Time : 2 Hours *Maximum Marks : 70*

Note : *Attempt **five** questions in all. Question **1** is **compulsory**.*

1. (a) Select the correct answer from the given options. **7x1=7**

(i) Internal Resistance of ideal voltage source is :

(A) Zero

(B) Infinite

(C) 1 ohm

(D) None of the above

(ii) Superposition Theorem is valid in :

(A) DC networks

(B) AC networks

(C) Both DC and AC networks

(D) None of the above.

(iii) Transformer is used to connect two :

(A) DC networks

(B) AC networks

(C) DC and AC networks

(D) None of the above

(iv) Which motor has highest starting torque :

(A) DC series motor

(B) DC shunt motor

(C) DC compound motor

(D) None of the above

(v) When a synchronous motor used as synchronous condensor it operates as :

(A) Unity power factor load.

(B) Lagging power factor load.

(C) Leading power factor load.

(D) None of the above.

(vi) In $3-\phi$ Induction motor, Maximum torque developed when.

(A) $R_2 = 0$ (B) $X_2 = 0$

(C) $R_2 = X_2$ (D) $s = \frac{R_2}{X_2}$

(vii) Pitch factor is :

(A) $Kp = \cos \alpha$

(B) $Kp = \cos \frac{\alpha}{2}$

(C) $Kp = \cos 2\alpha$

(D) None of the above

(b) Write ***true or false*** for the following statements : **7x1=7**

(i) For maximum power transfer in any DC network, the source resistance will be same as load resistance :

(ii) DC generator does not contain commutator.

(iii) CD shunt motor has zero starting torque.

(iv) In transformer, no load current is only 2% to 5% of rated current.

(v) 3 - phase Induction motor always operates at unity power factor.

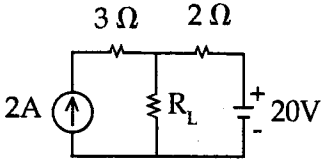
(vi) Synchronous motor has zero starting torque.

(vii) A reciprocal network consists of bilateral elements only.

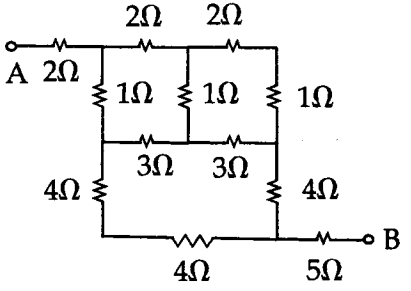
2. (a) Write merits of 3 - phase AC system over the single phase AC system. 7

(b) Explain R-L-C Series Resonance and write significance of Quality factor and Band width. 7

3. (a) Explain Thevenin's Theorem and find maximum power dissipated across R_L in network shown in Fig : 7



(b) Find R_{AB} for the network shown in fig : 7



4. (a) Write the necessary conditions for self excited generators. Explain voltage build-up phenomenon in DC shunt generator. 7

(b) A 250 volt DC shunt motor having an armature resistance of 0.25 ohm carries an armature current of 50 A and runs at 750 RPM. If the flux is reduced by 10%. Find the speed if torque remains the same. 7

5. (a) Draw the torque-slip characteristic of 3-phase Induction motor and explain it. 7

(b) Explain the following : 7

(i) Star - Delta starter

(ii) Auto transformer starter

6. (a) Discuss the following : 8

(i) EMF equation of synchronous generator.

(ii) Zero power factor method to find voltage regulation of alternator.

(b) A load in a factory is 240 KW at 0.8 pf lagging. When a 60 KW synchronous condensor (synchronous motor) is connected with factory, the pf of combination is 0.9 pf lagging. Calculate Reactive KVAR supplied by motor and leading power factor at which motor is working. 6

7. Write short notes on ***any two*** of the following : **7x2=14**

(a) Starting methods of synchronous motor.

(b) Synchronization of alternators.

(c) OCT and SCT on transformer.

(d) DC motor characteristics.
