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BEE-031

DIPLOMA IN MECHANICAL ENGINEERING (DME)

Term-End Examination

June, 2015

00041

BEE-031 : ELECTRICAL TECHNOLOGY

Time : 2 hours *Maximum Marks : 70*

Note : *Attempt **five** questions including question no. **1** which is **compulsory**. Use of calculator is allowed.*

1. (A) Select the correct answer from the given options. *7×1=7*

(a) For traction work, the motor used is

(i) Induction motor

(ii) DC Series motor

(iii) DC Shunt motor

(iv) Synchronous motor

(b) In case of transformer, the frequency of output supply is

(i) equal to that of input supply

(ii) greater than input supply

(iii) less than input supply

(iv) Cannot be said

(c) For maximum power transfer to the load, the condition required is

(i) $R_L = 2\,R_s$

(ii) $R_L = R_s$

(iii) $R_L = R_s / 2$

(iv) $R_L = 4\,R_s$

(d) In a capacitive circuit, power factor is

(i) 1

(ii) leading

(iii) lagging

(iv) 0·8 always

(e) Long distance power transmission is always preferred due to

(i) less line power loss

(ii) less conductor size required

(iii) less voltage drop along the line

(iv) All the above

(f) The equivalent resistance across AB in Figure 1 is

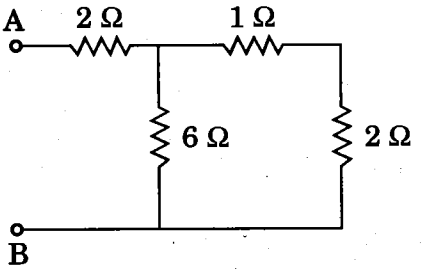

Figure 1

(i) 1 Ω

(ii) 4 Ω

(iii) 6 Ω

(iv) 2 Ω

(g) The unit of capacitive reactance (X_c) is

(i) Henry

(ii) Ohms

(iii) Farad

(iv) Curie

(B) Write *True* or *False* for the following statements : *7×1=7*

(a) DC generator does not contain commutator.

(b) Hysteresis losses occur in diamagnetic materials.

(c) The voltage between two phases of a 3-ϕ supply is called line voltage.

(d) 3-phase induction motor always operates at unity power factor.

(e) Lap winding is used in induction motor.

(f) Only one kind of flux is associated with alternator.

(g) A synchronous machine has both stator and rotor.

2. (a) Find the equivalent resistance between the terminals A and B in Figure 2. Every arm of the cube has a resistance of 2 Ω. *7*

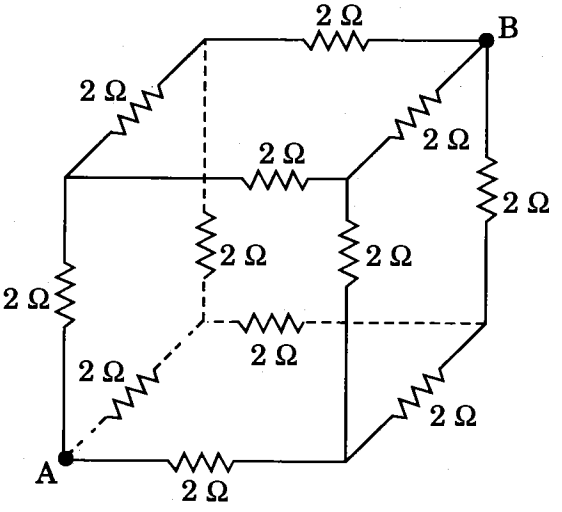

Figure 2

(b) State and prove maximum power transfer theorem for a dc network. *7*

3. (a) Draw the Thevenin's equivalent of the circuit shown in Figure 3 across points A and B. Also calculate the current flowing through branch AB. 7

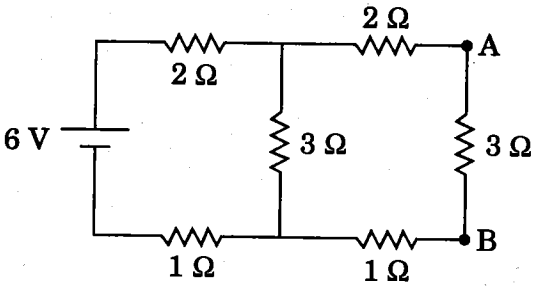

Figure 3

(b) State and explain Norton's theorem with the help of a suitable example. 7

4. (a) Explain the concept of armature reaction in a dc machine. 7

(b) Draw the various characteristics of a dc generator. 7

5. (a) Derive the emf equation of a transformer. 7

(b) Draw and discuss the equivalent circuit of a transformer. 7

6. (a) Discuss the torque-slip characteristics of a 3-phase induction motor. 7

(b) Draw the circuit diagram of an auto transformer starter and give its advantages and disadvantages. 7

7. (a) Explain the working principle of an alternator. 7

(b) With the help of a diagram, explain the working principle of a synchronous motor. 7