01862

Diploma in Electrical and Mechanical Engineering

Term-End Examination

June, 2011

BEE-031 : ELECTRICAL TECHNOLOGY

Time : 2 Hours *Maximum Marks : 70*

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

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

(i) RMS value of current $i = 10 + 10 \sin\theta$ is :

(A) 10 A (B) $10\sqrt{2}$ A

(C) $\sqrt{150}$ A (D) $\left(10 + \frac{10}{\sqrt{2}}\right)$A

(ii) Distribution factor is :

(A) $\cos\frac{\alpha}{2}$

(B) $\frac{\sin(m\beta/2)}{m\sin(\beta/2)}$

(C) $\frac{m\sin(\beta/2)}{\sin(m\beta/2)}$

(D) None of the above

(iii) In R-L-C series resonance circuit at resonance frequency, net Impedance of circuit is :

(A) $Z = 0$

(B) $Z = R$

(C) $Z = \infty$

(D) None of the above

(iv) Maximum efficiency of transformer occurs when :

(A) $P_i = 0$

(B) $P_c = 0$

(C) $P_L = x^2 P_c$

(D) None of the above

here P_L is iron loss and P_c is full load copper loss.

(v) A 4 pole Induction motor connected with 400 Volt, 3-phase, 50 Hz ac supply. The speed of rotating magnetic field is :

(A) 1000 RPM (B) 1500 r.p.m

(C) 3000 RPM (D) 1200 r.p.m

(vi) Which generator is suitable for Resistance welding ?

(A) d.c. Series generator

(B) d.c. Shunt generator

(C) d.c. Compound generator

(D) None of the above

(vii) For Synchronous motor V-curves are a graph between :

(A) excitation current and generated e.m.f.

(B) excitation current and armature current

(C) excitation current and power factor

(D) none of the above

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

(i) A linear network always follow the principle of superposition and homogenity.

(ii) Series Resonance circuit has voltage amplification.

(iii) In a transformer Negative voltage regulation is possible only for capacitive load.

(iv) Using Flux control method for speed control, speed of d.c. shunt motor, can increase above Rated value.

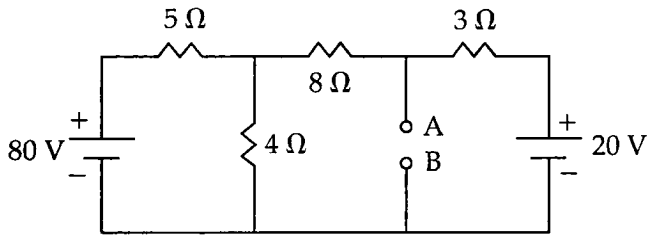
(v) For 3-phase induction motor torque is zero when slip is zero.

(vi) For RYB phase sequence in 3-phase, the Rotating magnetic field rotates in clockwise direction.

(vii) Synchronous motor always operates as leading power factor load.

2. (a) Explain R-L-C Series Resonance Circuit using Phasor and Vector diagrams. Write significance of quality factor. 7

(b) Obtain Thevenin's equivalent circuit between terminals A and B for network shown below. 7



3. (a) Explain various characteristics of dc shunt motor and write its applications. 7

(b) A 4-pole lap wound dc Shunt generator is rated for 500 Volt. It delivered 20 Ampere current to the load. Its armature circuit and field winding resistances are 1Ω and 200 Ohm respectively. Calculate. 7

(i) e.m.f. induced in armature

(ii) If armature contain 500 conductors and speed of rotation of armature is 1000 rpm than find flux per pole.

Assume voltage drop across carbon brush is 2 Volt/brush.

4. (a) Explain the following. 6

(i) All day efficiency of transformer

(ii) Voltage regulation

(b) A 100 kVA, transformer has 2 kW iron loss and 8 kW Full Load copper loss. Find load, at which maximum efficiency occurs. Also calculate efficiency at this load. 8

Assume unity load power factor.

5. (a) Explain concept of Rotating Magnetic field and Discuss working of 3-phase Induction motor. 7

(b) A-3 - phase Induction motor has a 4-pole star connected winding. The motor runs on a 50 Hz supply with 200 Volt between lines. The rotor resistance and stand still Reactance are 0.1 Ω and 0.9 Ω respectively. The ratio of rotor to stator turns is 0.67. Calculate the total torque at 4% slip. 7

6. (a) Explain the following. 8

(i) MMF method to determine voltage regulation of Alternator

(ii) Synchronization of alternators

(b) Explain why synchronous motor, fails to start. Write various starting methods. 6

7. Write short notes on ***any two*** of the following. **2x7=14**

(a) Superposition Theorem

(b) Voltage build-up phenomenon of dc shunt generator

(c) Speed control of 3-phase induction motor

(d) Synchronous condenser