No. of Printed Pages : 5

BEE-031

DIPLOMA IN MECHANICAL ENGINEERING (DME)

00200

Term-End Examination

June, 2014

BEE-031 : ELECTRICAL TECHNOLOGY

Time : 2 hours *Maximum Marks : 70*

Note : *Attempt* ***five*** *questions including Question no.* ***1*** *which is* ***compulsory****. Use of scientific calculator is permitted.*

1. (A) Choose the most correct answer from the following questions : *8×1=8*

(i) The two windings of a transformer are

(a) conductively linked

(b) inductively linked

(c) electrically linked

(d) not linked at all

(ii) A ceiling fan uses

(a) Split-phase motor

(b) DC motor

(c) Universal motor

(d) Capacitor start motor

(iii) A sinusoidal current has an rms value of 14 mA. The peak-to-peak value is

(a) 45·12 mA

(b) 28 mA

(c) 39·6 mA

(d) 22·6 mA

(iv) A thermistor is a type of

(a) Switch

(b) Resistor

(c) Battery

(d) Power supply

(v) The unit of electric charge is

(a) Volt

(b) Ampere

(c) Joule

(d) Coulomb

(vi) The direction of magnetic field within a magnet is

(a) from South to North

(b) from North to South

(c) from back to front

(d) None of the above

(vii) The ability of a material to remain magnetised after removal of the magnetising force is known as

(a) Permeability

(b) Hysteresis

(c) Reluctance

(d) Retentivity

(viii) When the voltage across the capacitor is doubled, the stored charge

(a) is cut to half

(b) remains the same

(c) doubles

(d) None of the above

(B) Write *true* or *false* for the following statements : *6×1=6*

(i) Hysteresis is the number of lines of force per unit area in a magnetic field.

(ii) Power factor of small induction motors is around 0·8 and that of large motors around 0·9.

(iii) Electromagnetic induction is the force that produces a magnetic field.

(iv) Harmonic losses, skin effect and pulsation losses in induction motor are accounted for as stray losses.

(v) Leakage flux in a transformer occurs because iron core has high permeability.

(vi) Ohm's law is applicable to all conductors of electricity.

2. (a) Compare the transformer with a induction motor. 7

(b) Discuss the open delta connection in transformers. 7

3. (a) Explain the working principle of single phase induction motor. 7

(b) How is the speed of DC shunt motor controlled ? 7

4. (a) A 230 volt DC shunt motor with constant field drives a load whose torque is proportional to the speed. When running at 750 rpm it takes 30 A. Find the speed at which it will run if a 10 ohm resistance is connected in series with the armature. The armature resistance may be neglected. 7

(b) Draw and explain the phasor diagram of a transformer on load at a lagging power factor. 7

5. (a) The power input to a 500 V, 50 Hz, 6-pole 3-phase squirrel cage induction motor running at 975 rpm is 40 kW. The stator losses are 1 kW and the friction and windage losses are 2 kW.

Calculate

(i) Slip

(ii) Rotor copper loss

(iii) Mechanical power developed

(iv) The efficiency $2 \times 4 = 8$

(b) Draw the torque – speed characteristics of a 3-phase induction motor and clearly indicate the effect of change in rotor resistance. 6

6. (a) Write the applications of synchronous motors. *5*

(b) Explain the principle of construction of alternator. *9*

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

(a) Thevenin's Theorem

(b) Cooling of Transformer

(c) Various losses in Transformer

(d) Construction and working of Selsyns.