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BIEE-027

DIPLOMA IN ELECTRICAL ENGINEERING (DELVI) / ADVANCED LEVEL CERTIFICATE COURSE IN ELECTRICAL ENGINEERING (ACELVI)

00356

Term-End Examination

June, 2015

BIEE-027 : ELECTRICAL MACHINES – I

Time : 2 hours *Maximum Marks : 70*

Note : *Question 1 is **compulsory.** Attempt any **four** out of questions no. 2 to 8.*

1. Attempt all the parts. *7×2=14*

(a) Back emf of a DC motor is proportional to

(i) Speed

(ii) Flux

(iii) Both (i) and (ii)

(iv) Neither (i) nor (ii)

(b) Brushes in a DC machine are made of

(i) Asphalt

(ii) Graphite

(iii) Diamond

(iv) Copper

(c) In a DC shunt motor, if flux decreases

(i) speed increases

(ii) speed decreases

(iii) speed remains same

(iv) None of the above

(d) Temperature rise can be determined in the transformer by

(i) Open circuit test

(ii) Short circuit test

(iii) Load test

(iv) Sumpner test

(e) The hysteresis loss in the transformer core

(i) remains constant with load changing

(ii) is proportional to frequency

(iii) depends on thickness of core

(iv) depends on secondary current

(f) Scott connection is used for

(i) two phase to single phase conversion

(ii) three phase to two phase conversion

(iii) three phase to twelve phase conversion

(iv) parallel operation of transformers

(g) Interpoles are used in

(i) DC machines

(ii) Induction motor

(iii) Transformer

(iv) Speed control

2. (a) Derive the equation for induced emf of a DC machine. 7

(b) A shunt generator gives full load output of 30 kW at a terminal voltage of 200 V. The armature and field resistances are 0·05 Ω and 50 Ω respectively. Calculate the generated emf. 7

3. (a) What are the different tests conducted on a DC machine ? Explain Swinburne test. 7

(b) Why are starters needed in a DC machine ? Explain 3-point starter with a neat diagram. 7

4. (a) A 460 V series motor runs at 500 rpm taking a current of 40 A. Calculate the speed and percentage change in torque, if the load is reduced and motor takes 30 A. Total resistance of the armature and field circuit is 0·8 Ω. 7

(b) What are the applications of DC series, DC shunt and compound motors ? 7

5. (a) Obtain the equivalent circuit of a single phase transformer referred to primary side. Define the parameters involved. 7

(b) What are the advantages and disadvantages of auto transformers compared to two winding transformers ? 7

6. (a) In a transformer, the core loss is 100 W at 40 Hz and 72 W at 30 Hz. Find the hysteresis and eddy current losses at 50 Hz. 7

(b) What are the differences between Power and Distribution transformers ? 7

7. (a) Draw the connection diagram and phasor diagram for the following three-phase transformer configurations : 7

(i) Delta – Delta ($\Delta - \Delta$)

(ii) Star – Delta ($Y - \Delta$)

(b) Explain the phenomenon of inrush current in transformers. 7

8. Write short notes on any ***four*** of the following : $4 \times 3\frac{1}{2} = 14$

(a) Lap and Wave type armature winding

(b) Compounded DC generators

(c) Losses in transformer

(d) Ward-Leonard method of speed control

(e) DC motor characteristics

(f) Tap changing transformer

(g) No-load current