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BIEE-027

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

Term-End Examination 03082

December, 2011

BIEE-027 : ELECTRICAL MACHINES - I

Time : 2 hours *Maximum Marks : 70*

Note : *Attempt **any five** (5) questions. Each question carry **equal** marks. Question - **1** is **compulsory**.*

1. All parts of the following objective type questions are compulsory. All parts carry equal mark. **2x7=14**

(a) In a dc machine, the coil span :

(i) Must be equal to pole pitch

(ii) May or may not be pole pitch

(iii) Can never be equal to pole pitch

(iv) Is equal to half pole pitch

(b) For providing proper commutation it is advisable to use :

(i) Emf commutation

(ii) Resistance Commutation

(iii) Both emf and Resistance commutation

(iv) Either of two but not both

(c) A dc shunt generator has a full-load voltage regulation of 10%. If the generator is separately excited and delivers rated load, the regulation will be :

(i) 10 %

(ii) more than 10%

(iii) less than 10%

(iv) 0

(d) The torque developed by a dc motor is proportional to :

(i) Flux

(ii) Armature current

(iii) Flux and armature current

(iv) None of the above

(e) The number of turns in the primary winding of a single phase transformer depends on :

(i) Applied voltage

(ii) Line current

(iii) Both applied voltage and current

(iv) Applied voltage, current and efficiency

(f) An auto-transformer results in saving of material if :

(i) Turn ratio is high

(ii) Turn ratio is low

(iii) Rating of transformer is high

(iv) Rating of transformer is low

(g) Three phase transformer connections most commonly used are :

(i) $\Delta - \Delta$

(ii) $Y - Y$

(iii) $\Delta - Y$ and $Y - \Delta$

(iv) $\Delta - \Delta$ and $\Delta - Y$

2. (a) Discuss the main features of dc machine windings. Differentiate between lap and wave winding and name their field of application. **7x2=14**

(b) What is commutation ? Explain any one method to improve it.

3. (a) What are the different methods of testing D.C. machine ? Explain Swinburne's method of testing. **7x2=14**

(b) An 8-pole dc generator has 480 armature conductors and a wave winding. The armature current is 200 Δ. Find the armature reaction demagnetising and cross-magnetising ampere turns, if (i) brushes are on gnp, (ii) brushes are shifted by 6° electrical from gnp, (iii) brushes are shifted by 6° mechanical from gnp.

4. (a) Discuss the various method of speed control of D.C. motor. 7x2=14

(b) A 60 hp, 230V dc shunt motor has armature resistance of 0.05 Ω and field circuit resistance R_f of 46 Ω. The no load speed is 1000 rpm. Find the speed when line current is (i) 75 A, (ii) 150 A, (iii) 250 A. Assume that the motor has compensating winding.

5. (a) Discuss the principle of operation of construction of single phase transformer. 7x2=14

(b) Discuss the advantages, disadvantages and applications of auto-transformer. Compare it with a two-winding transformer.

6. (a) Give reasons - During the open circuit test, the copper losses are negligible and during short circuit test, the iron losses are negligible. 7x2=14

(b) A 200 kVA, 2000/440V, 50Hz single phase transformer gave the following test results :

OC test (hv) 2 kV, 1.75 kW, 1.8A

SC test (lv) .13V, 1 kW, 300A

Find (i) parameter of equivalent circuit as refer to h.v. side, (ii) regulation and efficiency at full load, 0.8 p.f. lagging.

7. (a) A single phase 50 Hz 1200/120V transformer gave the following results of open circuit test with high voltage winding open circuited : Applied voltage 120 V, current 16A, power input 400W. find (i) core losses, (ii) no-load power factor, (iii) magnetising and core, loss components of no-load current. **7x2=14**

(b) A 6600/400/110V, star/star/mesh, three phase transformer has a magnetising current of 5.5 A and balance 3 phase loads of 1000 kVA at 0.8 lagging power factor on the secondary and 200 kVA at 0.5 leading power factor on tertiary. Neglect losses. Find primary current, kVA and power factor.

8. Write short notes on ***any four*** of the following : **3.5x4=14**

(a) Armature Reaction in DC machine.

(b) Why DC series motor is never started without any mechanical load on it ?

(c) Need of starter in DC motor.

(d) Equivalent circuit of transformer.

(e) Parallel operation of single phase transformer.

(f) Open data connection of 3 phase transformer.
