No. of Printed Pages : 5 **BIEE-027**

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

00969

Term-End Examination

June, 2012

BIEE-027 : ELECTRICAL MACHINES - I

Time : 2 hours *Maximum Marks : 70*

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

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

(a) The commutator pitch of a lap winding for a DC machine is

(i) $+1$

(ii) -1

(iii) $+1$ or -1

(iv) none of the above.

(b) Interpoles are used in

(i) lap wound machine.

(ii) wave wound machine.

(iii) both wave and lap wound machine.

(iv) none of the above.

(c) The separately excited dc generator has an open circuit voltage E_0 for a certain value of field current. If the field current is double the open circuit voltage.

(i) will be $2E_0$

(ii) will be less than or more than $2E_0$

(iii) may be $2E_0$ or less than $2E_0$

(iv) may be $2E_0$ or more than $2E_0$

(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 purpose of using laminated core in transformer is

(i) to reduce copper losses.

(ii) to reduce all losses.

(iii) to reduce hysteresis losses.

(iv) to reduce eddy current losses.

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

(i) a turn ratio is high

(ii) turn ratio is low

(iii) rating of transformer is high

(iv) rating of transformer is low.

(g) The maximum value of inrush current in a transformer depends on :

(i) instant of switching

(ii) residual flux density

(iii) instant of switching and residual flux density

(iv) none of above

2. (a) Derive the equation for induced emf of DC machine. **7x2=14**

(b) What is armature reaction in DC machine. Derive the torque equation of motor ?

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

(b) Two shunt are operating in parallel. Generator 1 has no emf load 405V and terminal voltage of 375 V when supplying 80A. Generator 2 has no - load emf of 405V and a terminal voltage of 370V when supplying 80A. If total load is 120A. Find the current supplied by two generators and the terminal voltage ?

4. (a) Why starters are used in DC machines ? Explain 3 point starter method of starting DC motor. **7x2=14**

(b) A 35hp, 230V DC series motor has an armature resistance of 0.07Ω, series field resistance of 0.08 Ω and brush voltage drop of 2V. When the line current is 95A, speed is 700 rpm Find .

(i) Speed when line current is130A.

(ii) Speed when line current is 130A and a diverter having a resistance of 0.08Ω is connected across the field. Assume that flux is proportional to line current.

5. (a) Draw the exact equivalent circuit of a transformer and describe briefly the various parameters involved in it ? **7x2=14**

(b) Discuss the advantages and disadvantages and application of auto transformer. Compare it with a two winding transformer ?

6. Explain why **3.5x4=14**

(a) The open circuit test on a transformer is conducted as rated voltage.

(b) Only a low voltage is applied to a transformer during short circuit test.

(c) Usually the low voltage winding is excited and the high voltage winding. Open circuited for the open circuit test and;

(d) Usually the low voltage winding is short circuited and high voltage winding is excited for the short circuit test.

7. (a) Explain the following connections giving suitable diagram. **7x2=14**

(i) Open delta connection

(ii) 3 - phase to 6 - Phase conversion

(iii) 3 - phase to 12 conversion.

(b) A balanced 3 - phase, 200 kW load at 400V and 0.8 power factor logging is to be supplied from a two phase 1100V supply. Determine voltage and currrent rating of each winding of scott connected transformer and KVA rating of each unit.

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

(a) Commtation process in DC machine.

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

(c) Ward - leonar method of speed control.

(d) Transformer efficiency.

(e) Parallel operation of single phase transformer.

(f) Inrush current phenomenon.
