

3E1645

Roll No. \_\_\_\_\_

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**3E1645**

**B. Tech III Sem. (Main/Back) Exam. Jan. 2016**  
**Electrical & Electronics Engineering**  
**3EX5A Electrical Machines - I**  
**EE, EX**

**Time: 3 Hours**

**Maximum Marks: 80**  
**Min. Passing Marks: 24**

*Instructions to Candidates:*

*Attempt any five questions, selecting one question from each unit. All questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

*Units of quantities used/calculated must be stated clearly.*

*Use of following supporting material is permitted during examination. (Mentioned in form No. 205)*

1. NIL

2. NIL

**UNIT-I**

- Q.1 (a) Explain principle of conversion of energy in electro-mechanical system and give its general representation. [12]
- (b) A circuit coil of 500 turns with a mean diameter of 50 cms is rotated about a vertical axis in the earth's field at 40 revolutions per second. Find the instantaneous value of emf induced in the coil when its plane P is - [4]
- (i) Parallel
- (ii) Inclined at 30° degree to the magnetic meridian.

Take value of H as 14.3 AT/m.

**OR**

Q.1 (a) Derive the expression of torque developed in closely excited magnetic system. Clearly explain the assumptions made. [8]

(b) Two coils with self inductance 1H and 4H have a mutual inductance of 1H. The RMS value of current flowing in the two coils is 4A and 1A respectively. [8]

Find-

- (i) The coupling factor
- (ii) The energy stored in magnetic system

**UNIT-II**

Q.2 Write short note on commutation in DC machine. Discuss the method of improving commutation? [16]

**OR**

Q.2 What are the different types of dc generators according to the ways in which fields are excited? Show the connection diagram of each type. [16]

**UNIT-III**

Q.3 Explain the Hopkinson's Method of testing of the dc machines. Differentiate this model with the Swinburne's method of testing of the dc machines. Can the Swinburne's method of testing of the dc machines be applied on dc series machines? [16]

**OR**

Q.3 (a) Establish an expression for the speed of dc motor with the help of neat connection diagram. Explain the method of controlling the speed of dc motor below and above the rated speed. Justify the statement that dc series motors are never started at no load. [10]

- (b) A 250V dc shunt motor runs at 1000 rpm at no load & takes 5Amp. The total armature and shunt yield resistance are  $0.2\Omega$  &  $250\Omega$  respectively. Calculate the speed under loaded condition taking 50Amp. The armature reaction weakens the yield by 3%. [6]

#### UNIT-IV

- Q.4 In what way a practical transformer differ from an ideal transformer? Develop an equivalent circuit for the practical transformer. [16]

OR

- Q.4 (a) Explain the process of finding efficiency of transformer by Sumpner's test. [12]  
(b) What is Welding Transformer? [4]

#### UNIT-V

- Q.5 (a) Explain the Scott connection with proper circuit diagram. [8]  
(b) Write short note on open – delta connection. [8]

OR

- Q.5 (a) Explain in detail the double star connection for obtaining 6-phase supply from 3-phase supply. [8]  
(b) Write short note on inrush of magnetizing current in poly phase transformer. [8]