

Enrollment No:-\_\_\_\_\_

Exam Seat No:-\_\_\_\_\_

# C.U.SHAH UNIVERSITY

Summer-2015

Subject Code: 4TE03EMC1

Subject Name: Electrical Machine-I

Course Name: B.Tech (Electrical)

Date: 8/5/2015

Semester: III

Marks : 70

Time: 02:30 TO 05:30

## Instructions:

- 1) Attempt all Questions of both sections in same answer book/Supplementary.
- 2) Use of Programmable calculator & any other electronic instrument prohibited.
- 3) Instructions written on main answer book are strictly to be obeyed.
- 4) Draw neat diagrams & figures (if necessary) at right places.
- 5) Assume suitable & perfect data if needed.

## SECTION-I

- Q-1 (a)** Explain the function of (i) Yoke (II) Commutator in d.c. generator. **02**
- (b)** Explain in short the (i) D.C. Shunt Generator (2) D.C. Series Generator. **02**
- (c)** Explain in short the function of Dummy Coils. **01**
- (d)** Draw and explain the different power stage of D.C. Motor. **02**
- Q-2 (a)** Derive the expression of e.m.f. developed in a d.c. generator. **05**
- (b)** Explain the different losses in d.c. generator. **05**
- (c)** Explain the process of voltage build up in a d.c. shunt generator. **04**
- OR**
- Q-2 (a)** Derive the expression of armature torque developed in a dc motor using normal notations. **05**
- (b)** Derive the condition of maximum efficiency of d.c. generator. **05**
- (c)** A 8 Pole d.c. shunt generator with 778 wave connected armature conductors and running at 500 r.p.m supplies a load of 12.5 ohm resistance terminal voltage of 50 V. The armature resistance is 0.24 ohm and field resistance is 250ohm. find the armature current, the induced e.m.f and the flux per pole. **04**
- Q-3 (a)** Why starter required in a dc shunt motor? Explain the working of 3-point starter with the help of a neat diagram. **05**
- (b)** A d.c. motor takes an armature current of 110A at 480V. The armature circuit resistance is 0.2 ohm. the machine has 6 poles and armature is lap connected with 864 conductors. the flux per pole is 0.05 Wb. Calculate (i) the speed (ii) the gross torque developed by the armature. **05**
- (c)** Explain the speed control of dc series motor by (i) field diverters (ii) Variable resistance in series with motor. **04**

**OR**

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8-5

- Q-3 (a)** Draw and explain the speed-torque characteristics of shunt, series and compound motors. **05**
- (b)** With the help of sketches, describe the main construction and working principle of a DC generator. **05**
- (c)** Explain the speed control of dc shunt motor. **04**

### SECTION-II

- Q-4 (a)** Explain the working principle of single phase transformer. **02**
- (b)** Explain the Ideal Transformer. **02**
- (c)** Define the voltage transformation ratio. **01**
- (d)** Define the all-day efficiency of single phase transformer. **02**

- Q-5 (a)** Discuss how will you perform open-circuit and short-circuit tests on a single phase transformer in the laboratory. From the test results how will you find the efficiency and regulation of a transformer? **05**
- (b)** Write short note on auto transformer. **05**
- (c)** Discuss conditions for parallel operation of two single phase transformers. **04**

### OR

- Q-5 (a)** Derive the expression of e.m.f. in single phase transformer. **05**
- (b)** State the various losses which takes place in a transformer. On what factors do they depend? Explain the steps taken to minimize these losses. **05**
- (c)** Explain the transformer at on load and no-load condition. **04**

- Q-6 (a)** Explain general principle of Induction motor and describe how rotor rotates when three phase supply is given to three phase induction motor. **05**
- (b)** Draw and Explain the equivalent circuit of single phase transformer. **05**
- (c)** A 4 pole ,3 phase induction motor operates from a supply whose frequency is 50 Hz. Calculate : **04**
- (i) The speed at which the magnetic field of the stator is rotating.
- (ii) The speed of rotor when the slip is 0.04
- (iii) the frequency of rotor currents when slip is 0.03

### OR

- Q-6 (a)** Explain the Torque-slip characteristics of 3 Phase Induction Motor. **05**
- (b)** Derive the expressions for starting torque in a 3-phase induction motor and find the condition for maximum starting torque. **05**
- (c)** Explain the Construction of Induction motor. **04**

