

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

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

# C. U. SHAH UNIVERSITY

## Winter Examination-2019

**Subject Name:** Electrical Machine – I

**Subject Code:** 4TE03EMC1

**Branch:** B.Tech (Electrical)

**Semester :** 3

**Date :** 22/11/2019

**Time :** 02:30 To 05:30

**Marks :** 70

Instructions:

- (1) Use of Programmable calculator & any other electronic instrument is prohibited.
  - (2) Instructions written on main answer book are strictly to be obeyed.
  - (3) Draw neat diagrams and figures (if necessary) at right places.
  - (4) Assume suitable data if needed.
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**Q-1**                      **Attempt the following questions:**    **(14)**

- a) A Step up transformer increases
  - (A) Voltage
  - (B) Current
  - (C) Power
  - (D) Frequency
- b) Lap winding is suitable for ..... Current,.....voltage d.c.generators.
  - (A) High, low
  - (B) Low, high
  - (C) Low, low
  - (D) High, high
- c) The critical resistance of the d.c.generator is resistance of
  - (A) Armature
  - (B) Field
  - (C) Load
  - (D) brushes
- d) D.C. shunt motors are used for driving
  - (A) trains
  - (B) cranes
  - (C) hoists
  - (D) machine tools
- e) Power transformers are designed to have maximum efficiency at
  - (A) nearly full load
  - (B) 70% full load
  - (C) 50% full load
  - (D) no load
- f) In a 3-phase induction motor, the rotor field rotates at synchronous speed with respect to
  - (A) stator



- (B) rotor
- (C) stator flux
- (D) none of the above
- g)** Slip rings are usually made of
  - (A) copper
  - (B) carbon
  - (C) phosphor bronze
  - (D) aluminum
- h)** The field coils of D.C. generator are usually made of
  - (A) mica
  - (B) copper
  - (C) cast iron
  - (D) carbon
- i)** Define the term: voltage regulation
- j)** What is the function of compensating winding?
- k)** How may the direction of rotation of a d.c. motor be reversed?
- l)** Define the term: All day efficiency
- m)** Explain the function of armature winding.
- n)** Explain the function of commutator.

**Attempt any four questions from Q-2 to Q-8**

- Q-2          Attempt all questions          (14)**
- (a)** Derive the E.M.F equation for Simplex lap and wave wound generator.          (07)
  - (b)** Explain in detail armature reaction in dc machines.          (07)
- Q-3          Attempt all questions          (14)**
- (a)** What is need of starter? Explain the construction and working of three point starter.          (07)
  - (b)** Derive the torque equation of motor and also explain the armature and shaft torque.          (07)
- Q-4          Attempt all questions          (14)**
- (a)** Explain the Swinburne test of D.C .Motor.          (07)
  - (b)** A short-shunt compound generator delivers a load current of 30A at 220V, and has armature, series-field and shunt-field resistances of 0.05  $\Omega$ , 0.30  $\Omega$  and 200  $\Omega$  respectively. Calculate the induced e.m.f. and the armature current. Allow 1.0 V per brush for contact drop.          (07)
- Q-5          Attempt all questions          (14)**
- (a)** Derive the EMF equation for single phase transformer with help of sketch.          (07)
  - (b)** Explain different types of D.C. generator.          (07)
- Q-6          Attempt all questions          (14)**
- (a)** Explain the Equivalent circuit of Transformer.          (07)
  - (b)** Explain the Speed control of D.C. Shunt Motor.          (07)
- Q-7          Attempt all questions          (14)**
- (a)** Define the term "slip" of induction motor. Draw and Explain the torque-slip characteristics of a three phase induction motor.          (07)



- (b) A 30kVA, 2400/120 V, 50 Hz transformer has a high voltage winding resistance of  $0.1 \Omega$  and a leakage reactance of  $0.22\Omega$ . The low voltage winding resistance is  $0.035\Omega$  and the leakage reactance is  $0.012\Omega$ . Find the equivalent winding resistance, reactance and impedance referred to the (i) high voltage side and (ii) the low voltage side. (07)

**Q-8 Attempt all questions (14)**

- (a) Explain the Production of Rotating field of 3 Phase Supply for Induction Motor. (07)
- (b) Explain the need of Parallel operation of Transformer. What are the Conditions for parallel operation of Transformers? (07)

