

Enrollment No: _____ Exam Seat No: _____

C.U.SHAH UNIVERSITY

Summer Examination-2017

Subject Name: Electrical Machine – II

Subject Code: 4TE04EMC1

Branch: B.Tech (Electrical)

Semester: 4

Date: 15/05/2017

Time: 02:00 To 05:00

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) The capacitor in a capacitor-start induction- run ac motor is connected in series with winding.
(a) starting (b) running
(c) squirrel-cage (d) compensating.
- b) If the load p.f. is 0.866, then the average p.f. of the V – V bank is
(a) 0.886 (b) 0.75
(c) 0.51 (d) 0.65
- c) At stand still condition the value of slip is
(a) 0 (b) 1
(c) finite value (d) infinite value
- d) In circle diagram for induction motor, diameter of circle represents which of the following?
(a) slip (b) rotor current
(c) running torque (d) line voltage
- e) In a synchronous motor, damper winding is provided in order to
(a) stabilize rotor motion (b) suppress rotor oscillations
(c) develop necessary starting torque (d) both (b) and (c)
- f) In a squirrel-cage induction motor, torque with autostarter is _____ times the torque with direct-switching.
(a) K^2 (b) K
(c) $1/K^2$ (d) $1/K$
- g) The V- curves of a synchronous motor show relationship between
(a) excitation current and back e.m.f.
(b) field current and p.f.
(c) d.c. field current and a.c. armature current
(d) armature current and supply voltage
- h) The starting winding of a single-phase motor is placed in the



- (a) rotor (b) stator
(c) armature (d) field
- i) The frequency of voltage generated by an alternator having 4-poles and rotating at 1800 r.p.m. is _____ hertz.
(a) 60 (b) 7200
(c) 120 (d) 450
- j) The term 'cogging' is associated with
(a) three phase transformers (b) compound generators
(c) D.C. series motors (d) induction motors
- k) Slip rings are usually made of
(a) copper (b) carbon
(c) phosphor bronze (d) aluminum
- l) Why induction motors are called asynchronous?
- m) What is a synchronous capacitor?
- n) Which is the usual cause of blow-outs in induction motors?

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

- Q-2 Attempt all questions (14)**
- (a) Explain the Scott connection for three phase transformer. (07)
(b) Explain double field revolving theory for single phase induction motor. (07)
- Q-3 Attempt all questions (14)**
- (a) Draw the Connection Three phase transformer (Dd0, Yy0, Dy11, Yd1 and Yy6). (07)
(b) Draw the circle diagram for a 3.73 kW, 200 V, 50 Hz, 4-pole, 3-phase star connected induction motor from the following test data: (07)
No-load : line voltage 200 V, line current 5 A; total input 350 W
Blocked rotor : line voltage 100 V, line current 26 A; total input 1700 W
Estimate from the diagram for full-load condition, the line current, power factor and also the maximum torque in terms of the full-load torque. The rotor Cu loss at standstill is half the total Cu loss.
- Q-4 Attempt all questions (14)**
- (a) Explain different methods of speed control of three phase induction motor. (07)
(b) In a 50-kVA, star-connected, 440 –V, 3-phase, 50 Hz alternator, the effective armature resistance is 0.25 ohm per phase. The synchronous reactance is 3.2 ohm per phase and leakage reactance is 0.5 ohm per phase. Determine at rated load and unity power factor: (07)
(a) internal e.m.f. E_a (b) no-load e.m.f. E_0 (c) percentage regulation on full-load
(d) value of synchronous reactance which replaces armature reaction.
- Q-5 Attempt all questions (14)**
- (a) What is Voltage regulation? Write different methods of voltage regulation in alternator and explain any one method. (07)
(b) A 3 Phase ,400V induction motor gave the following test reading: (07)
No Load : 400 V, 1250 W, 9 A, Short –Circuit : 150V, 4kW, 38A
Draw the circle diagram.
If the normal rating is 14.9 kW, find from the circle diagram, the full load value



of current, Power factor and slip.

- Q-6** **Attempt all questions** (14)
- (a) Explain e.m.f. equation of an Alternator. (07)
- (b) Explain the starting of Induction motor with (i) Primary Resistors (ii) Star-delta starters. (07)
- Q-7** **Attempt all questions** (14)
- (a) Explain construction and working of universal motor. Where it is used? How can control the speed of universal motor? (07)
- (b) Explain effects of varying excitation on armature current and power factor in a synchronous motor. Draw "V" curves. (07)
- Q-8** **Attempt all questions** (14)
- (a) Explain hunting in synchronous motor. (05)
- (b) Explain methods of starting of synchronous motor. (05)
- (c) Write applications of synchronous motor. (04)

