# C.U.SHAH UNIVERSITY
## Winter Examination-2015

**Subject Name: Electrical Machine – II**

**Subject Code: 4TE04EMC1**                                      **Branch: B.Tech(Electrical)**

**Semester: 4        Date: 23/11/2015        Time: 2:30 To 5:30        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)**  Define: voltage regulation.

**b)**  As compared to Δ - Δ bank, the capacity of the V – V bank of transformers is _____ percent.
(i) 57.7                              (ii) 66.7
(iii) 50                              (iv) 86.6

**c)**  Define: slip.

**d)**  Why induction motors are called asynchronous?

**e)**  Which is the usual cause of blow-outs in induction motors?

**f)**  In the circle diagram for 3-Φ induction motor, the diameter of the circle is determined by
(i) rotor current                    (ii) exciting current
(iii) total stator current            (iv) rotor current referred to stator

**g)**  Which class of induction motor will be well suited for large refrigerators?
(i) Class E                          (ii) Class B
(iii) Class F                        (iv) Class C

**h)**  The starting winding of a single – phase motor is placed in the
(i) rotor                            (ii) stator
(iii) armature                       (iv) field

**i)**  One of the characteristics of a single – phase motor is that it
(i) is self-starting                 (ii) is not self-starting
(iii) requires only one winding     (iv) can rotate in one direction only

**j)**  A 50-Hz alternator will run at the greatest possible speed if it is wound for _____ poles.
(i) 8                                (ii) 6
(iii) 4                              (iv) 2

**k)**  In alternator, the rotary part is
(i) core                             (ii) magnetic field poles
(iii) armature                       (iv) none of these

**l)** The slip of induction motor normally does not depend on which of the following?
(i) synchronous speed             (ii) rotor speed
(iii) shaft torque                  (iv) core loss component

**m)** Which type of single phase induction motor is having highest power factor at full load?
(i) shaded pole type            (ii) split phase type
(iii) capacitor start type       (iv) capacitor run type

**n)** A certain transformer has 400 turns in the primary winding and 2000 turns in the secondary winding. The turn ratio is
(i) 0.2                         (ii) 0.4
(iii) 5                         (iv) 25

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

**Q-2**          **Attempt all questions**                                                    **(14)**
**(a)** Why the Single Phase induction motor is not self-starting? Explain the making of single phase induction motor self-starting.
**(b)** Explain the Open Delta connection of Three Phase Transformer.

**Q-3**          **Attempt all questions**                                                    **(14)**
**(a)** Draw the circle diagram for a 3.73 kW, 3-phase, 4-pole, 50 Hz, 200 V star connected induction motor from the following data (line values)
No-load : 200 V, 5 A, 350 W
Short-circuit : 100 V, 26 A, 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.
**(b)** Explain the Speed Control of Squirrel Cage Induction Motor.

**Q-4**          **Attempt all questions**                                                    **(14)**
**(a)** Explain the starting of Induction motor with (i) Primary Resistors (ii) Star-delta starter.
**(b)** Draw the circle diagram from no-load and short-circuit test of a 3-phase, 14.92 kW, 400 V, 6-pole induction motor from following test results(line values)
No-load : 400 V, 11 A, p.f.= 0.2
Short circuit : 100 V, 25 A, p.f.= 0.4
Rotor cu loss at standstill is same as stator cu loss. From the circle diagram, find
(i) Line current, slip, efficiency and p.f. at full load (ii) the maximum torque.

**Q-5**          **Attempt all questions**                                                    **(14)**
**(a)** Explain Synchronous impedance method and MMF method to measure voltage regulation of alternator.
**(b)** Write short note on Capacitor start – and – run motor.

**Q-6**          **Attempt all questions**                                                    **(14)**
**(a)** Explain effects of varying excitation on armature current and power factor in a

synchronous motor. Draw "V" curves.

**(b)** Draw the Connection Three phase transformer (Dd6, Yy0, Dy11, Yd1, Yd11 and Yy6).

**Q-7** **Attempt all questions** **(14)**

**(a)** A 60 KVA, 220 V, 50 Hz, single phase alternator has effective armature resistance of 0.016 ohm and an armature leakage reactance of 0.07 ohm. Compute the voltage induced in the armature when the alternator is delivering rated current at a load power factor of (a) unity (b) 0.7 lagging and (c) 0.7 leading.

**(b)** Derive the equation of induced emf for an a.c. generator.

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

**(a)** Explain construction and working of universal motor. Where it is used? How can control the speed of universal motor?

**(b)** Explain the construction and working principle of Repulsion motor.