# C.U.SHAH UNIVERSITY
## Summer Examination-2022

**Subject Name: Electrical Machine-III**

**Subject Code: 4TE05EMC1**          **Branch:B.Tech (Electrical)**

**Semester: 5**        **Date: 27/04/2022**        **Time: 11:00 To 02:00**        **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)** Zero power factor method of an alternator is used to find its                **(1)**
  (a) efficiency
  (b) armature resistance
  (c) voltage regulation
  (d) synchronous impedance

**b)** The power factor of an alternator is determined by its                       **(1)**
  (a) speed
  (b) load
  (c) excitation
  (d) prime mover

**c)** The electric motor used in domestic mixers is                                **(1)**
  (a) universal motor              (b) shaded pole motor
  (c) capacitor start motor        (d) hysteresis motor

**d)** A stepping motor is a _____ device.                                       **(1)**
  (a) mechanical
  (b) electrical
  (c) analogue
  (d) incremental

**e)** The main thing common between Hopkinson's test and Field's test is that both **(1)**
  (a) requires two electrically-coupled series motors
  (b) need two similar mechanically-coupled motors
  (c) use negligible power
  (d) are regenerative tests

**f)** Hopkinson's test on D.C. machines is conducted at to determine               **(1)**
  (a) no-load
  (b) part load
  (c) full-load
  (d) overload

**g)** Which of the following A.C. motors is used for industrial application? **(1)**
(a) commentator motor
(b) 3-phase induction motor
(c) D.C. series motor
(d) synchronous motor

**h)** In a synchronous motor, damper winding is provided in order to **(1)**
(a) stabilize rotor motion
(b) suppress rotor oscillations
(c) develops necessary starting torque
(d) both (b) and (c)

**i)** In synchronous motor inverted V curve represents the relation between **(1)**
(a) field current and power factor
(b) field current and armature current
(c) armature current and power factor
(d) none of these

**j)** The maximum value of torque angle in a synchronous motor is _____ degree **(1)**
electrical.
(a) 45
(b) 90
(c) between 45 and 90
(d) below 60

**k)** Write application of synchronous motor. **(1)**
**l)** Will the motor start with the field excited in synchronous motor? **(1)**
(Yes/No)
**m)** Define: Hunting. **(1)**
**n)** How does the direction of rotation of dc motor reversed? **(1)**

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

**Q-2** **Attempt all questions** **(14)**
**a)** Write a short note on permanent magnet brush less dc motor. **(7)**
**b)** Explain Hopkinson's test for determination of efficiency of dc shunt machine. **(7)**

**Q-3** **Attempt all questions** **(14)**
**a)** Briefly discuss brake test on dc motor. **(7)**
**b)** Explain the slip test for measurement of $X_d$ and $X_q$ of synchronous machines. **(7)**

**Q-4** **Attempt all questions** **(14)**
**a)** Explain construction and working of switched reluctance motor. **(7)**
**b)** Describe the experimental setup to obtain the v-curves of a synchronous motor. **(7)**

**Q-5** **Attempt all questions** **(14)**
**a)** The Hopkinson's test on two shunt machine gave the following results for full **(7)**
load:
Line voltage = 250 V: Current taken from supply system excluding field current =
50 A; motor armature current = 380 A; field current 5 A and 4.2 A. Calculate the
efficiency of the machine working as generator. Armature resistance of each
machine is 0.2 ohm.
**b)** Briefly explain method of starting of synchronous machine. **(7)**

**Q-6**        **Attempt all questions**        **(14)**
- **a)** Explain armature reaction and its effects at different power factor in alternator. **(7)**
- **b)** Briefly explain voltage regulation of alternator by ZPF method. **(7)**

**Q-7**        **Attempt all questions**        **(14)**
- **a)** Explain the two reaction theory of salient pole machine in detail with phasor diagram. **(7)**
- **b)** Draw and explain parallel operation of alternator. **(7)**

**Q-8**        **Attempt all questions**        **(14)**
- **a)** What are the different types of torques in synchronous motor? Explain each of them. **(7)**
- **b)** Write short note on stepper motor. **(7)**