

C.U.SHAH UNIVERSITY

Winter Examination-2018

Subject Name: Electrical Machine – III

Subject Code: 4TE05EMC1

Branch: B.Tech (Electrical)

Semester: 5

Date: 05/12/2018

Time: 10:30 To 01:30

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) What is synchronous condenser? (01)
 - b) Define: Hunting. (01)
 - c) Retardation test on d.c. shunt motor is used for finding _____ losses. (01)
 - d) The main thing common between Hopkinson's test and Field's test is that both (01)
 - (a) requires two electrically-coupled series motors
 - (b) need two similar mechanically-coupled motors
 - (c) use negligible power
 - (d) are regenerative tests
 - e) The power factor of an alternator is determined by its (01)
 - (a) speed (b) load
 - (c) excitation (d) prime mover
 - f) A stepping motor is a _____ device. (01)
 - (a) mechanical (b) electrical
 - (c) analogue (d) incremental
 - g) The electric motor used in domestic mixers is (01)
 - (a) universal motor (b) shaded pole motor
 - (c) capacitor start motor (d) hysteresis motor
 - h) Zero power factor method of an alternator is used to find its (01)
 - (a) efficiency (b) armature resistance
 - (c) voltage regulation (d) synchronous impedance
 - i) Hopkinson's test on D.C. machines is conducted at to determine (01)
 - (a) no load (b) full load
 - (c) part load (d) overload
 - j) The maximum value of torque angle α in a synchronous motor is degrees (01) electrical.
 - (a) 45 (b) 90
 - (c) between 45 and 90 (d) below 60
 - k) In a synchronous motor, damper winding is provided in order to (01)
 - (a) stabilize rotor motion (b) suppress rotor oscillations
 - (c) develop necessary starting torque (d) both (b) and (c)



- l) In synchronous motor inverted V curve represents the relation between (01)
 (a) field current and power factor (b) field current and armature current
 (c) armature current and power factor (d) none of these
- m) Turbo-alternators are generally used to run at (01)
 (a) 1500 r.p.m. (b) 3000 r.p.m.
 (c) 5000 r.p.m. (d) 15000 r.p.m.
- n) A switched reluctance motor differs from a VR stepper motor in the sense that it (01)
 (a) has rotor poles of ferromagnetic material
 (b) rotates continuously
 (c) is designed for open-loop operation only
 (d) has lower efficiency

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

- Q-2 Attempt all questions (14)**
 (a) Explain the operation of A.C. & D.C. servo motor. (07)
 (b) Explain Hopkinson's test for determination of efficiency of DC shunt machine. (07)
- Q-3 Attempt all questions (14)**
 (a) Derive the equation of induced emf for a synchronous generator. (07)
 (b) Explain field test on two identical dc series machines. (07)
- Q-4 Attempt all questions (14)**
 (a) Explain the slip test for measurement of X_d and X_q of synchronous machines. (07)
 (b) Draw and explain the capability curve of a synchronous generator. (07)
- Q-5 Attempt all questions (14)**
 (a) What are the different types of stepper motor? Explain any one in detail. (07)
 (b) Write a short note on Permanent Magnet Brush Less DC motor. (07)
- Q-6 Attempt all questions (14)**
 (a) A 400 V, 50 Hz, 3-phase, 37.5 KW, star connected synchronous motor has a full-load efficiency of 88%. The synchronous impedance of the motor is $(0.2+j1.6)$ ohm per phase. If the excitation of the motor is adjusted to give a leading pf of 0.9, Calculate for full-load (a) the induced emf (b) total mechanical power developed. (07)
 (b) Explain the construction and working of an induction regulator. (07)
- Q-7 Attempt all questions (14)**
 (a) What are the different types of torques in synchronous motor? Explain each of them. (07)
 (b) Explain construction and working of axial flux permanent magnet machines. (07)
- Q-8 Attempt all questions (14)**
 (a) Explain construction & working of Hysteresis motor. (07)
 (b) Derive the equation for the load shared by the two synchronous generators. (07)

