

C.U.SHAH UNIVERSITY

Summer Examination-2018

Subject Name: Electrical Machine-III

Subject Code: 4TE05EMC1

Branch: B.Tech (Electrical)

Semester: 5

Date: 31/03/2018

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)** In a synchronous motor, damper winding is provided in order to (1)
- (a) stabilize rotor motion (b) suppress rotor oscillations
(c) develop necessary starting torque (d) both (b) and (c)
- b)** As compared to $\Delta - \Delta$ bank, the capacity of the V - V bank of transformers is (1)
- _____ percent.
(a) 57.7 (b) 66.7 (c) 50 (d) 86.6
- c)** 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
- d)** A 50 Hz alternator will run at the greatest possible speed if it is wound for (1)
- _____poles.
(a) 8 (b) 6 (c) 4 (d) 2
- e)** Zero power factor method of an alternator is used to find its (1)
- (a) efficiency
(b) armature resistance
(c) voltage regulation
(d) synchronous impedance
- f)** In a synchronous motor, the rotor Cu losses are met by (1)
- (a) motor input
(b) armature input
(c) supply lines
(d) d.c. source
- g)** The electric motor used in domestic mixers is (1)
- (a) universal motor (b) shaded pole motor
(c) capacitor start motor (d) hysteresis motor
- h)** Hopkinson's test on D.C. machines is conducted to determine (1)



- (a) no-load (b) part load
(c) full-load (d) overload
- i) Retardation test on d.c. shunt motor is used for finding _____ losses. (1)
(a) stray (b) copper
(c) friction (d) iron
- j) Armature reaction in an alternator primarily affects (1)
(a) rotor speed (b) terminal voltage per phase
(c) frequency of armature current (d) generated voltage per phase
- k) Turbo-alternators are generally used to run at (1)
(a) 1500 r.p.m. (b) 3000 r.p.m.
(c) 5000 r.p.m. (d) 15000 r.p.m.
- l) Enlist the types of electrical breaking. (1)
- m) What is hunting? (1)
- n) What is synchronous condenser? (1)

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

- Q-2 Attempt all questions (14)**
a) Briefly discuss the brake test to find efficiency of DC machines. (7)
b) Derive the equation of induced emf for a synchronous generator. (7)
- Q-3 Attempt all questions (14)**
a) Explain Hopkinson's test for determination of efficiency of DC shunt machine. (7)
b) Explain the phenomena of Armature Reaction in detail with necessary equation and diagram? (7)
- Q-4 Attempt all questions (14)**
a) Explain the operation of d.c. and a.c. servo motor. (7)
b) Explain the slip test for measurement of X_d and X_q of synchronous machines. (7)
- Q-5 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. (7)
b) Draw and explain the capability curve of a synchronous generator. (7)
- Q-6 Attempt all questions (14)**
a) Derive expression for power shared by two alternators when they are connected in parallel. (7)
b) Write a short note on Permanent Magnet Brushless DC motor. (7)
- Q-7 Attempt all questions (14)**
a) What are the different types of torques in synchronous motor? Explain each of them. (7)
b) Describe the experimental setup to obtain the V-curves of a synchronous motor. (7)
- Q-8 Attempt all questions (14)**
a) Explain construction & working of Hysteresis motor. (7)
b) Explain construction and working of variable reluctance stepper motor. (7)

