

Morning.

D. 13/05/2014.

Student Exam No:- _____

GANPAT UNIVERSITY
B.TECH SEM-IV (ELECTRICAL)
REGULAR EXAMINATION MAY- 2014
2EE402:-ELECTRICAL MACHINE-II

Time: 3 Hours

Total Marks:-70

- Instructions: - 1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

SECTION-I

- Que-1 (A) Explain the procedure to construct the circle diagram for induction motor & how various quantities are measured from circle diagram. [07]
(B) Describe the constructional features and operating characteristics of single phase shaded pole motor. [05]

OR

- Que-1 (A) A double cage rotor has two independent cages. Ignoring mutual coupling between cages, estimate the torque in synchronous watts per phase (i) at standstill and at 4 percent slip, given that the equivalent standstill impedance of the inner cage is $(0.06 + j0.5)$ ohm per phase and of the outer cage $(0.55 + j0.25)$ ohm per phase and that the rotor equivalent induced e.m.f per phase is 125 V at standstill. [06]
(B) The ratings of a single phase induction motor are as follows : 1 kW, 230 V, 50 Hz, 6-pole and the parameters are given below : [06]
i) resistance of main stator winding : 6 ohms
ii) reactance of main stator winding : 4Ω
iii) reactance of magnetizing branch referred to stator 100Ω
iv) rotor resistance referred to stator at standstill: 6Ω
v) rotor reactance referred to stator at stand still : 3.5 ohms
The core losses are 45 watts while mechanical losses are 20 watts. The motor is operating with 4% slip. Calculate : i) Input current ii) Power factor iii) Shaft power v) Efficiency.

- Que-2 (A) Draw and explain the equivalent circuit of a single phase induction motor based on double revolving field theory for with and without losses. [06]
(B) A 10 H.P.(7.46kw) motor when started at normal voltage with a star-delta switch in the star position is found to take an initial current of 1.7 times full load current and gave an initial starting torque of 35% of full load torque. Explain what happens when the motor is started under the following conditions (a) an auto transformer giving 60% of normal voltage (b) a resistance in series with the stator reduced the voltage to 60 % of normal and calculate in each case the value of starting current and torque in terms of the corresponding quantities at full load. [05]

OR

- Que-2 (A) Explain different speed control methods for 3 phase induction motor. [06]
(B) What are causes of harmonic production in 3- phase induction motor? Explain crawling phenomenon in induction motor. [05]

- Que-3 **Attempt following Questions** [12]
- (A) Write short note on linear induction motor.
 - (B) Explain working of universal motor with necessary figure.
 - (C) Write short note on switched reluctance motor.

SECTION-II

- Que-4 (A) Explain the Potier triangle method of finding the voltage regulation of an alternator. [06]
- (B) A 3-phase, star-connected, 1,100 KVA, 11 KV alternator has rated current of 57.5 A. The ac resistance of the winding per phase is 0.65Ω . The test results are given below: [06]
- OC Test: field current = 17.5 A, voltage between lines = 440 V
- SC Test: field current = 17.5 A, line current = 57.5 A
- Determine the full-load voltage regulation of the alternator (a) 0.8 p.f. lagging and (b) 0.8 p.f. leading (c) unity p.f by synchronous impedance method

OR

- Que-4 (A) Explain the different factors affected in alternator on load. [06]
- (B) Two alternators A and B operate in parallel and supply a load of 10MW at 0.8 p.f lagging (a) by adjusting steam supply of A, its power output is adjusted to 6000 KW and by its p.f is adjusted to 0.92 lagging. Find the p.f of alternator B. [06]
- (b) if steam supply of both machines is left unchanged, but excitation of B is reduced so that its p.f becomes 0.92 leading. Find new p.f of alternator A.

- Que-5 (A) Explain characteristics of synchronous motor at constant excitation and variable load with vector diagram. [06]
- (B) Derive the expression of coil span factor and distribution factor. [05]

OR

- Que-5 (A) What are the conditions of two alternators connecting in parallel? Explain one dark and two bright lamp method used for synchronizing of alternators. [06]
- (B) A 3-phase star connected 440 V, takes a power input of 6500 watts at rated voltage. Its synchronous reactance is 15Ω and resistance is negligible. If its excitation voltage is adjusted equal to the rated voltage of 440 V, Calculate load angle, Power factor and the armature current. [05]

- Que-6 **Attempt following Questions.** [12]
- (A) Explain the use of synchronous motors for power factor compensation with advantage and disadvantage.
 - (B) Draw the vector diagram of a synchronous motor with different excitation and write equation of back emf and load angle.
 - (C) Compare salient pole type construction with non salient pole type construction for three phase alternator.

END OF PAPER

Best of Luck