

GANPAT UNIVERSITY
B.TECH SEM-IV (ELECTRICAL)
REGULAR EXAMINATION April - June 2015
2EE402:-ELECTRICAL MACHINES -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)** Draw and explain the equivalent circuit of a single phase induction motor based on double field revolving theory for with and without core loss. [06]
- (B)** Explain the no load and blocked rotor tests in a 3-phase induction motor. [06]
- OR**
- Que-1 (A)** A 415 V, 29.84 KW, 50 Hz delta connected motor gave the following test data : [08]
 No-load test : 415 V, 21 A, 1250 W
 Blocked rotor test : 100 V, 45 A, 2730 W
 Construct the circle diagram and determine (a) the line current and power factor for rated output (b) maximum torque. Assume rotor copper loss and stator copper loss equal at standstill.
- (B)** What are causes of harmonic production in 3-phase induction motor? Explain crawling phenomenon in 3-phase induction motor. [04]
- Que- 2 (A)** Write the different methods to starting of squirrel-cage induction motor. Explain any one in detail. [06]
- (B)** The ratings of a 1- phase induction motor are as follows : 1 kW, 230 V, 50 Hz, 6- pole and the parameters are given below : [05]
 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 : 3.5Ω
 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 (iv) Efficiency.
- OR**
- Que- 2 (A)** Describe the constructional features and operating characteristics of single phase shaded pole motor. [06]
- (B)** A 25 H.P, 500 V, 4 pole 50 Hz induction motor with delta connected stator takes full load current of 30 A and has a slip of 4 %. The impedance per phase is 3.5Ω . Calculate the starting torque and starting current taken from the supply if the motor is started by (i) direct switching (ii) a star delta starter (iii) an auto transformer with 70 % tapping. [05]

- Que-3** Attempt following Questions [12]
- (A) Discuss construction and working principle of BLDC motor.
 - (B) Compare Switched reluctance motor with variable reluctance stepper motor.
 - (C) Explain the rotor rheostat control of 3-phase slip ring induction motor with necessary figure.

SECTION-II

- Que-4 (A)** Explain pitch factor and distribution factor and also derive $K_d = \frac{\sin m\beta/2}{m \sin \beta/2}$ [06]
- (B)** A 3-phase star connected 1000KVA, 11000V alternator has rated current of 50.5 A. [06]
The ac resistance of the winding per phase is 0.35Ω . The test results are given below:
O.C. Test: field current = 11.5 A, voltage between lines = 420 V
S.C. Test : field current = 11.5A, line current = 50.5A
Determine the full load voltage regulation of the alternator for (i) 0.8 p.f lagging and (ii) 0.707 p.f leading loads with synchronous impedance method.

OR

- Que-4 (A)** Define voltage regulation of an alternator & explain any one method to find the voltage regulation. [06]
- (B)** Which conditions must be satisfied for parallel operation of alternators? Explain Synchronizing of single phase Alternators. [06]

- Que-5 (A)** Explain the effect of varying excitation at constant load on synchronous motor. [06]
- (B)** Explain the distribution of load on alternator. [05]

OR

- Que-5 (A)** Explain construction and working principle of universal motor. [06]
- (B)** Explain following terms: [05]
(i) Damper Winding (ii) Hunting (iii) Synchronizing current and power
(iv) Pull in and Pull out torque

- Que-6** Attempt following Questions. [12]
- (A) Explain different types of rotor used in alternator with necessary figure.
 - (B) Draw phasor diagram of loaded alternator at different power factor.
 - (C) Discuss V and inverted V curve of synchronous motor.

END OF PAPER

Best of Luck