

GANPAT UNIVERSITY
B. TECH SEM- III (MECHATRONICS ENGINEERING)
REGULAR EXAMINATION NOV - DEC 2016
2EE307: ELECTRICAL MACHINES & DRIVES

TIME: 3 HRS

TOTAL MARKS: 60

Instructions:

- (1) This Question paper has two sections. Attempt each section in separate answer book.
- (2) Figures on right indicate marks.
- (3) Be precise and to the point in answering the descriptive questions.

SECTION: I

- Q.1 (A) Discuss the voltage build up process of dc shunt generator. (05)
- (B) A 4 pole 220 V shunt motor has 540 lap wound conductor. It takes 32 A from the supply mains and develops output power of 5.595 KW. The field winding takes 1 A. The armature resistance is 0.09 ohm and the flux per pole is 30 mWb. Calculate the speed and the torque developed by motor. (05)

OR

- Q.1 (A) Draw and explain the torque vs armature current and speed vs armature current characteristics for dc shunt motor and dc series motor. (05)
- (B) A short shunt compound generators delivers a load current of 20 A at 200 V and has armature, series field and shunt field resistances of 0.04 ohm, 0.40 ohm and 180 ohm respectively. Calculate the induced emf and the armature current. Allow 1 V per brush for contact drop. (05)
- Q.2 (A) Deduce an equation of running torque for induction motor. (05)
- (B) A 50 Hz, 8 pole induction motor has full load slip of 4%. The rotor resistance per phase is 0.01 ohm and standstill reactance per phase is 0.1 ohm. Find the ratio of maximum torque to full load torque and the speed at which the maximum torque occurs. (05)

OR

- Q.2 (A) Draw and describe the torque vs slip characteristics curve for induction motor. Also mention the effect of rotor resistance on starting torque in characteristic curve. (05)
- (B) Compare Individual, Group and Multi-motor drives. (05)
- Q.3 (A) List the different methods of speed control of dc shunt motor. Explain any one detail. (04)
- (B) What are the factors influencing the choice of electric drives? (04)

OR

- (B) Enlist the advantages of electrical drive over another form of drives? (04)
- (C) A 3 phase induction motor is wound for 6 poles and is supplied from 50 Hz system. Calculate the i) synchronous speed, ii) rotor speed, when slip is 3%. (02)

SECTION: II

- Q.4 (A) Derive an emf equation for single phase transformer? (05)
- (B) A 3000/200 V, 50 Hz, single phase transformer is built on a core having an effective cross section of 150 cm^2 and has 80 turns in the low voltage winding. Calculate. (05)
- (a) The value of the maximum flux density in the core.
- (b) The number of turns in the high voltage winding.

OR

- Q.4 (A) The no-load current of a transformer is 2.0 A at 0.3 power factor when supplied at 230-V, 50-Hz. The number of turns on the primary winding is 200. Calculate (i) the maximum value of flux in the core (ii) the core loss (iii) the magnetizing current. (05)
- (B) Draw and explain equivalent circuit of single phase transformer? (05)
- Q.5 (A) Discuss about construction & working of alternator? (05)
- (B) Write down the condition for parallel condition of alternator? Explain any one method of synchronizing? (05)

OR

- Q.5 (A) A 3- ϕ , 10-pole, Y-connected alternator runs at 600 r.p.m. It has 120 stator slots with 8 conductors per slot and the conductors of each phase are connected in series. Determine the phase and line e.m.fs. if the flux per pole is 56 mWb. Assume full-pitch coil (05)
- (B) Explain working of Synchronous Motor on load with constant excitation. (05)
- Q.6 Attempt any two. (10)
- (A) Discuss working principle of transformer. Draw the Phasor diagram when transformer on no load condition.
- (B) Describe the operation of shaded-pole single-phase motor.
- (C) Why the single phase induction motor is not self-starting? Explain capacitor start capacitor run single phase induction motor?

----- END OF PAPER -----