GANPAT UNIVERSITY
B.TECH. SEM-III (MECHANICAL ENGINEERING)
REGULAR EXAMINATION DEC 2013
2EE303 ELECTRICAL TECHNOLOGY

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

Q:1 **(A)** Draw and explain Torque / Slip Characteristics of 3-phase induction motor and also discuss the effect of rotor resistance on it. **(06)**

(B) Explain the power stages and derive the condition for maximum efficiency of D.C. generator **(06)**

OR

Q:1 **(A)** A shunt generator delivers 195 A at terminal p.d. of 250 V. The armature resistance and shunt field resistance are 0.02Ω and 50Ω respectively. The iron and friction losses equal 950 W. Find (i) emf generated (ii) Cu. Losses (iii) output of the prime motor (iv) commercial, mechanical and electrical efficiencies **(06)**

(B) Discuss the operation of Two phase 4/2 Variable Reluctance Stepper Motor **(06)**

Q:2 **(A)** Discuss the role of rotor magnetic field on the operation of $3\text{-}\Phi$ Induction motor. **(06)**

(B) The power input to the rotor of 440V, 50Hz, 6-pole, $3\text{-}\Phi$, induction motor is 80 kW. The rotor electromotive force is observed to make 100 complete alternations per minute. Calculate (i) the slip, (ii) the rotor speed, (iii) rotor copper losses per phase. **(05)**

OR

Q:2 **(A)** Draw and explain internal characteristics of (i)DC series generator(ii) DC shunt generator(iii) DC separately excited generator **(06)**

(B) A d.c. series motor operates at 700 rpm with a line current of 80A from 230V mains. Its armature circuit resistance is 0.2Ω and its field resistance is 0.15Ω. Find the speed at which the motor runs at a line current of 20A, assuming that the flux at this current is 50% of the flux at 80A. **(05)**

Q:3 **Attempt any two:**

(A) State and explain the factors affecting the selection of drives. **(06)**

(B) Justify "Slip affects rotor Cu losses." **(06)**

(C) A 4-pole 250 volt, lap wound dc series motor has 200 conductors. The flux per pole is 0.05 Wb. the motor draws a current of 60 A from the supply. The armature and series field winding resistances are $0.15~\Omega$ and 0.2Ω respectively. calculate the speed of motor.

Q: 4 (A) Explain transformer on load with diagram (06)

(B) Discuss open circuit and short circuit test on 1-Φ transformer. (06)

OR

Q: 4 (A) Discuss the three phase transformer and list out its connection. (06)

(B) A single Phase transformer has 500turns on Primary and 1200 turns on secondary the cross sectional area of core is 80 sq.cm.If the primary winding is connected to a50Hz supply at 500V calculate(i)Peak flux density (ii)Voltage induced in Secondary (06)

Q: 5 (A) Comparison Synchronous motor and Induction Motor (06)

(B) Explain Distribution Factor and Winding Factor (05)

OR

Q:5 (A) Explain working of synchronous motor on load with constant excitation. (06)

(B) A 3- phase 50 Hz star – connected 2000 kVA, 2300 V alternator gives a short circuit current of 600A for a certain field excitation. With the same excitation, the open circuit voltage was 900V. the resistance between a pair of terminals was 0.12Ω find full load regulation at (i) UPF (ii) 0.8 p.f. lagging (05)

Q: 6 **Attemp any Three**

(A) Discuss arc heating-Arc Furnaces with neat sketches. (04)

(B) Briefly explain resistance welding. (04)

(C) Explain typical a.c. Power Supply Scheme (04)

(D) What is distribution system? Explain Classification of Distribution system (04)

END OF PAPER