

Student Exam No:- _____

GANPAT UNIVERSITY
B.TECH SEM-III (ELECTRICAL)
REGULAR EXAMINATION NOV-DEC 2014
2EE305:- ELECTRICAL MACHINE-I

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)** What do you mean by ideal transformer? Discuss ideal transformer with phasor and vector diagram. [06]
- (B)** A 25 KVA, 3300 /240V, 50Hz transformer has a high voltage winding resistance of 0.1Ω and a leakage reactance of 0.22Ω . The low voltage winding resistance is 0.03Ω and the leakage reactance is 0.012Ω . Find the equivalent winding resistance, reactance and impedance referred to the (i) the high voltage side and (ii) the low voltage side [06]

OR

- Que-1 (A)** Explain various types of losses occur in transformer and derive the condition for maximum efficiency of a transformer. [06]
- (B)** Draw the phasor and connection diagrams of transformers connected in (i) Yd11 (ii) Dy11 (iii) Dd6. [06]

- Que-2 (A)** The useful full load torque 3-phase, 6-pole, 50Hz induction motor is 162.84 Nm. The rotor emf is observed to make 90 cycles per minute. Calculate (i) Motor output (ii) Cu loss in rotor (iii) motor input and (iv) efficiency if mechanical torque lost in windage and friction is 20.36 Nm and stator losses are 830W. [06]
- (B)** Discuss the torque-speed characteristics of an induction motor. [05]

OR

- Que-2 (A)** Prove that ratio of rotor copper loss to rotor input give the slip of induction motor. [05]
- (B)** Write short notes on Scott Connection. [06]

Que-3 Attempt any three. [12]

- (A)** Write short note on Auto transformer.
- (B)** Draw and explain equivalent circuit of induction motor.
- (C)** Why transformer rating in KVA? Discuss open circuit and short circuit on single phase transformer.
- (D)** Discuss construction and working principle of three phase induction motor.

SECTION-II

- Que-4 (A)** Explain different parts of dc generator with necessary figure. [06]
(B) A shunt generator has a full load current of 186 A at 220V. The rotational losses are 820 W and the shunt field coil resistance is 65 Ω . If it has a Full load efficiency of 86 %. Find the armature resistance. Also find the load current corresponding to maximum efficiency [06]

OR

- Que-4 (A)** Discuss the characteristics of dc compound generator with necessary diagram. [06]
(B) A 6-pole DC generator has 150 slots. Each slot has 8 conductors and each conductor has resistance of 0.01 ohm. The armature terminal current is 15A. Calculate the current per conductor and the drop in armature for lap and wave winding connections. [06]

- Que-5 (A)** Discuss various methods of speed control for DC shunt motor. [06]
(B) Derive the armature and shaft torque equation for D.C. motor. Discuss significant of back emf. [05]

OR

- Que-5 (A)** Why starter is required for DC motor? Explain three point starter. [06]
(B) A 4-pole ,240V wave connected shunt motor gives 1119 kW when running at 1000 rpm and drawing armature and field current of 50A and 1.0 A respectively. It has 540 conductors. Its resistance is 0.1 Ω . Assuming a drop of 1 volt per brush, find (i) total torque (ii) useful torque (iii) useful flux/pole (iv)rotational losses [05]

- Que-6** Attempt following question. [12]
(A) Derive the EMF equation of D.C generator.
(B) Compare lap winding with wave winding for d.c. machine.
(C) With a neat sketch explain the commutation in a d.c machine.

END OF PAPER