Student Exam No:-_____

GANPAT UNIVERSITY
B.TECH SEM-III (MARINE)
REGULAR EXAMINATION NOV-DEC-2015
2MR305:- ELECTRICAL MACHINES

Time: 3 Hours

Total Marks:-60

Instructions: - 1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Answer to two sections must be written in separate answer books.
4. Figures to the right indicate full marks.

SECTION-I

Que.-1 (A) Discuss parallel operation of DC series generator. Give the function of Equalizer. [05]

(B) Explain the characteristics of separately excited DC generator with necessary diagram. [05]

OR

Que.-1 (A) Explain the working principle of DC generator briefly, also derive the EMF equation of DC generator. [05]

(B) A 4-pole, long –shunt lap wound generator supplies 25 KW at a terminal voltage of 500 V. The armature resistance is 0.03 Ω, series field resistance is 0.04 Ω and shunt field resistance is 200 Ω. The brush drop may be taken as 1.0 V. Determine the EMF generated also Calculate the No. of conductor if the speed is 1200 rpm and flux per pole is 0.02 Wb. Neglect armature reaction. [05]

Que.-2 (A) Derive the equations of armature torque and shaft torque of DC motor. [05]

(B) A DC motor takes an armature current of 110 A at 480 V.The armature circuit resistance is 0.2Ω. The machine has 6 poles and the armature is lap connected with 864 conductors.
The flux per pole is 0.05 Wb. Calculate (i) the speed and (ii) the gross torque developed by the armature. [05]

OR

Que.-2 (A) Explain working of four point starter, and discuss the function of HOLD ON and TRIP ON coil. [05]

(B) A 440 V shunt motor has armature resistant of 0.8 Ω and field resistance of 200Ω. Determine the back emf when giving an output of 7.46 kW at 85% efficiency [05]

Que.-3 **Attempt any two.** [10]

(A) Discuss speed control of dc shunt motor using uncontrolled rectifier.

(B) Define armature reaction, and elaborate cross magnetizing and demagnetizing effect.

(C) Draw and explain characteristics of D.C. shunt motor.

SECTION-II

Que.-4 **(A)** Explain working principle of auto transformer. Derive the equation of Cu saving in auto transformer. [05]

(B) Discuss transformer ON Load as well as on NO load condition. [05]

OR

Que.-4 **(A)** Derive the equation for equivalent circuit for transformer and draw each circuit. [05]

(B) A 30 KVA, 2400/120 V, 50 Hz transformer has a high voltage winding resistance of 0.1 ohm and a leakage reactance of 0.22 ohm. The low voltage winding resistance is 0.035 ohm and the leakage reactance is 0.012 ohm. Find the equivalent winding resistance, reactance and impedance refereed to the (1) High voltage side and (2) Low voltage side. [05]

Que.-5 **(A)** Derive the condition for maximum efficiency for transformer. Also define magnetic leakage and voltage regulation. [05]

(B) In a 25 KVA, 2000/200 V, single phase transformer, the iron and full load Cu losses are 350 and 400 W respectively, calculate the efficiency at unity power factor on, (a) Full load (b) Half load [05]

OR

Que.-5 **(A)** Draw and explain 3 Phase transformer connections. [05]

(B) Explain construction and operation of low oil circuit breaker. [05]

Que.-6 **Attempt any two.** [10]

(A) Draw and explain single line diagram of Power supply.

(B) Discuss the working of HRC fuse.

(C) Derive the equation of volume of conductor for :

    i)   Single phase, 3 – wire system
    ii)   3 - phase 3 - wire AC system

END OF PAPER