

GANPAT UNIVERSITY
B. TECH SEM- III (MARINE ENGINEERING)
REGULAR EXAMINATION NOV-DEC 2016
2MR305: ELECTRICAL MACHINES

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

- Que.-1** (A) Explain the effect of armature reaction in DC machine? [05]
 (B) Give classification of DC Generator with respect to their field winding connection. [05]

OR

- Que.-1** (A) A 4 pole, DC shunt generator with a shunt field resistance of $100\ \Omega$ and an armature resistance of $1\ \Omega$ has 378 wave-connected conductors in its armature. The flux per pole is $0.02\ \text{Wb}$. If a load resistance of $10\ \Omega$ is connected across the armature terminals and the generator is driven at 1000 rpm, calculate the power absorbed by the load. [04]
 (B) The following information is given for a 300 kW, 600 V, long-shunt compound generator: Shunt field resistance= $75\ \Omega$, armature resistance including brush resistance= $0.03\ \Omega$, commutating field winding resistance= $0.011\ \Omega$, series field resistance= $0.012\ \Omega$, diverter resistance= $0.036\ \Omega$. When the machine is delivering full load, calculate the voltage and power generated by the armature. [03]
 (C) Explain various losses occurring in DC Generator. [03]

- Que.-2** (A) Draw and explain characteristic of DC Series Motor. [04]
 (B) Write advantage and disadvantage of Ward Leonard method of speed control. [03]
 (C) A 4-pole, 220 V shunt motor has 540 lap-wound conductors. It takes 32 A from the supply mains and develops output power of 5.596 KW. The field winding takes 1 A. The armature resistance is $0.9\ \Omega$ and the flux per pole is $30\ \text{mWb}$. Calculate (i) the speed and (ii) the output torque. [03]

OR

- Que.-2** (A) State different methods of speed control of dc shunt motor and explain any one of them. [04]
 (B) A 440-V, shunt motor has armature resistance of $0.8\ \Omega$ and field resistance of $200\ \Omega$. Determine the back e.m.f. when giving an output of 7.46 kW at 85 percent efficiency. [03]
 (C) A 25 kW, 250 V, d.c. shunt generator has armature and field resistances of $0.06\ \Omega$ and $100\ \Omega$ respectively. Determine the total armature power developed when working (i) as a generator delivering 25 kW output and (ii) as a motor taking 25 kW input. [03]

- Que.-3** Attempt any two: [10]
 (A) Explain construction and working of four point starter in detail.
 (B) List down the merits and demerits of AC transmission line.
 (C) Give classification of Distribution Systems and explain any one of them.

SECTION-II

- Que.-4 (A) Draw the equivalent circuit of transformer and derive equation for resistances referred to primary and secondary. [05]
(B) A transformer is connected to 2200 V, 40 Hz supply. The core-loss is 800 watts out of which 600 watts are due to hysteresis and the remaining, eddy current losses. Determine the core-loss if the supply voltage and frequency are 3300 V and 60 Hz respectively. [05]

OR

- Que.-4 (A) Describe transformer on load condition with suitable diagram. [05]
(B) A 30 kVA, 2400/120 V, 50 Hz transformer has high voltage winding resistance of 0.1Ω and a leakage reactance of 0.22Ω . The low voltage winding resistance is 0.035Ω and the leakage reactance is 0.012Ω . Find the equivalent winding resistance, reactance and impedance referred to the (i) high voltage side and (ii) the low voltage side. [05]

- Que.-5 (A) State the losses in transformer and derive the condition for maximum efficiency. [05]
(B) Compare core transformer with shell type transformer. [05]

OR

- Que.-5 (A) Explain short circuit test on transformer. [05]
(B) The core of a three phase, 50 Hz, 11000/550 V delta/star, 300 kVA, core-type transformer operates with a flux of 0.05 Wb. Find (i) number of H.V. and L.V. turns per phase. (ii) e.m.f. per turn (iii) full load H.V. and L.V. phase-currents. [05]

- Que.-6 **Attempt any two:** [10]
(A) Explain single line diagram of A.C. power supply system.
(B) Write short note on Oil Circuit Breaker.
(C) Explain the need for fuse. State its advantage and disadvantage.

END OF PAPER