

## GANPAT UNIVERSITY

## B. TECH. SEMESTER: III MARINE ENGINEERING

REGULAR NOVEMBER – DECEMBER 2014

2MR305: ELECTRICAL MACHINE

Time: 3 Hours

Total Marks: 70

- Instruction:** 1 Attempt all Questions.  
 2 Assume suitable data if necessary.  
 3 Figure to the right indicates full Marks.  
 4 Start new Question on New Page

## SECTION - I

- Q-1 (A) Derive the equation of armature torque and condition for maximum torque. 07  
 (B) A 230 V shunt motor has armature resistant of  $0.8 \Omega$  and field resistance of  $200 \Omega$ . Determine the back emf when giving an output of 7.46 kW at 85% efficiency. 05

OR

- Q-1 (A) Explain the characteristics of DC shunt motor with neat sketch. 05  
 (B) Brief about the different methods of speed control of DC series motor. 05  
 (C) What do you mean by back emf? Give its significance. 02  
 Q-2 (A) Explain paralleling of DC series generator. What is the use of equalizer? 06  
 (B) A 4-pole, 900 rpm dc machine has a terminal voltage of 220 V and induced voltage of 240 V at rated speed. The armature circuit resistance is  $0.2 \Omega$ . Is the machine operating as a generator or a motor? Compute the armature current. 05

OR

- Q-2 (A) What do you mean by critical resistance? Discuss voltage build-up process of DC generator. 06  
 (B) A 4-pole, long-shunt lap wound generator supplies 25 KW at a terminal voltage of 500 V. The armature resistance is  $0.03 \Omega$ , series field resistance is  $0.04 \Omega$  and shunt field resistance is  $200 \Omega$ . The brush drop may be taken as 1.0 V.  
 (i) Determine the emf generated.  
 (ii) Calculate the No. of conductor if the speed is 1200 rpm and flux per pole is  $0.02 \text{ Wb}$ . Neglect armature reaction. 05

- Q-3 Attempt any three 12  
 (A) Illustrate the single line diagram of power supply system.  
 (B) Derive the equation of volume of conductor for two wire DC transmission system with mid-point earthed.  
 (C) Compare different types of secondary distribution systems.  
 (D) Explain the working of 3-point starter with neat sketch.

SECTION - II

- Q-4 (A) Draw and explain phasor diagram of following: 06  
i) Transformer on load  
ii) Transformer on No load
- (B) In 25 KVA, 2000/200V, Single phase transformer the iron loss and full load Cu loss are 350 and 400 W respectively. Calculate efficiency at unity power factor on: 06  
(i) Full Load (ii) Half Load.

OR

- Q-4 (A) What is the working principle of transformer? Explain construction of a transformer with neat sketch. 06
- (B) The maximum flux density in the core of 250/3000 volts, 50Hz single phase transformer is  $1.2 \text{ Wb/m}^2$ . If the EMF per turn is 8 volt, determine, (i) Primary and Secondary turn (ii) Area of a core 06
- Q-5 (A) What is the function of oil in low oil circuit breaker? Explain Low oil circuit breaker and state its advantages. 06
- (B) Why circuit interruption process is more difficult in DC? Explain DC air break Circuit breaker with neat sketch. 05

OR

- Q-5 (A) Classify bulk oil circuit breakers and explain any one in detail. 06
- (B) What is arc? Explain factors affecting the arc resistance and methods of arc extinction. 05
- Q-6 Attempt any Three 12
- (A) Define fuse. State advantages and disadvantages of fuse.
- (B) Explain basic operation of circuit breaker with neat sketch.
- (C) Write desirable characteristic of fuse element and explain HRC fuse.
- (D) Explain following:  
1. Current Transformer  
2. Potential Transformer

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END OF PAPER