



B.E DEGREE EXAMINATIONS: JUNE 2015

(Regulation 2009)

Third Semester

ELECTRICAL AND ELECTRONICS ENGINEERING

EEE103: Electrical Machines-I

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. D.C. generators are connected to the bus bars or disconnected from them only under the floating condition
 - a) to avoid sudden loading of the prime mover
 - b) to avoid mechanical jerk to the shaft
 - c) to avoid burning of switch contacts
 - d) all above
2. Magnetic field in a D.C. generator is produced by
 - a) Electromagnets
 - b) permanent magnets
 - c) both (a) and (b)
 - d) none of the above
3. Voltage equation of a dc motor is
 - a) $V = E_b + I_a R_a$
 - b) $E_b = V + I_a R_a$
 - c) $V = E_b / I_a R_a$
 - d) $V = E_b + I_a 2R_a$
4. Which of the following motor has the constant speed?
 - a) DC Series motor
 - b) DC Shunt motor
 - c) DC Cumulatively compound motor
 - d) All of the above
5. One of the main advantage of the swinburn's test is
 - a) It is applicable both shunt and compound motors
 - b) It needs one running test
 - c) It is very economical and convenient
 - d) It ignores any change in iron loss
6. Both Hopkinson's test and Field test
 - a) Require two electrically coupled series motors
 - b) Need two similar mechanically coupled motors.
 - c) Use negligible power
 - d) Are regenerative tests

7. Transformer changes the value of
 - a) Power
 - b) Frequency
 - c) Voltage
 - d) Current
8. The efficiency of a transformer is usually in the range of
 - a) 50–60%
 - b) 65–75%
 - c) 70–90%
 - d) 90–98%
9. The open circuit test of a transformer gives information about
 - a) Core losses of the transformer
 - b) Cu losses of the transformer
 - c) Exciting current
 - d) None of these
10. A transformer is to be tested at full-load conditions consuming only losses from the mains. We do
 - a) Short circuit test
 - b) Open circuit test
 - c) Both open circuit and short circuit tests
 - d) Load test

PART B (10 x 2 = 20 Marks)

11. Define Fleming's right hand rule.
12. What circumstances does a dc shunt generator fail to build up?
13. What is back emf in D.C. motor?
14. What are different methods of speed control in D.C shunt motor?
15. What is eddy current loss?
16. Explain the Brake test.
17. Why transformers are rated in kVA?
18. What is the turns ratio and transformer ratio of transformer?
19. What are the necessary tests to determine the equivalent circuit of the transformer?
20. Define all day efficiency of a transformer?

PART C (5 x 14 = 70 Marks)

21. a) (i) Drive EMF equation of a generator. (7)
- (ii) Sketch dc machines and explain its principle and operation . (7)
- (OR)**
- b) (i) A 4 pole shunt generator with lap-connected armature having field and armature resistance of 50 ohm and 0.1ohm respectively supplies 60 number 40W lamps at 100 V. Calculate the total armature current, current per path and the generated emf. Assume a constant drop of 1V per path. (10)
- (ii) Describe the characteristics of separately excited dc shunt generator and self excited shunt generator (4)

22. a) (i) Explain the principle of operation of a DC motor. (4)
(ii) A 4 pole, 240 V wave connected shunt motor gives 1119 KW when running at 1000 rpm and drawing armature and field currents of 50 A and 1.0 A respectively. It has 540 conductors. Its resistance is 0.1 ohm. Assuming a drop of 1 V per brush. Find (a) total torque (b) useful torque (c) useful flux/pole (d) rotational losses (e) efficiency (10)

(OR)

- b) (i) Draw and explain the mechanical characteristics of DC series and shunt motor. (7)
(ii) Derive an expression for the torque developed in a DC machine. (7)

23. a) With the help of neat circuit diagram, explain Hopkinson's test and derive the relations for efficiency (both for generator and motor) also state the merits and demerits of this method.

(OR)

- b) With the help of neat circuit diagram, explain Swinburne's test and derive the relations for efficiency (both for generator and motor) also state the merits and demerits of this method.

24. a) (i) Describe the various three phase transformer connections. (7)
(ii) Derive the emf equation of the Transformer. (7)

(OR)

- b) (i) Explain the construction and principle of operation of single phase transformer (7)
(ii) Deduce the equivalent circuit of a Transformer (7)

25. a) (i) Derive the condition for maximum efficiency of a Transformer. (7)
(ii) What are the tests required to draw the equivalent circuit of a Single phase Transformer? How they are conducted? (7)

(OR)

- b) Explain the Back to back method of testing of two identical single phase transformers
