
B.E. / B.Tech. (Full Time) ARREAR EXAMINATIONS, November 2011
Electrical and Electronics Engineering Branch
Fourth Semester
EE 284 - ELECTRICAL MACHINES I
(REGULATIONS - 2004)

Duration: 3 Hours **Max. Marks: 100**

Answer All Questions

PART – A (10 x 2 = 20 Marks)

1. Why core loss is said to be a constant loss?
2. What is called dynamic induced emf?
3. What is an ideal transformer?
4. State any one application of tap changing of transformers.
5. Draw the λ Vs. i diagram for a nonlinear magnetic system and identify energy and coenergy.
6. Write down the energy balance equation of a rotating machinery.
7. Draw the MMF pattern of distributed winding excited with single phase a.c. power supply?
8. What is called mutual torque?
9. A 220 V d.c. shunt generator supplies 26A at full load condition from its armature terminals. The shunt field current is 1.2 A. Its armature resistance is 0.5 ohms. Calculate the power delivered to the load.
10. Which method is to be used to control the speed of a d.c. shunt motor above rated speed?

PART – B (5 x 16 = 80 Marks)

11. (a). (i) An inductor shown in figure has the following dimensions: A_c = 1.0 cm2, l_c = 15 cm, g = 0.8 cm, N = 480 turns. Neglecting leakage and fringing and assuming μr = 1000, calculate the inductance. **[8]**

11. (a). (ii) Write short notes on static induced emf and dynamic induced emf through practical examples. **[8]**

12. (a). (i). What is an ideal transformer. Draw its phasor diagram under lagging power factor, leading power factor and unity power factor conditions. **[8]**

12. (a). (ii). The primary winding of a single-phase transformer is connected to a 230 V, 50 Hz supply. The secondary winding has 1500 turns. If the maximum value of the core flux is 0.00207 Wb,

determine: (a) the number of turns on the primary winding; (b) the secondary induced voltage; (c) the net cross sectional core area if the flux density has a maximum value of 0.465 Tesla. **[8]**

[Or]

12. (b). (i). A 230/400V single-phase transformer absorbs 35 W when its primary winding is connected to a 230 V, 50 Hz power supply, the secondary being open circuit. When the primary is short circuited and a 20 V, 50 Hz supply is connected to the secondary winding, the power absorbed is 60 W when the current has a full load value of 15 A. Estimate the voltage regulation of the transformer at half load, 0.8 power factor leading. **[8]**

12. (b). (ii). Derive the expression for saving of copper when a two winding transformer is converted into an autotransformer. **[8]**

13. (a). Obtain the expression of developed torque for a singly excited system. **[16]**

[Or]

13. (b).Show that the developed force computed using energy and coenergy are one and the same. **[16]**

14. (a). (i) Derive the torque equation of a d.c. generator. **[8]**

14. (a). (ii) A cumulatively compounded motor is said to be operated as a differentially compounded d.c. motor. Draw the torque (Vs) speed characteristics for both the conditions. **[8]**

[Or]

14. (b). (i) A shunt motor, supplied at 250 V, runs at 900 rpm when the armature current is 30 A. The resistance of the armature circuit is 0.4 Ω. Calculate the resistance required in series with the armature to reduce the speed to 600 rpm assuming that the armature current is then 20 A. **[8]**

14. (b). (ii) Discuss the delayed commutation in the case of a d.c. generator. **[8]**

15. (a). Write short notes on the load characteristics of (i) d.c. shunt motor (ii) d.c. compound motor (iii) d.c. series motor. **[16]**

[Or]

15. (b). (i) Discuss the Swinburnes test and explain the procedure to predetermine the efficiency of identical d.c. machines. **[8]**

15. (b). (ii) Discuss the speed control methods of a d.c. shunt motor **[8]**