

B.E DEGREE EXAMINATIONS: APRIL/MAY 2010

Second Semester

ELECTRONICS AND COMMUNICATION ENGINEERING

U07EC301: Electrical Machines and Power System

Time: Three hours**Maximum Marks: 100****Answer ALL Questions:-****PART A (10 x 1 = 10 Marks)**

1. The series field of a short shunt D.C generator excited by _____ currents
 - a) shunt
 - b) Armature
 - c) Load
 - d) External
2. In a D.C generator, the generated EMF is directly proportional to the
 - a) Field current
 - b) Pole flux
 - c) Number of Coils
 - d) none
3. A Transformer transforms
 - a) Frequency
 - b) Voltage
 - c) current
 - d) frequency
4. A step up transformer increases
 - a) Voltage
 - b) Current
 - c) Power
 - d) frequency
5. A 6 pole , 50 Hz, 3 phase induction motor is running at 950 rpm and has rotor copper loss of 5 KW. Its rotor input is _____ KW
 - a) 100
 - b) 10
 - c) 95
 - d) 5.3
6. In a 3 phase induction motor the relative speed of stator flux with respect to _____ is zero
 - a) Stator winding
 - b) rotor
 - c) rotor flux
 - d) space
7. The power factor of an alternator is determined by its
 - a) Speed
 - b) Load
 - c) Excitation
 - d) Prime mover
8. At leading power factor the armature flux in an alternator _____ the rotor flux
 - a) Oppose
 - b) aids
 - c) Distorts
 - d) Does not effect
9. The length of the short transmission line is about _____ km.
 - a) Less than 80 km
 - b) 80km < length < 160 km
 - c) length > 160 km
 - d) none
10. The designation EHV usually refers to voltages in excess of _____
 - a) 100 KV
 - b) 500 KV
 - c) 250 KV
 - d) 10 KV

PART B (10 x 2 = 20 Marks)

11. What are the various losses occurring in a generator?
12. Draw the diagram of long shunt compound generator

13. Does the transformer draw any current when its secondary is open? Why?
14. What are the conditions of parallel operation of single phase transformer?
15. Classify the A.C Motors in electrical system
16. Give two Advantages of Induction motor
17. Mention two application of synchronous motor?
18. Under which condition a synchronous motor will fail to fall into step?
19. Write the operating transmission voltages of the network.
20. Write the significance of the reactive power.

PART C (5 x 14 = 70 Marks)

21. a) (i) Derive the expression for EMF equation of D.C. generator (10)
 (ii) Describe the principle of operation of D.C. motor (4)

(OR)

- b) (i) A 4 pole, 240v, wave connected shunt motor gives 1119 kw when running at 1000 rpm and drawing armature and field currents of 50 A and 1 A respectively. It has 540 conductors. Its resistance is 0.1 ohm. Assuming a drop of 1 volt/ brush find (a) total torque (b) useful torque(c) useful flux /pole (d) rotational losses (e) efficiency. (10)
 (ii) Draw and describe about the internal and external characteristic of D.C. Series Motor (4)

22. a) (i) A single phase transformer has 500 turns in the primary and 1200 turns in the secondary. The cross sectional area of the core is 80 cm². If the primary winding is connected to a supply at 500v, calculate (a) peak flux density (b) voltage induced in the secondary. (7)
 (ii) Derive the EMF expression of single phase transformer and brief about transformation ratio. (7)

(OR)

- b) (i) Write about open circuit test and short circuit test of single phase transformer. (10)
 (ii) A 11000/230 v, 150 KVA, 1 phase, 50 Hz transformer has core loss of 1.4 KW and Fill load cu loss of 1.6 KW. Determine (a) the KVA load for maximum efficiency and value of max efficiency at unity power factor (b) The efficiency at half full load 0.8 P.F leading. (4)

23. a) (i) Derive the condition for maximum torque under running condition of three phase induction motor and what do you infer from the condition. (10)
- (ii) Brief about speed-torque characteristics of three phase induction motor. (4)

(OR)

- b) (i) Explain about the principle operation and constructional details of three phase induction motor (10)
- (ii) The power input to the rotor of a 400V, 50 Hz, 6 pole, three phase induction motor is 75 KW. The rotor electromotive force is observed to make 100 complete alterations per minute. Calculate (a) slip (b) rotor speed (c) mechanical power developed. (4)

24. a) (i) Write down the basic operating principle of synchronous generator and its constructional details. (10)
- (ii) A 3 phase, 16 pole alternator has a star connected winding with 144 slots and 10 conductors per slot. The flux per pole is 0.03 wb. Sinusoidally distributed and the speed is 375 rpm. Find the frequency rpm and phase and line EMF. Assume full pitched coil. (4)

(OR)

- b) (i) What is the procedure for starting a synchronous motor and compare the synchronous motor with induction motor. (7)
- (ii) Brief about the stepper motor (7)

25. a) Discuss the recent trends of power transmission by EHVAC and HVDC systems.

(OR)

- b) (i) What is the need of primary distribution in an electric supply scheme? (7)
- (ii) Discuss the reasons to prefer DC transmission over A.C transmission. (7)
