

B.E DEGREE EXAMINATIONS: NOV / DEC 2010

Third Semester

ELECTRONICS AND INSTRUMENTATION ENGINEERING

U07EI302: Electrical Machines

Time: Three Hours

Maximum Marks: 100

Answer All Questions:-

PART A (10 x 1 = 10 Marks)

1. The emf induced in the armature conductor is ----- in nature
 - A. Alternating emf
 - B. direct emf
 - C. mutual emf
 - D. self emf
2. The speed of a DC motor is inversely proportional to
 - A. back emf
 - B. flux
 - C. No. of parallel paths
 - D. torque
3. For an ideal transformer, the resistance of primary and secondary windings is
 - A. high
 - B. low
 - C. Primary is high and secondary is low
 - D. negligible
4. The full load copper loss of transformer is 100 W. What is the copper loss at half of the full load?
 - A. 25 W
 - B. 75 W
 - C. 100 W
 - D. 50 W
5. The synchronous speed of an induction motor is always
 - A. Less than the rotor speed
 - B. equal to the rotor speed
 - C. greater than the rotor speed
 - D. 1000 rpm
6. The starting current of the induction motor is ----- times of full load current.
 - A. 5 to 7
 - B. 10
 - C. 2
 - D. 25
7. Generally alternators are rated in -----
 - A. kVA
 - B. kW
 - C. BHP
 - D. kVA reactive
8. The stepper motor is normally powered by
 - A. DC voltage
 - B. AC voltage
 - C. Square wave pulse train
 - D. DC current
9. The interconnection of several generation stations in parallel is known as
 - A. Grid system
 - B. star system
 - C. Delta system
 - D. Load system
10. If power factor is improved to a proper value, there will be ----- for the consumer.
 - A. Net annual saving
 - B. Net annual loss
 - C. No loss/ No gain
 - D. penalty

Answer ALL Questions

PART B (10 X 2=20 marks)

11. What are the functions of a commutator?
12. State the types of armature windings.
13. Define regulation of a transformer.
14. List the various losses of a practical transformer.
15. What are the advantages of 3-phase Induction motor over DC motor?
16. A 3-phase Induction motor is wound 4-poles and is supplied from 50 Hz system. Calculate the synchronous speed.
17. What do you mean by armature reaction?
18. What are the applications of stepper motor?
19. What are the merits of EHVDC system?
20. Give the classifications of cables.

PART C (5 X 14=70 marks)

21. a i) Derive the emf equation of the DC machine. (7)
- ii) A shunt generator has an induced voltage of 127 Volts. When the machine is on load, the terminal voltage is 120 Volts. Find the load current if the load circuit resistance is 15 ohms and the armature resistance of 0.02 ohms. Ignore armature reaction. (7)

(OR)

- b i) Why is DC series motor is suitable for traction (7)
- ii) Explain in detail the speed control of DC shunt motors. (7)
22. a) i) Draw a neat circuit diagram of no load test on 1 – Φ transformer. How will you determine constant loss. (8)
- ii) A 20 kVA 1 – Φ transformer has 200 turns on the primary and 40 turns on the secondary. The primary is connected to 1000 V, 50Hz supply. Determine the secondary voltage on open circuit and the current flowing through the two windings on full load. (6)

(OR)

- b) A 500kVA transformer has an iron loss of 500 W and full load copper loss of 600 W. Calculate the efficiency at $3/4^{\text{th}}$ full load and 0.8 p.f. Also calculate the maximum efficiency at that powerfactor. (14)
23. a) i) Explain how the rotor rotates in 3 – Φ IM. (8)
- ii) A 3 – Φ , 6 pole, 50 Hz IM has a speed of 950 rpm on full load. Calculate

the synchronous speed and the slip at full load. (6)

(OR)

b) Write notes on:

i) Split phase IM ii) Capacitor start IM (7+7)

24. a) i) Explain the construction of synchronous machine. (6)

ii) A 3 – Φ , 12 pole, 50 Hz star connected alternator has 72 slots and 6 conductors per slot. If it is driven at 500 rpm, calculate the induced emf (line to line). Assume coil span as 180° electrical and the flux per pole 40mwb. (8)

(OR)

b) What are stepping motors? Give their types. Discuss about any one type in detail. (14)

25. a) i) Write a note on electric power generation system. (7)

ii) Explain the various stages on EHVAC (7)

(OR)

b) i) List out various types of insulators and explain any one type. (7)

ii) Write a note on cable (7)

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