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Question Paper Code : 90215

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2025

Second Semester

Electronics and Communication Engineering

BE 3254 – ELECTRICAL AND INSTRUMENTATION ENGINEERING

(Common to : Electronics Engineering (VLSI Design and Technology) / Electronics and Telecommunication Engineering

(Regulations 2021)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Justify whether transformer draw any current when secondary is open?
2. A 1100/400 V, 50 Hz single phase transformer has 100 turns on the secondary winding. Calculate the number of turns on its primary.
3. Why should a DC series motor never be started on no-load?
4. List the applications of stepper motor.
5. Draw the equivalent circuit of three phase squirrel cage induction motor.
6. Name the types of starting methods of single phase induction motor.
7. List the instrument transformers.
8. How DSO differ from ordinary CRO?
9. Name the components of power system.
10. What is the need of switch fuse unit?

PART B — ($5 \times 13 = 65$ marks)

11. (a) (i) A 6600/440 V Single phase 600 KVA transformer has 1200 primary turns. Find (1) Transformation ratio (2) Secondary turns (3) Voltage / turn (4) Secondary current when it supplies a load of 400 kW at 0.8 p.f. lagging. (6)

- (ii) Explain the principle of operation of a single phase transformer. (7)

Or

- (b) (i) Develop the exact equivalent circuit of a single phase transformer and explain each step. (6)

- (ii) Explain the working principle of an auto transformer and deduce the expression for copper savings in an auto transformer. (7)

12. (a) Explain the construction details and principles of operation of a DC motor also derive its torque equation.

Or

- (b) (i) Draw and explain the various characteristics of DC shunt and series generators. Also write its applications based on their characteristics. (7)

- (ii) Explain the principle of operation of universal motor. (6)

13. (a) Discuss different methods of speed control for three-phase induction motor.

Or

- (b) Explain the working principle of synchronous motors and enumerate any one type of its starting method.

14. (a) Explain three phase power measurement by two wattmeter method for balance delta connected load system with relevant diagram.

Or

- (b) With neat sketch describe the construction and working of a permanent magnet moving coil (PMMC) instrument meters.

15. (a) What is electrical earthing? Explain several of methods of earthing.

Or

- (b) (i) Explain the construction details of MCBs with necessary diagram. (7)
(ii) Discuss the safety and precautions rules working with electricity. (6)

PART C — ($1 \times 15 = 15$ marks)

16. (a) (i) A 500V, 6 pole, 50Hz, three phase Induction motor develops 20kW. When running at 995 rpm the p.f. is 0.87 lagging. Calculate (1) Slip (2) rotor copper loss (3) the total input if stator loss is 1500W (4) Line current (5) the rotor current frequency. (8)
(ii) Derive the EMF equation of an three phase alternator. (7)

Or

- (b) Obtain the approximate equivalent circuit referred to L.V. side for the following reading were taken in open-circuit and short-circuit tests on a single phase 20 kVA, 2000/200 V transformer:

O.C. Test : 200 V, 2 A, 120 W (L.V. side)

S.C. Test : 30V, 10 A 140 W (H.V. side)

