Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 77128

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2015.

Third Semester

Electronics and Communication Engineering

EE 6352 — ELECTRICAL ENGINEERING AND INSTRUMENTATION

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Mention the advantages of star and delta systems.

2. A 200 V DC motor has an armature resistance of 0.06 Ω and series field resistance of 0.04 Ω. If the motor input is 20 kW, find the back emf of the motor and power developed in armature.

3. Distinguish between core and shell type transformer.

4. What is an deal transformer and how does it differ from a practical transformer?

5. Mention the characteristic features of synchronous motor.

6. Compare slip ring and squirrel cage type rotor.

7. A thermistor has a resistance temperature coefficient β of –5%/°C. If the resistance of the thermistor is 100 Ω at 25°C, What is the resistance at 35°C?

8. What is piezoelectric effect?

9. Compare analog and digital instruments.

10. Write the advantages and disadvantages of Anderson bridge.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain the Internal and external characteristics of DC generator. (8)

(ii) A 10kW 250V, DC shunt generator is driven at 1000 rpm. Armature circuit resistance is 0.15 Ω and the field current is 1.64 A when the terminal voltage is 250V. Rotational losses are to be 540 W. Find at rated load armature induced emf, developed torque and efficiency. (8)

Or

(b) (i) Explain the characteristics of DC shunt and series motor. (8)

(ii) A 250V DC shunt motor has an armature resistance of 0.5Ω and a field resistance of 250Ω. When driving a constant load at 600 rpm the motor draws 21 A. What will be the new speed of the motor if an additional 250Ω resistance is inserted in the field circuit? (8)

12. (a) (i) A 20 kVA single phase transformer designed for 2000/200 V has the following constant : R_1 = 2.5Ω, X_1 = 8Ω, R_2 = 0.04Ω and X_2 = 0.07 Ω. Calculate the approximate value of the secondary terminal voltage and % regulation at full load and 0.8 p.f. lagging when primary applied voltage is 2000 V. (8)

(ii) Find "all day" efficiency of a transformer having maximum efficiency of 98% at 15 kVA at unity power factor and loaded as follows:

12 hours — 2kW at 0.5 p.f lag

6 hours — 12kW at 0.8 p.f lag

6 hours — at no load. (8)

Or

(b) (i) Deduce the equivalent circuit of transformer. (8)

(ii) A 1100 / 110 V, 22kVA single phase transformer has primary resistance and reactance 2 Ω and 5 Ω respectively. The secondary resistance and reactance are 0.02 Ω and 0.045 Ω respectively. Calculate:

(1) Equivalent resistance and reactance of secondary referred to primary.

(2) Total resistance and reactance referred to primary.

(3) Equivalent resistance and reactance of primary referred to secondary.

(4) Total resistance and reactance referred to secondary.

(5) Total copper loss. (8)

13. (a) (i) Give the constructional details of rotor of both salient pole and cylindrical rotor synchronous machines. (8)

(ii) Explain the working principle of synchronous motor and also explain any two methods of starting of synchronous motor. (8)

Or

(b) (i) Explain double field revolving theory of single phase induction motor. (8)

(ii) Explain the working of split phase capacitor start motor. (4)

(iii) A 3 phase induction motro runs at 1140 rpm at full load when supplied with power from a 60 Hz, 3 phase line calculate the number of poles and full load speed, frequency of rotor voltage. (4)

14. (a) (i) Explain the construction and principle of working of a LVDT. Explain how the magnitude and direction of the displacement of core of LVDT detected? (8)

(ii) Describe the working and construction of RTD. Describe the materials used for RTD along with their properties. (8)

Or

(b) (i) Define the following static characteristics :

(1) Static sensitivity

(2) Linearity

(3) Precision

(4) Accuracy

(5) Threshold (10)

(ii) Discuss the errors in measurements. (6)

15. (a) (i) Explain the construction and working of digital multimeter with all the self diagnostic features. (10)

(ii) Explain the working of ramp type digital voltmeter. (6)

Or

(b) (i) Derive the bridge balance equation of Schering bridge. (8)

(ii) How is low resistance measured using Kelvin double bridge? (8)
