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

Question Paper Code : 40996

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2018
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. On what operating factors does the speed of a DC motor depend ?
2. Distinguish between cumulative compound and differential compound generators.
3. Give the condition to be satisfied for parallel operation of transformer.
4. Distinguish between Power Transformer and Distribution Transformer.
5. The value of voltage regulation obtained by EMF method is always higher than the actual value. State the reasons for this error.
6. Explain the phenomenon crawling of an induction motors.
7. Define self-generating and non self-generating transducers. Give some examples.
8. List the common errors present in analog indicating instruments.
9. State the limitations of Wheatstone bridge in measuring resistances of very low and very high values.
10. List the applications of Q-meter.

PART – B (13×5=65 Marks)

11. a) i) Draw and explain the shape of the speed-torque characteristics of a DC series motor and state the applications for which the motor is particularly suitable. (6)

ii) A 230 V, DC series motor runs at 1000 rpm when taking 155 A. Its total armature circuit resistance is 0.1 Ω. Calculate the speed of the motor at half the torque. Assume unsaturated magnetic field. (7)

(OR)

b) Two shunt machines loaded for the Hopkinson's test take 15A at 220 V from the supply mains. The generator output current is 85A and the shunt field currents are 3 A and 2.5 A, resistance of the armature is 0.05 Ω. Calculate the efficiency of each machine for this particular load condition.

12. a) i) The primary and secondary windings of a 30 kVA, 6.6 kV/240 V transformer have resistances of 10 Ω and 0.013 Ω respectively. The leakage reactance of the windings are 17 Ω and 0.022 Ω. Estimate the percentage voltage regulation of the transformer when it is delivering full-load at 0.8 pf lagging at the rated voltage. (7)

ii) Derive the condition for maximum efficiency of the transformer. (6)

(OR)

b) Explain the principle of working of an Auto-transformer. Deduce the expression for volume of copper saved in terms of turns ratio when compared with a 2-winding transformer.

13. a) i) Explain the terms d-axis and q-axis reactance of an Alternator and with suitable diagram brief the experimental method to determine these reactance. (8)

ii) Explain the operation of Synchronous motor as a Synchronous condenser. (5)

(OR)

b) i) Explain V and inverted V curves of synchronous motor. (5)

ii) Using Double revolving field theory, explain why a single-phase induction motor is not self-starting. (8)

14. a) i) On what three principles does Inductive Transducer work ? Also give a brief account on working of LVDT. (6)

ii) Explain the construction and working of Strain gauge. What are the classifications of strain gauge. (7)

(OR)

b) i) What is called Piezo-resistive Effect ? Derive the gauge factor of a Piezo resistive gauge and list its types. (7)

ii) Explain the working of RTD and Thermistor. (6)

15. a) i) Explain with neat sketch the working of ramp and integrating type Digital Voltmeter. (10)

ii) Draw the block diagram of basic digital multimeter. (3)

(OR)

b) i) With the help of circuit diagram and phasor diagram, explain how capacitance can be measured by using Schering bridge. (6)

ii) The Schering bridge with wheatstone bridge arrangement (Source across-A&C, Detector across-B&D) has following constants : CD-resistance 1.5 kΩ and capacitance 0.4 μF, AD-Unknown resistance and capacitance, AD-Capacitance-0.4 μF, BC-Resistance 3 kΩ. Find unknown resistance and capacitance. Also find dissipation factor when source frequency is 1 kHz. (7)

PART – C (1×15=15 Marks)

16. a) i) Develop a simplex lap winding diagram for a 2 pole, 6 slot dc machine with 6 commutator segments. Indicate the position of brushes. (10)

ii) Explain the process of commutation in a DC generator with sketches. Also describe any one method adopted for obtaining satisfactory commutation. (5)

(OR)

b) i) Derive an expression for torque developed in a 3-phase slip-ring induction motor and explain with the aid of speed-torque curve, the speed control of the motor when (i) the applied voltage is halved and (ii) the rotor resistance is doubled. (10)

ii) What are the various methods of synchronizing alternators ? Describe any one method of synchronization. (5)

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