PART C — (1 × 15 = 15 marks)

16. (a) Discuss various methods used for controlling the speed of D.C. motor with neat sketch. (15)

Or

(b) Draw the equivalent circuit of transformer. Also explain, how the circuit parameters are estimated using open circuit and short circuit tests. (15)

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

Question Paper Code : 20451

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 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. Explain the term "back emf" in DC motor.

2. Draw the internal characteristics of DC generator.

3. The number of turns on the primary and secondary windings of a $1-\varphi$ transformer is 350 and 35 respectively. If the primary is connected to a 2.2 kV, 50-Hz supply, determine the secondary voltage on no-load.

4. Write some applications of auto-transformer.

5. Define the term slip in Induction motor.

6. What are the uses of damper windings in synchronous machine?

7. State static and dynamic characteristics of instruments.

8. What are Piezo-electric transducers?

9. Distinguish between Analog and digital instruments.

10. Draw the schematic diagram of a Maxwell bridge used for unknown inductance measurement.

PART B — (5 × 13 = 65 marks)

11. (a) (i) Explain the working principle of DC motor with a sketch. (8)

(ii) Find the load and full-load speeds for a four-pole, 220-V, and 20-kW, shunt motor having the following data : Field-current = 5 amp, armature resistance = 0.04 ohm, Flux per pole = 0.04 Wb, number of armature conductors = 160, Two-circuit wave-connection, full load current = 95 amp, No load current = 9 A. Neglect armature reaction. (5)

Or

(b) (i) Classify DC Generators based on their method of excitation; draw the circuit diagram of each types and write the relationship between armature current and load current. (8)

(ii) The magnetization curve of a DC shunt generator at 1500 rpm is

I_f (A) :	0	0.4	0.8	1.2	1.6	2.0	2.4	2.8	3.0
E_0 (V) :	6	60	120	172	202	221	231	237	240

For this generator find no load e.m.f. for a total shunt field resistance of 100 Ω and the critical field resistance at 1500 r.p.m. (5)

12. (a) (i) Derive the emf equation of a Transformer from first principle. (8)

(ii) A single-phase transformer with a ratio of 440/110-V takes a no-load current of 5 A at 0.2 power factor lagging. If the secondary supplies a current of 120 A at a p.f. of 0.8 lagging, estimate the current taken by the primary. (5)

Or

(b) (i) Explain in brief various loses present in the Transformer; Efficiency of a transformer and write the condition for maximum efficiency. (8)

(ii) A-100 kVA transformer has 400 turns on the primary and 80 turns on the secondary. The primary and secondary resistances are 0.3 Ω and 0.01 Ω respectively and the corresponding leakage reactances are 1.1 and 0.035 Ω respectively. The supply voltage is 2200 V. Calculate the equivalent impedance referred to primary. (5)

13. (a) (i) A 4-pole, 3-phase induction motor operates from a supply whose frequency is 50 Hz. Calculate

(1) The speed at which the magnetic field of the stator is rotating.

(2) The speed of the rotor when the slip is 0.04

(3) The frequency of the rotor currents when the slip is 0.03.

(4) The frequency of the rotor currents at standstill. (6)

(ii) Classify single phase induction based on method of starting and write the principle of making single phase induction motor self starting. (7)

Or

(b) (i) Define the voltage regulation in alternator and draw the phasor diagram of a loaded alternator. (7)

(ii) Explain the construction of V-curves of synchronous motor. (6)

14. (a) (i) Define Transducer and classify different types of transducers. (8)

(ii) What is strain gauge, explain its working principle. (5)

Or

(b) (i) Explain the working of variable capacitance transducer with neat diagram. (7)

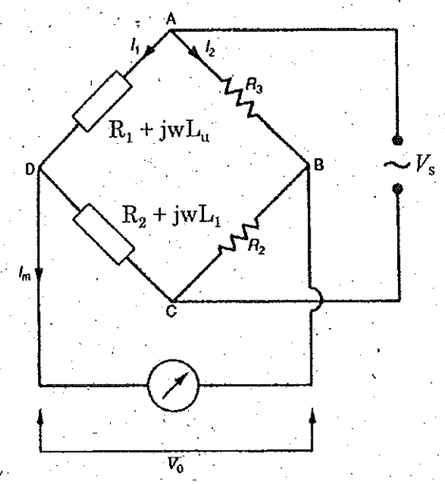
(ii) With a schematic diagram, explain the working of Linear Variable Differential Transformer (LVDT). (6)

15. (a) (i) Compare analog and digital modes of operation in measurements. (8)

(ii) Derive and explain the measurement of resistance using Wheatstone bridge. (5)

Or

(b) (i) An unknown inductance L_u is measured using a deflection type of bridge as shown in figure . The components in the bridge have the following values :



V_s = 10 $V_{r.m.s.}$, L_1 = 20 mH, R_2 = 100 Ω, R_3 = 100 Ω

If the output voltage V_0 is 1 V r.m.s., calculate the value of L_u. (6)

(ii) Explain with circuit the measurement of frequency of the AC. signal using Wien bridge. (7)