

**SECOND SEMESTER DIPLOMA EXAMINATION IN ELECTRICAL
AND ELECTRONICS ENGINEERING — APRIL, 2017**

BASIC ELECTRICAL ENGINEERING

[Time : 3 hours

(Maximum marks : 100)

PART — A

(Maximum marks : 10)

Marks

I Answer the following questions in one or two sentences. Each question carries 2 marks.

1. Give the relation between voltage, current and resistance in an electrical circuit.
2. Define an active element in a circuit.
3. Give any two factors affecting capacitance of parallel plate capacitor.
4. Give the absolute permeability of free space.
5. Give any two application of electromagnet. (5×2 = 10)

PART — B

(Maximum marks : 30)

II Answer *any five* questions from the following. Each question carries 6 marks.

1. Explain the procedure to find power in a DC circuit.
2. Find the equivalent resistance in a circuit containing 2 resistances 10 ohm and 5 ohm are connected in series and a 10 ohm resistor connected across this combination.
3. State and explain super position theorem.
4. Give the expressions for finding effective resistance of a parallel combination of three resistors.
5. State and explain Lenz's law.
6. Derive an expression for self-inductance of a coil in terms of its physical dimension.
7. Derive an expression for parallel plate capacitor in a uniform dielectric medium. (5×6 = 30)

PART— C

(Maximum marks : 60)

(Answer *one full* question from each unit. Each full question carries 15 marks.)

UNIT — I

- III (a) State and explain Kirchhoff's voltage and current law. 8
- (b) A tungsten lamp has a resistance of 150 ohms at 2850°C. What is its resistance at 20°C ? Temperature coefficient of tungsten is 0.0049/°C at 0°C. 7

OR

- IV (a) Explain characteristics and advantages of a parallel circuit. 8
- (b) The electrical installation in a house is used in the following manner.
- (i) Lamps – 60W, 6 Nos., 4 hours per day
 - (ii) Fan – 80W, 3 Nos., 6 hours per day
 - (iii) Iron box – 1 KW, 1 No., 2 hours per day
 - (iv) Electric cooker – 1.5 KW, 1 No., 2 hours per day
- Calculate the total cost of electric energy for 30 days at the rate of ₹ 3/unit. 7

UNIT — II

- V (a) State and explain Thevenin's theorem. 8
- (b) Two resistances of 20 ohms and 30 ohms respectively are connected in parallel. This two parallel resistances are further connected in series of 15 ohms. If the current through the 15 ohm resistance is 3A. Find :
- (i) Currents through 20 ohms and 30 ohms resistance respectively.
 - (ii) The voltage across whole circuit.
 - (iii) The total power consumed. 7

OR

- VI (a) Explain the steps for finding Thevenin's equivalent. 8
- (b) State and explain maximum power transfer theorem. 7

UNIT — III

- VII (a) Derive an expression for the equivalent capacitance of a group of capacitors when they are connected (i) in parallel (ii) in series 8
- (b) Write short notes on :
- (i) Potential gradient
 - (ii) Breakdown voltage 7

OR

- VIII (a) Derive the expression of potential at a point in a medium. 8
- (b) Two capacitors have capacitance of 6 μF and 10 μF respectively. Find the total capacitance when they are connected in parallel and in series. 7

UNIT — IV

- IX (a) Differentiate statically and dynamically induced emf. 8
- (b) State and explain Faraday's laws of electromagnetic induction. 7

OR

- X (a) Compare magnetic and electric circuits. 8
- (b) A straight wire 0.5m long carries a current of 100A and lies at right angles to an uniform field of 1.5T. Find the mechanical force on the conductor when
- (i) It lies in the given position
 - (ii) It lies in a position such that it is inclined at an angle of 30° to the direction of field. 7