6040

BOARD DIPLOMA EXAMINATION, (C-16)

MARCH/APRIL—2021

DEEE - FIRST YEAR EXAMINATION

BASIC ELECTRICAL ENGINEERING

Time : 3 hours]   [*Total Marks* : 80

PART—A   3×10=30

Instructions :   (1) Answer **all** questions.

(2) Each question carries **three** marks.

(3) Answers should be brief and straight to the point and shall not exceed five simple sentences.

1. State laws of Resistance.

2. State the effects of temperature on Resistance.

3. Define *(a)* Electrical work and *(b)* Electrical power, and mention their units.

4. State mechanical equivalent of heat and write the formula.

5. State Biot-Savarts law.

6. State Fleming's left-hand rule and mention where it is applied.

7. State Lenz's law.

8. Calculate the coefficient of coupling for two coils having self-inductances of 60 mH and 80 mH. The mutual inductance between them is 40 mH.

9. Define *(a)* Electric flux, *(b)* Permittivity and mention their units.

10. List any three factors affecting the capacitance of a capacitor.

PART—B

Instructions : (1) Answer *any* **five** questions.

(2) Each question carries **ten** marks.

(3) Answers should be comprehensive and criterion for valuation is the content, but not the length of the answer.

11. *(a)* Derive the formula for coefficient of resistance at any temperature as $a_t = a_0/(1 + a_0)t$ 5

(b) A conductor wire has a resistance of 5 Ω. What will be the resistance of the wire, if its diameter is reduced to half and length increased four times?   5

12. *(a)* List any four limitations of Ohm's law.   4

(b) Calculate the effective resistance when three resistances 20 Ω, 25 Ω and 50 Ω are connected in *(i)* series, *(ii)* parallel.   2+4=6

13. *(a)* Mention the typical power ratings of the following home appliances :   4

(i) LED lamp, *(ii)* Electric Iron, *(iii)* Air conditioner, *(iv)* Refrigerator

(b) Two lamps of rating 220 V, 40 W and 220 V, 60 W are connected in series across 220 V supply. Calculate *(i)* voltage across each lamp, *(ii)* total power consumption.   6

14. *(a)* Explain the working of Electric cooker with neat sketch.   4

(b) A water heater rated 2·07 kW has to raise the temperature of 3·4 litres of water from 15 °C to 95 °C in 10 minutes. If the water equivalent of heater is 130 grams, determine the efficiency of the heater.   6

15. *(a)* Derive an expression for the force between two parallel current carrying conductors. 6

(b) Compare magnetic circuit and Electric circuit in any four aspects. 4

16. *(a)* State and Explain Faraday's laws of electromagnetic induction. 6

(b) Write short notes on Mutually induced e.m.f. with diagram. 4

17. *(a)* Derive an expression for the energy stored in a magnetic field. 6

(b) A coil having 100 turns links with a flux of 1 mWb. If the direction of this flux is reversed in 0·01 second, find the e.m.f induced in the coil. 4

18. *(a)* Plot electrostatic field due to *(i)* isolated negative charge, *(ii)* like charges placed side by side. 4

(b) Two capacitors of 10 µF and 40 µF are connected in series across a voltage of 400 V. Calculate *(i)* Equivalent capacitance, *(ii)* Charge on each capacitor, *(iii)* Potential difference across each capacitor. 6

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