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C16-EE-106**6040****BOARD DIPLOMA EXAMINATION, (C-16)****OCTOBER/NOVEMBER—2023****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 Ohm's law and give the equation with units.
2. Determine the resistance of 200 m length of a wire having a uniform cross-sectional area of 0.25 mm^2 , if the wire is made of platinum having a resistivity of $100 \times 10^{-8} \Omega\text{-m}$.
3. Define (a) electrical power and (b) electrical energy.
4. List the heat producing appliances.
5. Define Fleming's left hand rule.
- * 6. Define (a) Mmf and (b) Reluctance.
7. State Faraday's laws of electromagnetic induction.
8. Define co-efficient of coupling.
9. Define Gauss theorem.
10. The capacitance of a capacitor formed by two parallel metal sheets, each 200 cm^2 in area, separated by a dielectric 3 mm thick is $4 \times 10^{-12} \text{ F}$. Determine relative permittivity of the dielectric.

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PART—B

10×5=50

- 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 an expression for equivalent resistance, when three resistances are connected in parallel. 5
(b) Calculate the total resistance when three resistances 10 Ω, 25 Ω and 60 Ω are connected in (a) series and (b) parallel. 5
- 12.** Derive an expression $\alpha_t = \alpha_0 / (1 + \alpha_0 t)$. 10
- 13.** A house has the following loads : 10
(a) 10 lamps of 100 watt each, working for 8 hours a day
(b) 5 fans of 80 watt each, working for 12 hours a day
(c) 1 electric iron of 550 watt, working for 2 hours a day
(d) 1 refrigerator of 350 watt, working for 14 hours a day
Calculate the monthly bill at 80 paise/unit, if the meter rent per month is ₹20.
- 14.** Draw a neat sketch of electric iron and explain its different parts. 10
- 15.** (a) Draw the magnetic field pattern due to (i) solenoid and (ii) toroid.
(b) An electromagnet has an air gap of 3 mm and flux density in the air gap is 1.8 Wb/m². Determine the ampere turns for the gap. 5+5=10
- 16.** Derive an expression for (i) self-inductance and (ii) mutual inductance. 10
- 17.** (a) Explain dynamically induced emf. 5+5=10
(b) A flux of 0.4 mWb is produced by a current of 10A flowing through a 200 turns coil corresponding to the complete reversal of the current in 0.02 second. Also find the magnitude of the emf induced.

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18. (a) Derive an expression for energy stored in a capacitor. 5+5=10

(b) A capacitor consisting of two parallel plates 0.55 mm apart in air and each of effective area $400 \times 10^{-4} \text{ m}^2$ is connected to a 200 V battery. Calculate (i) the capacitance and (ii) the charge.

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