23061

C23-EE–106

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BOARD DIPLOMA EXAMINATION, (C-23)

OCTOBER/NOVEMBER—2024

DEEE – FIRST YEAR EXAMINATION

BASIC ELECTRICAL TECHNOLOGY

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. 1+1+1

2. Define specific resistance and state its SI unit. 2+1

3. Determine the resistance of 100 m length of a wire having a uniform cross-sectional area of 0·1 mm^2, If the wire is made of manganin having a resistivity of 100×10^{-8} Ω-m.

4. Define junction, branch and loop regarding electrical circuits.

5. Define electrical energy mention its units. 2+1

6. Define thermal efficiency.

7. List any six applications of heating effect of electric current.

8. Three resistances 3 Ω, 6 Ω and 9 Ω are connected in Delta. Find the equivalent resistances in star.

9. State Norton's theorem.

10. State Maximum Power Transfer theorem.

PART—B

10×5=50

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

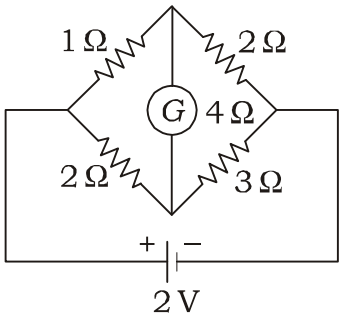
(2) Each question carries **ten** marks.

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

11. *(a)* Define temperature co-efficient of resistance and give its units. 3

(b) Explain the laws of resistance and give its units. Derive the relation $R = \rho \frac{l}{a}$. 7

12. Find the current through each resistor in circuit shown in below figure using Kirchhoff's laws. 10



13. Derive an expression for equivalent resistance when three resistances are connected in parallel and in series. 5+5=10

14. Calculate the bill of electricity charges for the following loads fitted in electrical installations : 5+5

(a) 10 lamps 60 watt each working 5 hours a day.

(b) 5 ceiling fans 120 watt each working 10 hours a day.

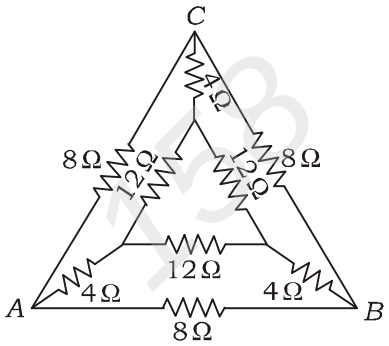
(c) 2 KW heater working 4 hours a day.

(d) 2 H.P. motor with efficiency 80% working 4 hours a day.

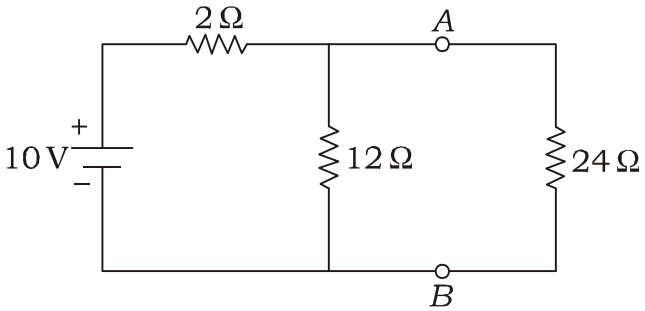
Calculate the monthly bill at ₹ 2·50 paise/unit, add meter rent per month as ₹ 50.

15. An electric kettle is rated 1·5 kW, 230 V takes 5 minutes to bring I kg of water to boiling point from 15 °C. Find the efficiency of the kettle.

16. Find the equivalent resistance between terminals A and B of the network shown in below figure.



17. Find the current through the 24 Ω resistor in the circuit shown in below figure by using Thevenin's theorem.



18. Derive the condition for maximum power to be transferred from source to load of an electrical circuit.

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