



C16-EE-106

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BOARD DIPLOMA EXAMINATION, (C-16)
MARCH/APRIL—2018
DEEE—FIRST SEMESTER EXAMINATION
BASIC ELECTRICAL ENGINEERING—I

Time : 3 hours]

[Total Marks : 80

PART—A

2×15=30

- Instructions** : (1) Answer *any fifteen* questions.
(2) Each question carries **two** marks.
(3) Answers should be brief and straight to the point and shall not exceed *five* simple sentences.

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1. Distinguish between conductor and insulator with respect to valence electrons.
2. Define the following terms :
(a) Electric current
(b) Electric potential
3. List any two limitations of Ohm's law.
4. Define conductivity and state its units.
5. The resistance of 360 m of a wire is 90 . What length of the same wire will have a resistance of 125 ?

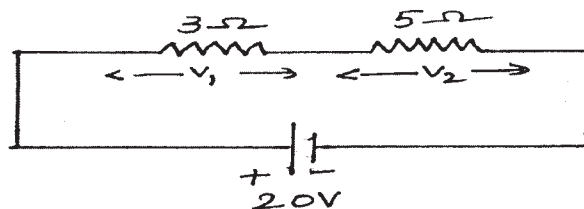
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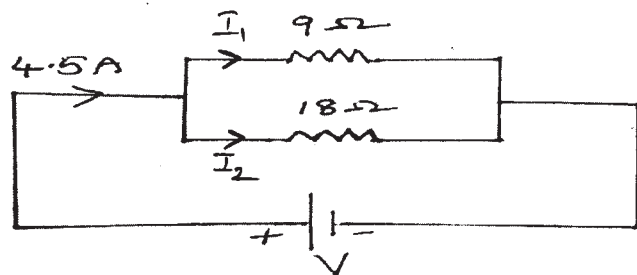
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6. Calculate the value of current through a resistance of $10\ \Omega$. If it is connected across a battery of 1.5 V .
7. What happens to the resistance of pure metals and insulators with increase in temperature?
8. State the properties of series circuits.
9. Calculate the effective resistance, when three resistances $2\ \Omega$, $8\ \Omega$ and $16\ \Omega$ are connected in series.
10. Calculate the effective resistance, when three resistances $20\ \Omega$, $25\ \Omega$ and $50\ \Omega$ are connected in parallel.
11. A $12\ \Omega$ resistor is connected in series with the parallel combination of two resistors $6\ \Omega$ and $10\ \Omega$, find the equivalent resistance.
12. Calculate the voltages V_1 and V_2 for the circuit shown below using voltage divider rule :



13. Calculate the currents I_1 and I_2 for the circuit shown below using current division method :



14. Define electrical work and state its units.
15. State the units of (a) mechanical power and (b) electrical power.

16. Define ^{*} electrical energy and state its units.
17. Define efficiency.
18. A lamp which is connected to 230 V draws a current of 0.261 A. Calculate the power consumed by the lamp.
19. Find the resistance of an incandescent bulb of rating 200 W, 220 V.
20. An immersion heater has a resistance of 125 ohms and is connected to a 500 V d.c. supply. Find the kWh energy taken in 45 minutes.

PART—B

10×5=50

- Instructions :** (1) Answer *any five* questions.
 (2) Each question carries **ten** marks.
 (3) Answers should be comprehensive and the criterion for valuation is the content but not the length of the answer.

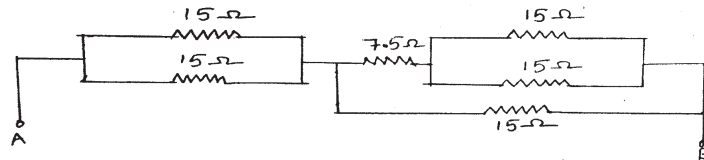
21. (a) State the laws of resistance. 5
- (b) A copper wire 100 m long has a diameter one-third of the diameter of manganin wire. The resistivities of manganin and copper are 0.44 $\times 10^{-8}$ Ω -m and 0.018 $\times 10^{-8}$ Ω -m respectively. Calculate the length of manganin wire, if it has the same resistance of copper wire. 5
22. (a) Derive the expression for temperature coefficient of resistance at temperature t_1 as $\frac{R_1 - R_0}{R_0(t_1 - t_0)}$. 7
- (b) A coil wound of copper wire has a resistance of 16 Ω at 20 °C. Calculate the resistance at 60 °C. The resistance temperature coefficient of copper is 0.0043/°C. 3

23. (a) * Derive the expression for resistance at any temperature t of a conductor as $R_t = R_0(1 + \alpha t)$. 5

(b) The resistance of a coil of wire increases from 40Ω at 10°C to 48.25Ω at 60°C . find the temperature coefficient at 0°C of the conductor. 5

24. (a) Derive an expression for equivalent resistance when three resistances are connected in parallel. 5

(b) Calculate the equivalent resistance between terminals A and B for the circuit shown below : 5

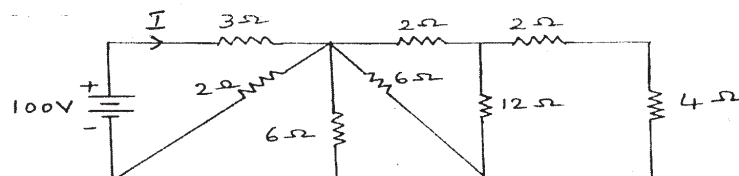


25. (a) Derive an expression for equivalent resistance when three resistances are connected in parallel. 5

(b) the equivalent resistance of two resistors is 10Ω when connected in series and 2.4Ω when connected in parallel. Find the value of resistors. 5

26. (a) * Two resistances 25Ω and 50Ω are connected in series across a d.c. voltage supply. If the voltage drop across 25Ω resistance is 100 V , find the current drawn from the supply and total supply voltage. 3

(b) Find the current I in the given circuit : 7



27. (a) Two lamps of rating $220 \text{ V}, 40 \text{ W}$ and $220 \text{ V}, 60 \text{ W}$ are connected in series across 220 V supply. Find the power consumed by each lamp. 5

- (b) ^{*} A resistance R is connected in series with a parallel circuit comprising of two resistances 12 Ω and 8 Ω respectively. The total power dissipated in the circuit is 70 W when the applied voltage is 20 V. Calculate the value of R . 5
- 28.** (a) Calculate the input of electric motor when the output of the motor is 10 HP and efficiency is 90%. 2
- (b) The details of electrical load in a house are as follows :
- (i) 3 lamps of 60 W each used for 5 hours per day
 - (ii) 2 fluorescent tubes of 40 W each used for 4 hours per day
 - (iii) 4 fans of 75 W each used for 10 hours per day
 - (iv) 1 electrical iron of 1 kW used for 2 hours per day
- Determine the energy consumption and cost of energy at the rate of ₹ 4.25 per kWh for the month of May. 8

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