

Friday 22-11-2019
10:00 AM-01:00 PM



W-20422-2019
Max. Marks: 60

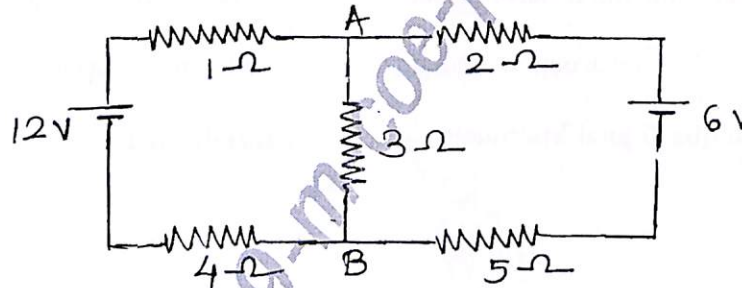
N.B.:

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Use of non-programmable calculator is **ALLOWED**.

- Q.1**
- a) State and explain the factors on which resistance of conductor depends. What is the effect of temperature increase on resistance of Copper, Silicon and Nichrome? (04)
 - b) An electric kettle is required to heat 5 liters of water from 20°C to 90°C in 40 minutes. Find the rating of the kettle assuming the efficiency of 85%. If the kettle is to operate on 230 V mains, find the resistance of the heating element. Assume the specific heat capacity of water to be $42000 \text{ J/kg}^{\circ}\text{K}$ and 1 liter of water to have mass of 1 kg. (06)

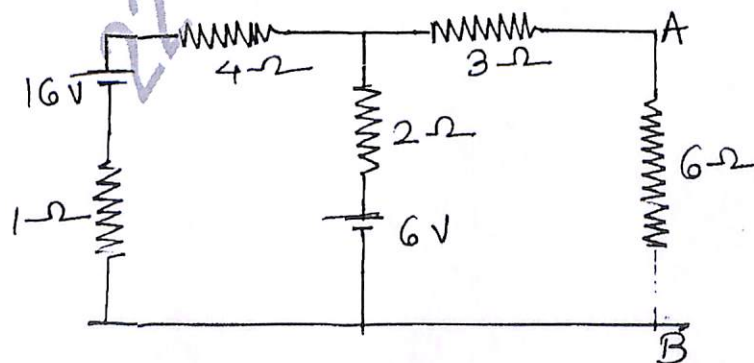
OR

- a) Derive the expression for insulation resistance of a cable. (05)
 - b) With usual notation prove that $(\alpha_1 \cdot \alpha_2) = \alpha_1 \cdot \alpha_2 (t_2 - t_1)$ (05)
- Q.2**
- a) Derive a formula to convert a DELTA connected network into its equivalent STAR connected network. (04)
 - b) Find the current flowing through AB using Superposition Theorem. (06)



OR

- a) State and explain Kirchhoff's laws. (05)
- b) Find the current flowing through AB using Thevenin's Theorem. (05)



- Q.3**
- a) Define and explain Permittivity and its types. (04)
 - b) Two capacitors of capacitance $5 \mu\text{F}$ and $10 \mu\text{F}$ are charged to voltage of 300 V and 400 V respectively. The capacitors are connected in parallel. Calculate: (06)
 - i) Charge on each capacitor
 - ii) Charge on the combination
 - iii) P.D. between the terminals of the combination

OR

- a) State the types of capacitors based on dielectric material used and describe any two types. (05)
- b) Derive an expression for energy stored in capacitor. (05)

P.T.O.

- Q.4 a) A series circuit of $R=14.4$ ohm and $L=0.127H$, draws a current of 4.6 A, when connected to $230V$ ac supply. Find the frequency of the supply in Hz. Also calculate the active power, reactive power and apparent power (06)
- b) Draw the waveforms of voltage, current and power across R-L series circuit(in above example) (04)

OR

- a) An ac circuit , connected across 200 Volts, 50 Hz supply has two parallel branches X and Y .The current in branch X is 4 A at 0.8 lagging power factor The total supply current is $5A$ at unity power factor. Find current through branch Y and phase angle. (06)
- b) Define and Explain i) Power Factor ii) Form Factor (04)
- Q.5 a) A 10 kVA, 11 kV, 440 V, 50 Hz, single phase transformer has 44 turns on low voltage winding. Find (06)
- i) Number of turns of high voltage winding
- ii) Maximum value of flux in the core
- iii) Current in low voltage winding
- b) Define i) Reluctance ii) Magnetic Field intensity. State their units. (04)

OR

- a) A magnetic circuit consist of an iron ring of mean circumference of 80 cm with cross sectional area of 12 cm². A current of $2A$ in the magnetizing coil of 200 turns produces a total flux of 1.2 milliweber in the iron. Calculate: (04)
- a) Flux density in the iron
- b) The absolute and relative permeability of iron
- c) The reluctance of the circuit
- b) Draw hysteresis curve of silicon steel and describe its significance. (04)
- Q.6 a) Describe construction and working of Fluorescent Lamp with neat diagram. (04)
- b) What is the importance of Earthing? State the different types of earthing? (06)

OR

- a) Describe construction and operation of Mercury Vapor Lamp with neat diagram. (05)
- b) Describe Digital Multimeter with front panel diagram. (05)

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