

**B. Tech. SEM -I (Computer Science & Business Systems) (CBCS 2018
Course) : SUMMER - 2019**

SUBJECT: PRINCIPLES OF ELECTRICAL ENGINEERING

Day : Monday
Date : 13/05/2019

S-2019-2515

Time : 10.00 AM To 01.00 PM
Max Marks : 60

N.B.:

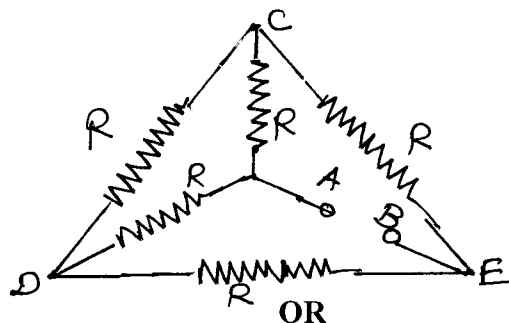
- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Use of non-programmable calculator is **ALLOWED**.

- Q.1**
- a) Define and explain 1) Resistance ii) Ohm's Law (04)
 - b) An electric geyser is used to heat 5 liters of water from 13°C to 83°C. If the heat lost in radiation is 40kJ and water equivalent of calorimeter is 100 gms. Determine the efficiency of geyser. Take specific heat of water as 4200 J/kg°C. (06)

OR

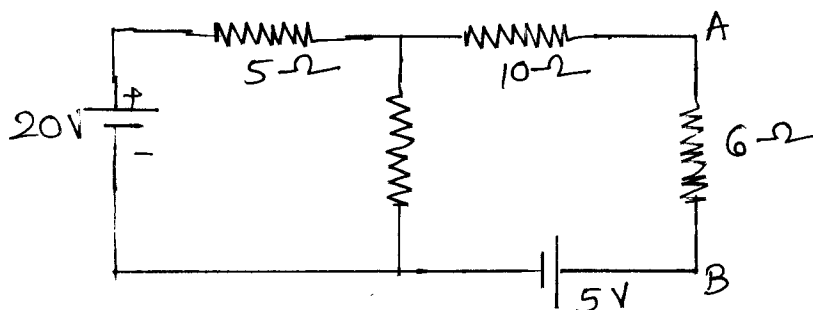
- a) What is the insulation resistance? Derive an expression for the insulation of a cable. (06)
- b) Explain the effect of temperature on the resistance of following material (with graph) i) Metal ii) Insulation (04)

- Q.2**
- a) State and explain Superposition Theorem. (06)
 - b) Find the R_{AB} for the circuit shown below. Take each $R=5\Omega$. (04)



OR

- a) State and Explain Thevenin's Theorem (05)
- b) Find the current flowing through AB using Kirchoff's Laws. (05)



- Q.3**
- a) Describe the methods of charging storage batteries. What are the indications that confirm a Lead Acid Battery is full charged? (04)
 - b) Derive an expression for capacitor voltage, charge and current at any instant during charging. (06)

OR

- a) State various types of batteries. Explain any one in brief. (04)
- b) Derive an expression for the capacitance of a parallel plate capacitor with a composite dielectric medium of two materials. (06)

- Q.4**
- a) A voltage $v(t) = 141.4\sin(314t + \pi/18)$ is applied to a circuit and current $i(t) = 14.4\sin(314t - \pi/9)$ is found to flow through it. Determine (06)
 - i) Power Factor of the circuit.
 - ii) Sketch voltage and current waveforms
 - iii) Sketch phasor representation of voltage and current.
 - b) Find i) RMS value ii) Average value of voltage and current in above example. (04)

P.T.O.

OR

- a) Draw three phase star connection of load. Draw phasor diagram and show relationship of line voltage and phase voltage, line current and phase current. (06)
- b) A series R-L circuit with $R=5\Omega$ and $L=2\text{mH}$ is connected across 230 V, 50 Hz, AC supply. Calculate i) Current ii) Power Factor of the circuit. (04)

- Q.5**
- a) Derive emf equation of single phase transformer. (04)
 - b) A 100 kVA, 50 Hz, single phase transformer has full load copper loss of 1500 W and iron loss of 1800 W. Calculate efficiency of transformer at
 - i) full load, 0.8 P.F lag
 - ii) half load, 0.8 P.F lag

OR

- a) Compare Electric circuit and Magnetic circuit. (04)
- b) A conductor of active length 30 cm carries current of 100 A and lies at right angles to a magnetic field strength of 0.4 wb/m^2 . Calculate the force in newton exerted on it. If the force causes the conductor to move at velocity of 10 m/s. Calculate emf induced in it and power in watts developed by it. (06)

- Q.6**
- a) Draw layout of distribution system. State the voltage levels at each stage. (05)
 - b) What are the different types of wiring? Describe any one with components used in wiring. (05)

OR

- a) Describe construction and principle of operation of LED. What are the advantages of LED over Fluorescent lamp. (05)
- b) Draw circuit diagram of parallel circuit with one branch with 40 W lamp and other branch with 1kW geyser across 230V, 1 phase, and 50 Hz supply. Show ammeter and wattmeter connections in the circuit with range of instruments. (05)

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