

Total No. of Questions : 8]

SEAT No. :

PD4028

[6401]-1905

[Total No. of Pages : 4

First Year Engineering (All Branches)
BASIC ELECTRICAL ENGINEERING

(2019 Pattern) (Credit System) (Semester - I/II) (103004)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Figures to the right indicate full marks.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Assume suitable additional data, if necessary.
- 5) Use of non-programmable calculator is allowed.

Q1) a) For the Resonance in RLC Series circuit-Comment on reactance's, impedance, current & power factor. **[4]**

b) The R-L circuit when supplied by 180V, 50 Hz ac voltage, the voltage drop across the inductance is 150 V. The current drawn by the circuit is 5 A. Calculate: **[6]**

- i) Inductive Reactance
- ii) Inductance
- iii) Resistance
- iv) Impedance
- v) Voltage across Resistance and
- vi) P.F.

c) A voltage of $V = V \angle 0^\circ$ is applied across a R-L-C series circuit. Write the equation for impedance, current & comment on power factor --- when **[8]**

- i) $X_L > X_C$
- ii) $X_L < X_C$

Also draw the phasor diagram in each case.

OR

P.T.O.

- Q2) a)** Define and state the unit of **[4]**
- i) Admittance, susceptance, & conductance
 - ii) Impedance
- b) If $v = V_m \sin(\omega t)$ is applied across single phase circuit and current flowing through the circuit is $i = I_m \sin\left(\omega t + \frac{\pi}{2}\right)$. Draw the circuit diagram & derive the expression for average power consumed in the circuit. **[6]**
- c) A Pure resistance of 15Ω is connected in series with a pure inductor of 25mH . This series circuit is connected across 230V , 50-Hz supply. Find **[8]**
- i) The Inductive Reactance
 - ii) Impedance
 - iii) Current
 - iv) Power factor
 - v) Phase angle
 - vi) Voltage across Resistor
 - vii) Voltage across inductor
 - viii) Draw the phasor diagram
- Q3) a)** State the advantages of three phase systems over single phase system. **[3]**
- b) Derive the EMF Equation of single-phase transformer. **[6]**
- c) In a 3-phase Star-connected load, each phase has a an impedance of $(50+j32)\Omega$. This load is fed from three phase supply voltage of 400 V with frequency of 50Hz . Calculate: **[8]**
- i) Phase Voltage and Line Voltage;
 - ii) Phase Current and Line Current;
 - iii) Total Active Power, Reactive Power and Apparent Power consumed.

OR

- Q4)** a) State the different types of losses in the transformer. [3]
- b) A 80 KVA, 3200/400V, 50Hz, single phase transformer has 111 turns on the secondary winding. Calculate [6]
- Number of turns on primary side
 - Primary & Secondary full load current
 - Cross sectional area of the core if the maximum flux density is 1.2T
- c) Derive the relationship between the line current and phase current, line voltage and phase voltage, for a balanced three phase STAR connected load across three phase AC supply. Draw the circuit diagram & required phasor diagram. Assume phase sequence RYB and inductive load. [8]
- Q5)** a) Compare the ideal & practical voltage source by means of [4]
- definition
 - Symbol & V-I characteristics.
- b) Write the three steps to find current flowing through load resistance R_L using Thevenins Theorem for the circuit shown in Figure-5 (b). [6]

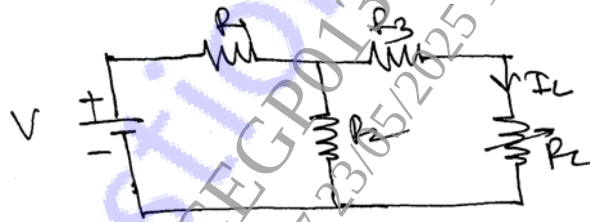


Figure-5 (b)

- c) Derive the formulae to convert DELTA connected resistances into equivalent STAR connected resistances. Draw the circuit diagram in each case. [8]

OR

- Q6)** a) State and Explain Kirchhoffs Laws. [4]
- b) Find the Resistance between terminal A and C. [6]

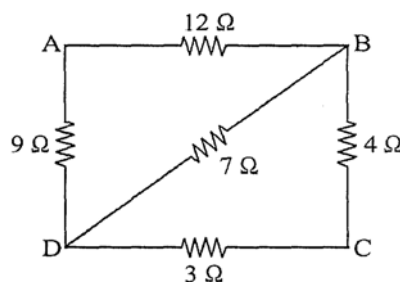


Figure-6 (b)

- c) Find the current flowing through $5\ \Omega$ by applying Super Position Theorem. [8]

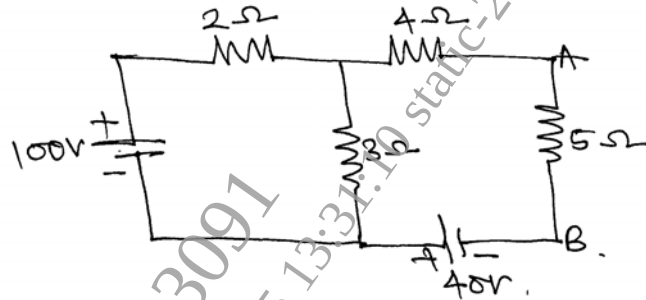


Figure 6 (c)

- Q7)** a) Comment on effect of increase in temperature on Resistance of [3]

i) metallic conductor

ii) alloys &

iii) insulators

- b) Explain the construction and working of Lead acid battery. [6]

- c) Derive the expression of insulation resistance of the single core cable. Draw the cut section diagram & label it. [8]

OR

- Q8)** a) State the 3 applications of lithium ion battery. [3]

- b) With usual notations derive the expression [6]

$$\alpha_2 = \frac{\alpha_1}{1 + \alpha_1(t_2 - t_1)}$$

- c) Find the current flowing at the instant of switching 40 W, 240 V filament lamp. The temperature coefficient of resistance of filament is 5.5×10^{-3} per degree Celsius at 20°C . The working temperature of lamp is 2000°C . Also find the working current & compare it with starting current. [8]

x

x

x