

Total No. of Questions : 12]

SEAT No. :

P556

[4456]-4

[Total No. of Pages : 3

F.E. (Semester - I)
BASIC ELECTRICAL ENGG.
(2008 Course)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from Section I and Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12 from Section - II.*
- 2) *Answer to the two sections should be written in separate answer books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of Non - Programmable pocket size scientific calculator is permitted.*
- 5) *Neat diagrams must be drawn wherever necessary.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Define **[6]**
- i) Resistance Temp. Coeff.
 - ii) Insulation Resistance and
 - iii) Conductance
- b) The resistance of a certain length of wire is 5Ω at 25°C and 6.25Ω at 90°C . Find the temp coefficient of the material of wire at 0°C and 25°C . Also calculate the resistance of the wire at 100°C . **[10]**

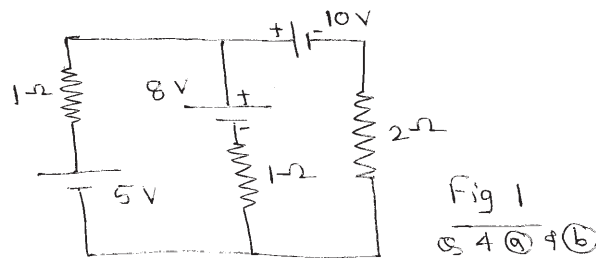
OR

- Q2)** a) Derive the relation between α_1 and α_2 where α_1 and α_2 are the RTC at $t_1^\circ\text{C}$ & $t_2^\circ\text{C}$ resp. **[6]**
- b) An electric kettle is required to raise the temp of 2 kg of water from 20°C to 100°C in 15 minutes. If the efficiency of the kettle is 80%, calculate the resistance of heating element if it is to be operated on 240V. supply. **[10]**
- Q3)** a) State and explain kirchhoff's laws. **[8]**
- b) Derive the expressions / formulae to convert delta connected network into its equivalent star network. **[8]**

OR

P.T.O.

- Q4)** a) Apply Kirchoff's laws and calculate current flowing in 2Ω resistance for the circuit shown in fig.1 [8]



- b) Apply superposition theorem to calculate current flowing in 2Ω resistance for the circuit shown in fig. 1 [8]

- Q5)** a) Define [10]

- i) Magnetic flux
- ii) Flux density
- iii) Reluctance
- iv) MMF and
- v) Magnetic field strength

- b) Derive an expression for Energy stored in the magnetic field. [8]

OR

- Q6)** a) Compare Electric and magnetic circuit stating similarities & disimilarities. [10]

- b) An iron ring of mean circumference of 50 cm has an air gap of 2 mm cut in it. It has circular cross section with area 5 cm^2 . It carries a coil with 200 turns wound uniformly. The relative permeability of iron is 300. If the coil carries current of 1 amp. Find the flux in the air gap. [8]

SECTION - II

- Q7)** a) Define the terms : [8]

- i) Electric flux
- ii) Electric flux density
- iii) Electric field strength and
- iv) Permittivity

- b) Define average value of an alternating quantity. Derive its expression for sinusoidally varying current. [8]

OR

Q8) a) Define RMS value of an alternating quantity and derive an expression for sinusoidally varying current. [8]

b) In a circuit four currents as indicated below are meeting at a point. Find the resultant current. $i_1 = 5 \sin \omega t$, $i_2 = 10 \sin (\omega t - 30^\circ)$, $i_3 = 5 \cos (\omega t - 30^\circ)$, and $i_4 = -10 \sin (\omega t + 45^\circ)$ [8]

Q9) a) If Sinusoidal voltage of $v = V_m \sin \omega t$ is applied to R - C series ckt, derive an expression for current. Draw waveforms of voltage current & power. [8]

b) Find the expression for the current & Calculate the power consumed, when voltage of $v = 283 \sin 100\pi t$ is applied to a coil having $R = 10 \Omega$ and $L = 0.159 \text{ H}$ [8]

OR

Q10) a) If sinusoidal voltage of $v = V_m \sin \omega t$ is applied to R - L series ckt, derive an expression for current. Draw waveforms of voltage current & power. [8]

b) Define [8]

i) Impedance

ii) Susceptance

iii) Conductance and

iv) Admittance

Q11) a) Write short notes on [10]

i) Losses taking place in transformer &

ii) Auto transformer

b) State the relationship between line and phase values of voltage and current for 3 phase star and delta connected load. State equation of Active & Reactive power consumed. [8]

OR

Q12) a) Explain working principle of transformer and compare shell type & core type transformer construction. [10]

b) Three similar coils each having resistance of 5Ω and inductance of 0.02 H are connected in Δ (Delta) across 3 phase 440 V , 50 Hz ac supply. Calculate current drawn and power consumed by load. [8]

