P1272

OCT/FE/INSEM-5
F.E. (Semester – I)
BASIC ELECTRICAL ENGINEERING (All Branches)
(2019 Pattern)

Time : 1 Hour]   *[Max. Marks : 30*

Instructions to the candidates:

1) *Answer Q.1 or Q.2, Q.3 or Q.4.*
2) *Neat Diagrams must be drawn wherever necessary.*
3) *Figures to right indicate full marks.*
4) *Use of Non-Programmable Scientific Calculators is allowed.*
5) *Assume Suitable Data if necessary.*

Q1) a) Define reluctance. State its unit. Also state the factors on which it depends. **[3]**

b) Compare Electric and magnetic circuit stating clearly similar and dissimilar points. **[6]**

c) A coil of 500 turns is uniformly wound on iron ring of mean circumference 25 cm having area of cross section 15 cm^2. When coil carry current of 1A, produces flux density of 0.8 T. Calculate – (i) magnetizing force H (ii) flux (iii) inductance (iv) relative permeability of iron. **[6]**

OR

Q2) a) State Faradays first and second laws of electromagnetic induction. **[3]**

b) Obtain the expression for coefficient of coupling between two magnetically coupled coils. **[6]**

c) An iron ring of mean diameter 20 cm has square area of cross section of 2 cm x 2 cm and is uniformly wound with 600 turns. The relative permeability of iron is 1000. Calculate (i) Self inductance of coil (ii) If permeability of iron is doubled, find new value of inductance. **[6]**

Q3) a) A sinusoidally varying a.c. voltage is given by $v = 141.4 \sin(100\,\pi t)$ volt. Find its (i) RMS value (ii) average value (iii) frequency **[3]**

b) Derive the expression for energy stored in Electric field. **[6]**

c) Obtain the expression for RMS value of sinusoidally varying alternating current in terms of its peak value by analytical method. **[6]**

OR

Q4) a) Covert polar to rectangular Or rectangular to polar form **[3]**

(i) $5 + j10$ (ii) $6 - j8$ (iii) $5 \angle -36.87^0$

b) The RMS value of 50 Hz sinusoidally varying alternating current is 20A. When t = 0, its value is 10A. Obtain the equation of current. Find the value of current when t = 0.002 second. Also sketch the waveform. **[6]**

c) Sketch the curves for voltage across the charging capacitor and charging current when charged through resistance R and connected DC voltage. Also write down the expression for (i) voltage across the capacitor (ii) charging current (iii) time constant (iv) initial charging current. **[6]**