P-5371

[6185]-54

F.E. (All Branches) (Insem.)
BASIC ELECTRICAL ENGINEERING
(2019 Pattern) (Semester - I) (103004)

Time : 1 Hour]

[Max. Marks : 30

Instructions to the candidates:

1) *Solve Q1 or Q2 and Q3 or Q4.*
2) *Figures to the right indicate full marks.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Assume suitable data, if necessary.*
5) *Use of non-programmable calculator is allowed.*

Q1) a) Derive an expression for Energy stored per unit volume in the magnetic field. **[7]**

b) Two coils having turns 1000 and 1500 are placed on common magnetic circuit. A current of 5A in coil-1 produces a flux of 0.2 mWb and 80% of this flux links to coil-2 . Find **[8]**

     i) Self Inductance of coil-1

     ii) Mutual Inductance between them

     iii) If this current in first coil is interrupted in 0.01 sec find emf induced in coil-1 and coil-2

OR

Q2) a) Obtain an expression for coefficient of coupling between two magnetically coupled coils. **[7]**

b) i) Derive the expression for flux, for iron ring wound with N turns & current is passed through it.

     ii) Define the reluctance & state the factors on which it depends.

[8]

P.T.O.

Q3) a) Define the RMS value of current and obtain the expression for RMS value of sinusoidally varying alternating current in terms of its peak value. **[7]**

   b) An air capacitor has two parallel plates of 10 cm × 10 cm and plates are separated by 1 cm. Find **[8]**

      i) Capacitance

      ii) Potential difference, when charge of 500 µC is applied.

      iii) If air is replaced by dielectric material having relative permittivity $\varepsilon r = 4$, find new value of capacitance & potential difference when same charge is applied.

<div align="center">OR</div>

Q4) a) Explain the concept of phase lag & phase lead by using : **[7]**

      i) mathematical equations

      ii) waveform and

      iii) phasor diagram.

   b) A sinusoidally varying alternating voltage of 100 V (rms value) with 50 Hz frequency is applied to a circuit find : **[8]**

      i) The mathematical equation of the voltage;

      ii) Time Period

      iii) The instantaneous voltage when t = 1.667 ms;

      iv) The time when instantaneous voltage is 100 V;

      v) Average value of the voltage

      vi) Maximum value of the voltage.

<div align="center">⌘⌘⌘</div>