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SEAT No. :

P-5371

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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.

OR

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.

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