

Total No. of Questions : 4]

SEAT No. :

PB4

[6267]-4

[Total No. of Pages : 2

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

Time : 1 Hour]

[Max. Marks : 30

Instructions to the candidates:

- 1) *Attempt Q.1 or Q.2, Q.3 or Q.4.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicates full mark*
- 4) *Assume suitable data, if necessary.*
- 5) *Use of non-programmable electronic calculator is allowed*

Q1) a) Obtain the expression for the mutually induced emf in a coil when the neighboring coil is excited by a current. Draw the circuit diagram and mention all the notations clearly. [7]

b) A magnetic circuit consists of an iron ring of mean circumference 80 cm with cross sectional area 12cm^2 . A current of 2 A in the magnetizing coil of 200 turns produces a total flux of 1.2mWb in the iron. [8]

Calculate:

- i) flux density in the iron
- ii) absolute and relative permeability of iron
- iii) reluctance of the circuit

OR

Q2) a) Derive the expression for the energy stored in the magnetic field of a coil and hence, the energy stored per unit volume of the circuit. [7]

b) Two coils having 50 and 500 turns respectively are wound side by side on a closed iron circuit of cross section 50cm^2 and mean length 120 cm. [8]

- i) Estimate the mutual inductance between the coils if the permeability of iron is 1000.
- ii) Find the self-inductance of each coil.
- iii) If the current in one coil increases steadily from zero to 5 A in 0.01 second, find the emf induced in the other coil.

P.T.O.

Q3) a) What is phase? Explain the concepts of phase lag between two alternating quantities by [7]

- i) Mathematical equations
- ii) Drawing waveforms and phasor diagrams.

b) Three sinusoidally alternating currents varying at 50Hz have rms values 5 A, 7.5 A and 10 A with phase angles of 30° , -60° and 45° respectively.[8]

- i) Find their average values
- ii) Write equations for their instantaneous values
- iii) Find the instantaneous values of 10 A current at 100 mSec.

OR

Q4) a) Obtain the rms value of a sinusoidal alternating current in terms of its peak value and hence find the peak factor. [7]

b) A potential difference of 10 kV is applied to the terminals of a 300 pF capacitor with two rectangular plates each having an area of 100cm^2 and separated by a dielectric 1 mm thick. [8]

Calculate:

- i) Total charge
- ii) Electric flux density
- iii) Relative permittivity of the dielectric

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