

Total No. of Questions :4]

SEAT No. :

P4

FE/Insem./APR-4

[Total No. of Pages : 2

F.E (Semester - II)

103004 : BASIC ELECTRICAL ENGINEERING

(2019 Pattern)

Time : 1 Hour]

[Max. Marks : 30

Instructions to the candidates:

- 1) *Answer Q1 or Q2, Q3 or Q4.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figure to right indicate full marks.*
- 4) *Use of Non-Programmable Scientific Calculators is allowed.*
- 5) *Assume Suitable Data if necessary.*

Q1) a) Define the terms:

- i) Reluctance ii) Magnetic Flux Density and iii) Mutual inductance [3]
- b) Compare Electric circuit and Magnetic circuit, clearing stating similar and dissimilar points. [6]
- c) Iron ring of mean diameter 25 cm & relative permeability of 1000 is uniformly wound with 500 turns. Find current required to produce a flux density of 1 Tesla in the ring. If an air gap of 1 mm is cut in the ring, calculate new value of current to maintain the same flux density in the ring. [6]

OR

- Q2) a)** Compare series & parallel magnetic circuits. [3]
- b) Derive the expression for energy stored in an inductor. [6]
- c) Two coils A & B have self inductances of 120 μH and 300 μH respectively. A current of 2 Amp in coil A, produces flux linkage of 200 μWb - turns in coil B. Calculate -
- i) Mutual inductance
 - ii) Coefficient of coupling k &
 - iii) Average emf induced in coil B, when the current in coil A is switched off in 0.05 sec. [6]

P.T.O.

- Q3)** a) Obtain the expression for capacitance of parallel plate capacitor. [3]
b) Derive the expression for rms value of a sinusoidal alternating current in terms of its peak value. [6]
c) Three capacitors $2\ \mu\text{F}$, $4\ \mu\text{F}$, and $6\ \mu\text{F}$, are connected in series across 200 V DC supply. Find equivalent capacitance and voltage across each capacitor. [6]

OR

- Q4)** a) An alternating voltage is given by $v=141.4 \sin 377 t$. Find its
i) RMS value ii) average value iii) frequency [3]
b) Derive the expression for average value of a sinusoidal alternating current in terms of its peak value. Also write the formula for
i) Form Factor and ii) Amplitude Factor [6]
c) The rms value of 50 Hz sinusoidal alternating current is 20A. At $t=0$, its value becomes 10A. Write down the equation for current. Also find the magnitude of current at $t=6\ \text{ms}$. [6]