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SEAT No. :

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**P4**

**FE/Insem./APR-4**

**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  $\mu\text{H}$  and 300  $\mu\text{H}$  respectively. A current of 2 Amp in coil A, produces flux linkage of 200  $\mu\text{Wb}$  - 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]

