17214

Seat No. ☐☐☐☐☐☐☐

Instructions – (1) All Questions are *Compulsory.*

(2) Answer each next main Question on a new page.

(3) Illustrate your answers with neat sketches wherever necessary.

(4) Figures to the right indicate full marks.

(5) Assume suitable data, if necessary.

(6) Use of Non-programmable Electronic Pocket Calculator is permissible.

(7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. **Attempt any <u>TEN</u> of the following:** **20**

a) Define resistance and write it's unit.

b) State ohm's law of electrical circuit.

c) Draw the waveforms of Direct current and Alternating current.

d) State KCL applied to D.C. circuits.

e) Define capacitance and write its unit.

f) Define magnetic flux density and give its formula.

Marks

g) Draw hysteresis loop for hard steel and soft steel.

h) State Faraday's first law of electromagnetic induction.

i) State any four electrical properties of conducting materials.

j) State Fleming's Right hand rule.

k) List any four materials used for making ferromagnetic materials.

l) Define reluctance and give it's unit also.

2. **Attempt any <u>FOUR</u> of the following:**   **16**

a) Explain any two effects of an electric current.

b) Calculate current, resistance and energy consumed by an electric iron rated 230V, 2KW when used for 12 hours.

c) Derive current division formula for two resistors in parallel.

d) Derive the expression for equivalent resistance when three resistances are connected in series.

e) Calculate current through each resistor of the circuit shown in Figure No.1. Also find the equivalent resistance and also the potential difference across each resistance.
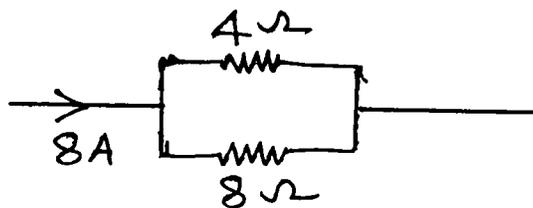

<u>Fig. No. 1</u>

f) Compare electrical and magnetic circuits on any four points.

Marks

3. **Attempt any <u>FOUR</u> of the following:** 16

   a) State the factors that affect the magnitude of the capacitance a parallel plate capacitor and also write the related formula.

   b) Draw the voltage and current curves during charging and discharging of a capacitor.

   c) Calculate the capacitance of two parallel plates of area $30m^2$ and separated by a dielectric 2 mm thick and of relative permittivity 6.

   d) Three capacitors have capacitances of $2\mu F$, $4\mu F$ and $8\mu F$. Find the total capacitance when they are connected in series.

   e) Explain B-H curve of a magnetic material.

   f) Compare Dry cell and Liquid cell.

4. **Attempt any <u>FOUR</u> of the following:** 16

   a) Explain leakage flux and its effect with the help of neat diagram.

   b) State any two areas of applications of :

      i)   Permanent magnet

      ii) Electromagnet

   c) An iron magnetic circuit has a uniform cross-sectional area of $5cm^2$ and a length of 25cm. A coil of 120 turns is wound uniformly over the magnetic circuit. When the current in the coil is 1.5 A, the total flux is 0.3 wb. Find the relative permeability of iron.

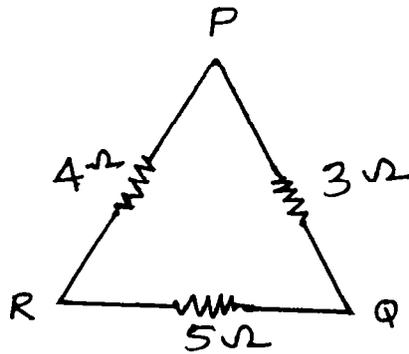d) Convert the delta network shown in Figure No.2 to equivalent star network.

Fig. No. 2

e) State and explain Ohm's law of magnetic circuit.

f) State any four properties of insulating materials used in electrical systems.

5. **Attempt any FOUR of the following:** 16

a) Define :

   i) Statically induced e.m.f.

   ii) Dynamically induced e.m.f.

b) Define self inductance of a coil and mutual inductance of coils.

c) List the types of inductors along with their applications.

d) A conductor of length 0.5 m moves at right angles to a uniform magnetic field of flux density 1.5 Wb/m^2 with a velocity of 40m/sec. Calculate the e.m.f. induced in the conductor. Also find the value of induced e.m.f. when the conductor moves at 30° to the direction of field.

Marks

e) Explain ideal and practical voltage sources.

f) Define the following terms :

    i)   Active network

    ii)   Passive network

    iii) Linear circuit

    iv) Bilateral circuit

6.   **Attempt any <u>FOUR</u> of the following:**   **16**

a) State Ampere-Hour efficiency and Watt-Hour efficiency of battery.

b) Explain constant voltage charging method of battery.

c) Define :

    i)   Cycle

    ii)   Frequency

    iii) amplitude

    iv) Time period

    of alternating voltage or current

d) Write the classification of insulating materials based on its temperature with standing ability.

e) Compare copper and aluminium as a conducting materials on any four points.

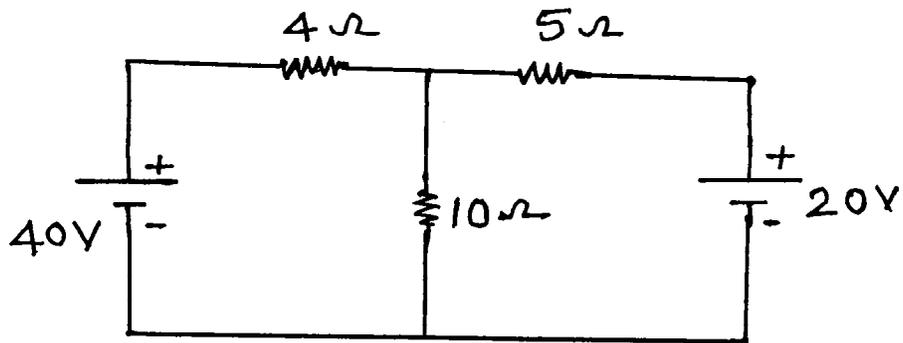f) Calculate the current in 10Ω resistance shown in Figure No.3 using Kirchhoff's laws.

Fig. No. 3

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3 Hours / 100 Marks