17214

15116

3 Hours / 100 Marks 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) Assume suitable data, if necessary.

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

Marks

1. Attempt any TEN of the following: **20**

a) Define 'electric potential' and 'potential difference'.

b) State ohm's law applied to an electric circuit and write the mathematical expression for it.

c) State KCL and KVL as applied to D.C. circuits.

d) Related to electric circuits, define:

(i) node

(ii) branch

e) Draw the nature of charging current of a capacitor and write the expression for it.

Marks

f) With reference to Magnetic circuits define:

(i) Reluctance,

(ii) Ampere turns (AT)

g) State any two applications each for

- Permanent magnet

- Electromagnet

h) Define 'coefficient of self-induction' and 'coefficient of mutual - induction.

i) State two applications for each of 'Air cored inductors' and 'Iron cored inductors'.

j) State the law used to determine the direction of:

- Statically induced emf

- Dynamically induced emf

k) With reference to alternating current define - amplitude, cycle frequency and time.

l) State any two materials used for current conduction and two materials used as insulating material in electrical appliances.

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

a) Define 'Ideal voltage' source and 'Practical voltage' source. Draw the symbol for each.

b) State one application for each

- Carbon composition resistor

- Metal film resistor

- Wire wound resistor

- H.V. Ink film resistor

c) Write the expression for 'equivalent resistance' and 'voltage division' when 3 resistance are connected in series.

Marks

d) State the difference between and example for:

(i) Linear circuit and non-linear circuit.

(ii) Unilateral circuit and Bi-lateral circuit.

e) Three capacitor's having capacitances 3μF, 5μF and 7μF respectively are connected in a circuit. Determine the equivalent capacitance when they are connected in -

(i) Series

(ii) Parallel

f) Derive the expression for energy stored in capacitor. Also draw discharging curves of capacitor.

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

a) State following effects of electric current and state two applications of each:

- Heating effect

- Chemical effect

b) The rating of electric geyser is 250 V, 3 kW. How much current does it take and what is its hot resistance? Also calculate the energy consumed by it in one hour.

c) Derive the expression for equivalent capacitance when three capacitors are connected in parallel.

d) Describe the concept of 'break-down voltage' and dielectric strength.

e) Draw B-H curve for magnetic material and state its nature. Also draw hysteresis loop for hard steel and soft steel.

f) List out the simillarities (any four) between electric circuit and magnetic circuit.

Marks

4. Attempt any FOUR of the following: 16

a) With the help of diagram describe the concept of 'leakage flux'. 'useful flux' and fringing.

b) Iron ring of mean circumference 80 cm is uniformly wound with 550 turns of wire. Calculate value of flux density when a current of 1.1 Amp. would produce in the ring.
Assume μ_r = 1400.

c) State the difference between 'self-induced e.m.f.' and 'mutual induced e.m.f'. Also state the expression for 'coefficient of coupling' and 'equivalent inductance' when two inductors are connected in series.

d) With the help of labelled diagram explain the concept of 'series magnetic circuit' and 'parallel magnetic circuit'.

e) With reference to storage batteries define the terms:

- Terminal voltage
- Internal resistance
- Amp hour capacity
- watt - hr efficiency.

f) List out the steps to carry out the maintenance of storage batteries.

Marks

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

a) State the comparison between series and parallel circuits. (any four points)

b) Determine the equivalent delta circuit of the following circuit. Refer Figure No. 1

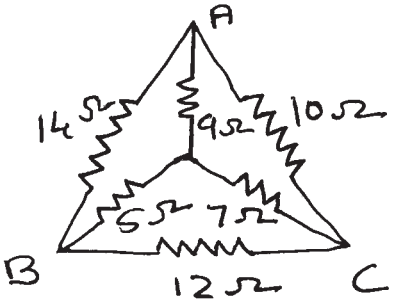

Fig. No. 1

c) State and explain Faraday's first law and second law of electromagnetic induction.

d) A magnetic flux of 0.4 mWb. passing through a coil of 1200 turns is reversed in 0.1 second. Determine the average value of self-induced emf.

e) State the classification of 'conducting material' and 'magnetic material' with two examples for each.

f) State the temperature withstanding capacity of following class - Insulating material class

Y, class A, class B, class E.

Also state two examples for each.

Marks

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

a) Explain the constant voltage charging of a battery.

b) List out the precautions to be taken while charging of lead-acid battery.

c) Draw a labelled sinusoidal emf generated by a.c. generator and indicate cycle, time period, amplitude and instantaneous value.

d) Define Paramagnetic; Diamagnetic and Ferromagnetic material and Amorphous metal.

e) Determine the current through 6 Ω resistor shown in Figure No. 2 using KVL.

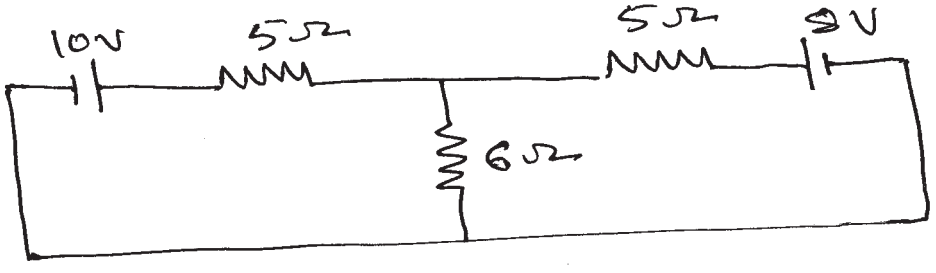

Fig. No. 2

f) Calculate equivalent resistance R_{ab} in following Figure No. 3

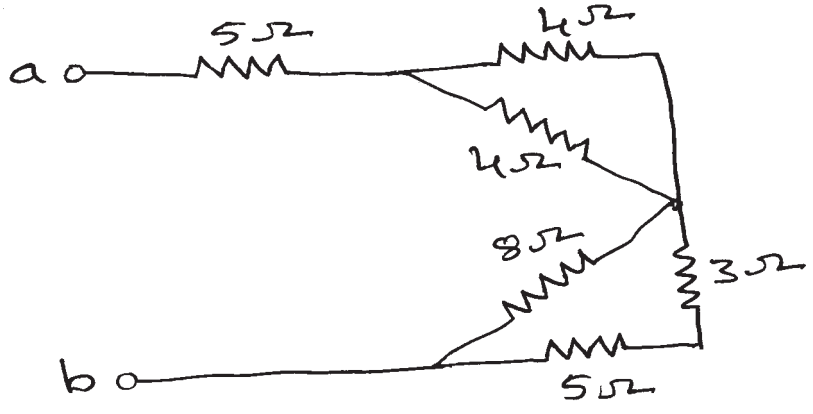

Fig. No. 3