

## Sample Test Paper-I

Course Name : Electrical Engineering Group

Course Code : EE/EP

Subject Title : Fundamentals of Electrical Engineering

Semester : Second

Marks : 25

# 17214

Time: 1 Hour

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**Instructions:**

1. All questions are compulsory.
2. Illustrate your answers with neat sketches wherever necessary.
3. Figures to the right indicate full marks.
4. Assume suitable data if necessary.
5. Preferably, write the answers in sequential order.

**Q.1 Attempt any THREE of the following**

**Marks 09**

- a) State any two applications of following types of resistance.
  - i. Carbon composition
  - ii. HV link film
  - iii. Wire wound
- b) Calculate current through branch AB using current division rule in the following circuit of Fig. 1

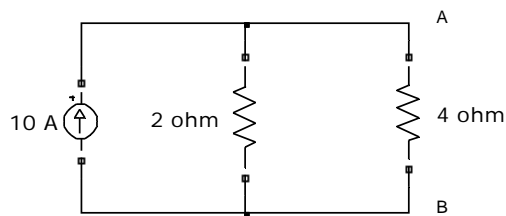


Fig No. 1

- c) Derive the expression for parallel plate capacitor with uniform Dielectric medium.
- d) Define following terms related to magnetic circuits.
  - i. Reluctance
  - ii. Magnetic flux Density
  - iii. Magneto- motive force

**Q.2 Attempt any TWO of the following****Marks 08**

- a) Define temperature coefficient of resistance of material.  
A platinum coil has a resistance of  $3.146\ \Omega$  at  $40\ ^\circ\text{C}$  and  $3.767\ \Omega$  at  $100\ ^\circ\text{C}$ . Calculate the resistance at  $0\ ^\circ\text{C}$  and the temperature coefficient of resistance at  $40\ ^\circ\text{C}$ .
- b) A circuit consisting of resistance of  $12\ \Omega$ ,  $18\ \Omega$ , &  $36\ \Omega$  respectively joined in parallel is connected in series with a fourth resistance  $R$ . The whole circuit is supplied at  $60\ \text{V}$  and it is found that power dissipated in  $12\ \Omega$  resistance is  $36\ \text{W}$ . Determine the value of  $R$  and power absorbed in the parallel group.
- c) Give two Similarities and two Di-similarities between magnetic and electric circuit.

**Q.3 Attempt any TWO of the following****Marks 08**

- a) State & explain Kirchhoff's voltage Law.
- b) Define following terms related to electrical circuit
  - i. Active circuit
  - ii. Linear circuit
  - iii. Unilateral Circuit
  - iv. Node
- c) Three capacitors A, B, & C have capacitances  $10$ ,  $50$ , and  $25\mu\text{F}$ . are connected in parallel across  $250\text{V}$  supply. Calculate
  - i. Charge on each capacitor
  - ii. Total capacitance
  - iii. Potential difference across each capacitor when they are connected in series.

**Sample Test Paper-II**

**Course Name : Electrical Engineering Group**

**Course Code : EE/EP**

**Subject : Fundamentals of Electrical Engineering**

**Semester : Second**

**Marks : 25**

**17214**

**Time: 1 Hrs.**

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**Instructions:**

1. All questions are compulsory
2. Illustrate your answers with neat sketches wherever necessary
3. Figures to the right indicate full marks
4. Assume suitable data if necessary
5. Preferably, write the answers in sequential order

**Q.1 A) Attempt any THREE of the following**

**Marks 09**

- a) Define following terms related to magnetic circuit
  - i. Leakage flux, ii. Useful flux, iii. Fringing flux
- b) State faradays first law and second law of electromagnetic induction.
- c) Draw waveform of sinusoidal emf and define following terms related to it
  - i. Cycle, ii. Frequency, iii. Amplitude
- d) A ring is wound with 100 turns uniformly. The current of 3 A is passing through it producing flux of 2 mwb. Find the inductance of the coil. Also calculate energy stored in the coil.

**Q.2 Attempt any TWO of the following**

**Marks 08**

- a) List the steps to carry out maintenance of lead acid battery (Any Eight).
- b) Give the classification of insulating materials on the basis of temperature withstanding ability. Also state at least two insulating materials of each class.
- c) State: i. Flemings Right hand rule, ii. Lenz's law. for finding direction of induced EMF.

**Q.3 Attempt any TWO of the following**

**Marks 08**

- a) Describe current charging method of charging of batteries. What is indication of fully charged battery?
- b) Classify magnetic materials. Write name of two materials of each type.
- c) Derive the expression for Energy stored in magnetic field.

Sample Question Paper

Course Name : Electrical Engineering Group

Course Code : EE/EP

Subject : Fundamentals of Electrical Engineering

Semester : Second

Marks : 100

17214

Time: 3 Hrs.

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**Instructions:**

1. All questions are compulsory.
2. Illustrate your answers with neat sketches wherever necessary.
3. Figures to the right indicate full marks.
4. Assume suitable data if necessary.
5. Preferably, write the answers in sequential order.

**Q.1 Attempt any TEN of the Following**

**20 Marks**

- a) Define emf and resistance. State their SI units.
- b) Define the following terms related to electric circuits:
  - i) Bi-lateral circuit
  - ii) Loop
  - iii) Linear Circuit
  - iv) Passive circuit
- c) State any two effects of electric current. Give one application for each.
- d) State KCL and KVL as applied to DC circuits.
- e) Write equations for current and voltage during discharging of capacitor.
- f) State ohm's law as applied to electric circuit and express the mathematical formula.
- g) Draw hysteresis loop for hard steel and soft steel.
- h) Define following:
  - i) Self induced emf
  - ii) Mutually induced emf.
- i) Enlist any two mechanical properties of insulating materials.
- j) State Faraday's laws of electromagnetic induction.
- k) List any four materials used for making ferromagnetic materials.
- l) Define Ampere-hour efficiency and Watt-hour efficiency of battery.

**Q.2 Attempt any FOUR of the Following****16 Marks**

- a) Describe the procedure for converting a given practical voltage source into practical current source. Draw equivalent voltage source for circuit shown in

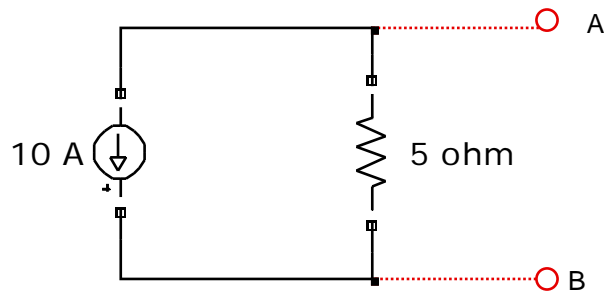


Fig. No. 1.

- b) An immersion heater takes 1 hour to heat 50 kg of water from 20 °C to boiling point. Calculate the power rating of heater, assuming the heating equipment to have efficiency of 90 %.
- c) Derive the expression for equivalent resistance when three resistances are connected in parallel.
- d) i) State the formulae to convert star to delta connection.  
ii) Convert the circuit of Fig. No. 2 to equivalent delta.

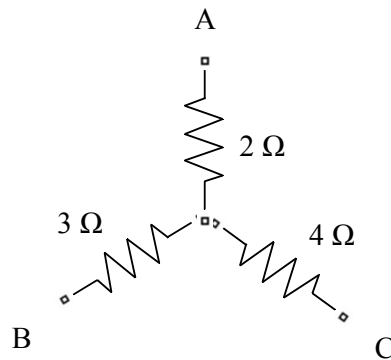


Fig. No. 2

- e) Calculate current in 2 Ω resistance of the circuit shown in Fig. No.3, using Kirchoff's voltage law.

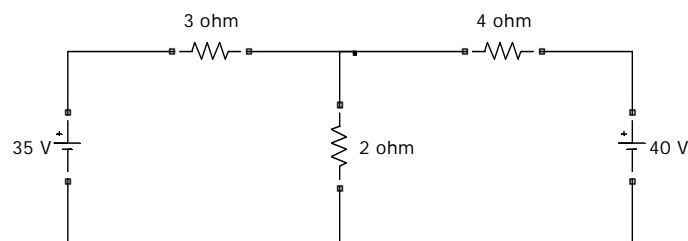


Fig. No. 3

- f) Give any two similarities and dissimilarities between electric and magnetic circuits.

**Q.3 Attempt any FOUR of the Following**

**16 Marks**

- Describe phenomenon of charging and discharging of capacitor.
- A capacitor of  $30\ \mu\text{F}$  connected in series with a resistor of  $500\ \Omega$  is suddenly Connected across a 100 volt dc supply. Find i) Time constant of the circuit, ii) Initial current, iii) Equation of voltage as function of time, iv) Equation of current as a function of time.
- Derive the expression for equivalent capacitance when number of capacitors is connected in series.
- Three capacitors having capacitance of  $4\ \mu\text{F}$ ,  $2\ \mu\text{F}$  and  $8\ \mu\text{F}$  respectively. Find the equivalent capacitance when they are connected in i) Series and ii) Parallel.
- Describe concept of leakage flux, useful flux and fringing effect with relevant diagram.
- List the steps (any eight) to carry out maintenance of lead-acid battery.

**Q.4 Attempt any FOUR of the Following**

**16 Marks**

- Define following terms with units related to magnetic circuit.
  - Magneto- motive force,
  - Magnetic flux density,
  - Reluctance,
  - Permeance.
- An iron ring with mean circumference of 80 cm and cross sectional area  $10\text{cm}^2$  is uniformly wound with 500 turns of wire. Determine the current required to set up a flux density of 1.2 Tesla in the ring. Assume  $\mu_r = 1000$  for iron.
- State the types of magnets and give two applications for each.
- An electric iron is marked with 250 V, 360 W. How much current does it take and what is its hot resistance? Calculate weekly cost of using it for one hour daily at rate Rs.5 per unit.
- Calculate  $R_{ab}$  in Fig. No.4

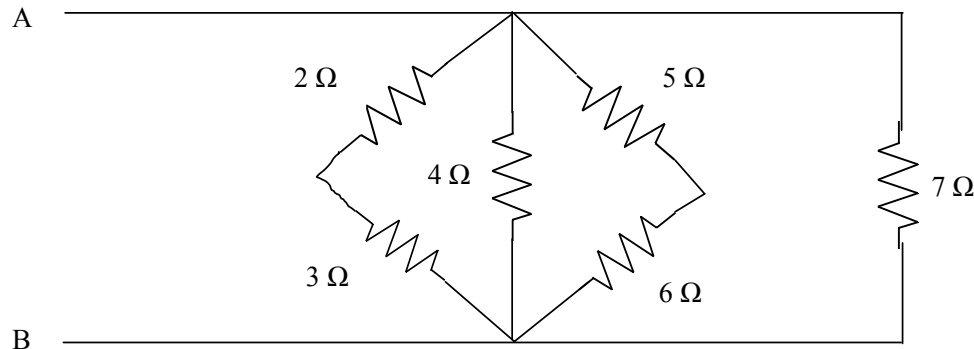


Fig. No.4

- Describe the effect of temperature on electrical conductivity of materials.

**Q.5 Attempt any FOUR of the Following****16 Marks**

- a) Derive formula for induced emf in the coil due to change of flux. Write the significance of negative sign in it.
- b) State and explain Fleming's Right hand rule with relevant diagram.
- c) Derive expression for energy stored in magnetic field.
- d) A coil consisting of 120 turns is placed in the magnetic field of 0.8 mwb. Calculate the average emf induced in the coil when it is moved in 0.08 second from the given field of 0.3 mwb. If the resistance of coil is  $200\ \Omega$ , find the induced current in the coil.
- e) Give two applications for each of the following resistors: i) Cermet ii) Metal film iii) Metal glaze iv) Deposited carbon.
- f) Derive current division formulae when two resistances are connected in parallel. Draw relevant circuit diagram.

**Q.6 Attempt any FOUR of the Following****16 Marks**

- a) Ampere-Hour capacity of storage battery is the idealized approximation of its life. Justify the statement.
- b) Compare Dry cell and Liquid cell on basis of principle of operation, cost, life and maintenance.
- c) Draw a waveform of sinusoidal AC current. Show and define following parameters in the same. i) Cycle          ii) Time period          iii) Amplitude
- d) Distinguish between paramagnetic and ferromagnetic materials with any four points.
- e) Classify insulating materials on the basis of temperature withstanding capacity. Specify limiting temperature of each class with one example.
- f) Describe duality between series and parallel electrical circuit.