Chapter 4

Passive electronic components

One mark questions (Knowledge):

- 1. What is a passive component?
- 2. What is an active component?
- 3. What is a resistor?
- 4. What is the unit of resistance?
- 5. What is ohms rating of a resistor?
- 6. Define temperature coefficient of a material.
- 7. Define specific resistance or resistivity.
- 8. Write the circuit symbol of variable resistor.
- 9. Write the circuit symbol of preset.
- 10. Name any one fixed resistor.
- 11. Name any one variable resistor.
- 12. What is a SMD resistor?
- 13. What is capacitance of a capacitor?
- 14. What is the unit of capacitance?
- 15. Write the circuit symbol of inductor.
- 16. What is electromagnetic induction?
- 17. What is the unit of self-inductance?
- 18. Write the circuit symbol of iron core inductor.
- 19. Write the circuit symbol of air core inductor.
- 20. Write the expression for energy stored in an inductor.
- 21. Write the mathematical expression for self-inductance.
- 22. What is a choke?
- 23. What is a relay?
- 24. What is a transformer?
- 25. Define turns ratio.
- 26. What is a step down transformer?
- 27. Expand NTC.
- 28. Expand PTC.
- 29. What is a transducer?
- 30. What is meant by pressure transducer?

One mark questions (Understanding):

- 1. Give one example for a passive component.
- 2. Give one example for an active component.
- 3. What does the fourth band of 4 band colour coded resistor indicate?
- 4. What does the fifth band of 5 band colour coded resistor indicate?
- 5. Write any one advantage of metal film resistor against carbon composition resistor.
- 6. What does the power rating of a resistor indicate?

- 7. Which type of capacitor is sensitive to polarities?
- 8. When is inductance said to be 1 Henry?
- 9. Which has more inductance, a coil with iron core or with air core?
- 10. Write the relation between turns ratio, voltage ratio and current ratio in a transformer.
- 11. Give one example for temperature sensor.
- 12. Which expression do you use to calculate the effective inductance when two inductors are connected in series?
- 13. Which expression do you use to calculate the effective inductance when two inductors are connected in parallel?
- 14. Write the unit for energy stored in an inductor?
- 15. Which type of inductor is used in radio frequency range?
- 16. What happens to the strength of secondary current with reference to primary current in a step down transformer?
- 17. Which principle of inductance is used in transformer?
- 18. What happens to the resistance of NTC thermistor, when its temperature is increased?

One mark questions (Application):

- 1. Draw the symbol of electrolytic capacitor.
- 2. What would be the current value in a capacitor when it is fully charged by DC-source?
- 3. How do you connect number of capacitors to obtain maximum capacitance value?
- 4. How do you connect number of capacitors to obtain minimum capacitance value?
- 5. Write the application of a speaker.
- 6. What is the resistance of a resistor when shorted?
- 7. What is the resistance of a capacitor when shorted?
- 8. What is the resistance of a resistor when open?
- 9. What is the resistance of a capacitor when open?
- 10. What is the resistance value of SMD resistor printed with the code 223? Ans: $22 k\Omega$
- 11. What for LM35 is used?
- 12. Draw the pin diagram of LM35.

Two marks questions (Knowledge):

- 1. Write any two specifications of resistor.
- 2. What are the factors on which resistance of the material depends?
- 3. Mention the factors on which the capacitance of a capacitor depends.
- 4. Write an expression for energy stored in a capacitor.
- 5. What is leakage current and leakage resistance in a capacitor?
- 6. Write any two specifications of an inductor.
- 7. List the factors on which self-inductance of a coil depend.
- 8. Write the principle of mutual inductance?
- 9. List the factors on which mutual-inductance of a coil depends.
- 10. Mention the different types of transformer based on the core used.

Two marks questions (Understanding):

- 1. Distinguish between active and passive components.
- 2. How to troubleshoot a capacitor?
- 3. Distinguish between self-inductance and mutual-inductance.
- 4. Explain the terms in the expression of mutual inductance of a coil.
- 5. How is energy stored in an inductor? Write its expression.
- 6. Write any two applications of chokes.
- 7. List the advantages of relays.
- 8. Write the specifications of relay.
- 9. How is the impedance behaviour of inductor towards AC and DC?
- 10. With an appropriate diagram, write the expression for inductors connected in series.
- 11. With an appropriate diagram, write the expression for inductors connected in parallel.
- 12. Write any two applications of transformer.
- 13. How step up transformer differs from step down transformer.
- 14. Why centre tapping is necessary?
- 15. Give two examples for pressure transducer.
- 16. Distinguish between speaker and microphone.

Two marks questions (Application):

- The resistance of a coil made of copper wire is 100 Ω at 0 °C. Calculate its resistance at 30 °C. Given α = 0.004/°C. Ans: Rt = 112 Ω
 Calculate the resistor value that has Brown-Black-Yellow-Gold colour bands. Ans: 100 kΩ ± 5%
 Two capacitor plates each of effective area 6 x 10⁻⁴ m² are capacitod by 1.2 x10⁻³ mater. Find its
- 3. Two capacitor plates each of effective area 6 x 10^{-4} m² are separated by 1.3 x 10^{-3} meter. Find its capacitance. The space between the plates is filled with air.Ans: C = 4.086 pF
- 4. How much energy is stored in a 20 μF capacitor with a voltage rating of 15 volts?

Ans: 2250 µJ

- 5. Write the applications of choke.
- 6. Write the applications of IF transformer.
- 7. Write the applications of LDR.
- 8. Determine the charge on 30 μF capacitor charged to 20 volt.
- 9. Write the applications of AF transformer.
- 10. Write the applications of pulse transformer.
- 11. Write the applications of transformer.

Three marks questions (Knowledge):

- 1. Write a note on SMD resistor.
- 2. Write a note on presets.
- 3. Write a note on power rating of a resistor.
- 4. Write a note on trimmers.
- 5. Write the constructional features of ganged capacitor.
- 6. Write the constructional features of SMD capacitor.
- 7. Write a note on iron core inductor.

Ans: 600 μC

- 8. Write a note on ferrite core inductor.
- 9. Write a note on IF transformer.
- 10. Write a note on centre tapping in transformer.
- 11. Write a note on pulse transformer.
- 12. Write a note on thermistor.

Three marks questions (Understanding):

- 1. Explain the construction of carbon composition resistor.
- 2. Derive an expression for the equivalent capacitance of two capacitors connected in parallel.
- 3. Describe the construction of a ceramic capacitor.
- 4. Explain the role of dielectric in capacitor construction.
- 5. Explain the phenomenon of self-induction.
- 6. Explain the phenomenon of mutual induction.
- 7. Explain the construction of air core inductor.
- 8. How is a choke constructed? Explain.
- 9. With a circuit diagram, explain the working of an SPDT relay.
- 10. Define efficiency of a transformer. Write its expression.
- 11. Briefly explain the construction of pulse transformer.
- 12. Explain the principle of transformer.

Three marks questions (Application):

- The resistance of a wire of length 1 m and of diameter 0.12 mm is 40 Ω. What is its specific resistance?
 Ans: 0.45216 X 10⁻⁶ Ωm
- 2. Two capacitors of capacitance 20 μ F and 30 μ F are connected in series across 200 V dc supply. Determine a) effective capacitance. b) total charge on combination.

Ans: 12 μF, 2400 μC

3. Two capacitors of capacitance 60 μ F each are connected in parallel. The combination is further connected in series with capacitor of 30 μ F. Determine effective capacitance.

Ans: 24 μF

- 4. A 2 cm long air core coil with cross sectional area of 3 cm² has 10 turns. Determine the inductance of the coil Ans: L = 1.88 μ H
- 5. A 5 mH inductor is subjected to an electric current that changes at a rate of 5 A per second. How much voltage will be dropped by the inductor?Ans: 250 mV
- 6. Calculate the energy stored in the magnetic field of 100 mH inductor with a current of 80 mA.

Ans: 320 µJ

Five marks questions (Applications):

1. Complete the following table for the carbon resistor R.

Sl.no.	I band	II band	III band	IV band	Value of R
1	Orange	Red	Red	Gold	
2					100K ± 10%
3	Brown	Black	orange	Silver	
4					47k ± 20%

Ans: (1) 3.2KΩ ± 5%

(2) Brown, Black, Yellow and Silver (3) $10K\Omega \pm 10\%$ (4) Yellow, Violet, Orange and No colour.

2. Two capacitors of 60 μ F each are connected in parallel. The combination is further connected in series with two capacitors of 30 μ F and 75 μ F. Calculate the total capacitance of the Circuit.

Ans = 18.18 μF

- Two capacitors of capacitance 10 μF and 30 μF are connected in series across 100 V dc supply. Determine a) effective capacitance b) the total charge on combination c) potential difference across each capacitor.
 Ans: (a) 7.5 μF (b) 750 μC (c)75 V, 25 V
- A step down transformer having a power output of 10 KW and efficiency 90% reduces the voltage from 11 KV to 220 V. Calculate (i) the number of turns in the primary if the secondary has 100 turns and (ii) the current in the primary.
 Ans: 5000 and 0.909 A
- Calculate the voltage output by the secondary winding of a transformer if the primary voltage is 220V, the secondary winding has 4000 turns; the primary winding has 400 turns. What is the turn ratio?
 Ans: 2200 V, 1:10
- 6. Calculate the load current and load voltage in this transformer circuit:



Ans: I_{load} = 23.77 mA, V_{load} = 8.318 V

Five marks questions (Knowledge):

- 1. Write the constructional features of electrolytic capacitor and mention its applications.
- 2. Describe the construction and working of a transformer.
- 3. Write a note on audio transformer and mention its applications.
- 4. Describe the construction and working of a moving coil loudspeaker.

Five marks questions (Understanding):

- 1. Explain the important specifications of resistor.
- 2. Explain the principle of capacitor.
- 3. Explain the construction of a polystyrene capacitor.
- 4. Derive an expression for the equivalent capacitance of three capacitors connected in series.
- 5. Derive an expression for the equivalent capacitance of three capacitors connected in parallel.
- 6. Explain the phenomenon of mutual-induction.
- 7. Explain the construction and working of microphone.
- 8. Explain the construction and working of LDR.
- 9. Explain the construction and working of a thermistor.
