

- Instructions:** 1. For PART-A questions, only the first written answers will be considered for evaluation.
 2. Part – D consists of two sections.
 Section - I is of essay type questions and Section - II is of problems.
 3. Circuit diagram and truth tables must be drawn wherever necessary.
 4. Solve the problems with necessary formulae.

PART A

I. Select the correct answer from the choices given:

15 x 1 = 15

1. Vacuum tube triode was invented by.
 a) Shockley b) Jack Kilby c) J.A. Fleming d) Lee De Forest
2. SI Unit of charge is
 a) Ampere b) Coulomb c) Faraday d) Tesla
3. Two equal value resistors are connected in parallel, the effective resistance is
 a) equal to single resistor b) half of the single resistor
 c) twice the single resistor d) thrice the single resistor
4. Sphygmomanometer is an instrument used to measure
 a) Glucose b) Hemoglobin c) Temperature d) Arterial pressure
5. Identify the active device amongst the following
 a) Transistor b) Resistor c) Capacitor d) Inductor
6. Transformer is a device used to
 a) Step-up voltage b) Step-down current
 c) Isolate one circuit with the other circuit d) All the above
7. In an RC circuit connected to DC source, voltage across the capacitor increase
 a) Linearly b) Exponentially
 c) Constantly d) Logarithmically
8. For a series resonant (LCR) circuit condition for resonance is
 a) $X_L > X_C$ b) $X_L < X_C$ c) $X_L = X_C$ d) $X_L \neq X_C$
9. Barrier voltage for Silicon diode is
 a) 0.3V b) 0.5V c) 0.6V d) 0.7V
10. A centre tapped full wave rectifier consists of
 a) One diode b) Two diodes c) Three diodes d) Four diodes
11. A transistor consists of
 a) One junction b) Two junctions c) Three junctions d) No junctions
12. A transistor has $\alpha = 0.99$ then its β is given by
 a) 95 b) 98 c) 99 d) 100
13. A group of four bits is called
 a) Bit b) Byte c) Word d) Nibble
14. Logic expression for the output of NOR gate is
 a) $Y = \overline{A} \overline{B}$ b) $Y = \overline{A + B}$ c) $Y = AB$ d) $Y = \overline{AB}$
15. Technical document of a component is called
 a) Data sheet b) Excel sheet c) Google sheet d) Work sheet

II. Fill in the blanks by choosing appropriate answer from those given in the bracket: 5 x 1 = 5

[a) filter b) frequency c) timing diagram d) chopper e) transistor f) potentiometer]

16. DC to DC converters are called
17. Number of AC cycles completed in one second is called
18. Example for a variable resistor is
19. The circuit which eliminates ripples is called
20. A pictorial representation of inputs and output states of a logic circuit is called

PART B**III. Answer any FIVE questions:****5 x 2 = 10**

21. Silicon is more preferred than germanium in semi conductor devices fabrication, justify.
22. Mention any two advantages of digital thermometer.
23. Distinguish between self inductance and mutual inductance.
24. Draw the graph showing growth of current in RL circuit.
25. Mention any two applications of a diode.
26. Obtain relationship between α and β .
27. Prove that $A + \bar{A}B = A + B$
28. Mention two important specifications of LED.

PART C**IV. Answer any FIVE questions:****5 x 3 = 15**

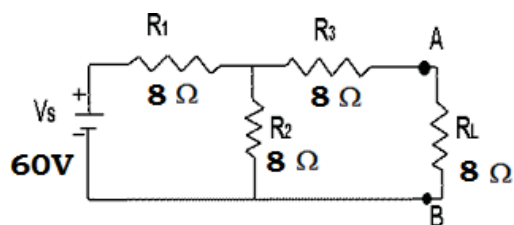
29. Mention any three properties of charges.
30. How do you create 3 V, 2 V and 1 V from a 3 V source?.
31. Explain the construction of carbon composition resistor.
32. In a series RLC circuit explain variation of impedance with reference to frequencies.
33. What is the reactance of a $3 \mu\text{H}$ inductor connected to an AC of 230 V, 50 Hz?
34. Write a note on formation of n-type semiconductor.
35. Compare the doping levels and physical sizes of emitter, base and collector layers of a transistor.
36. State and prove De-Morgan's Theorems.

PART D (Section I)**V. Answer any THREE questions:****3 x 5 = 15**

37. Derive an expression for the effective resistance of two resistors connected in series.
38. Explain the construction and working of loudspeaker.
39. Classify solids based on energy band diagram.
40. Construct a bridge rectifier circuit and explain.
41. Explain working of two input AND gate.

PART D (Section II)**VI. Answer any TWO questions:****2 x 5 = 10**

42. Using Thevenin's theorem, find the load current and load voltage for the following circuit.



43. A transformer has 500 turns in the primary and 250 turns in the secondary. What is the turn's ratio? How much is the secondary voltage with a primary voltage of 230 V?
44. For the Zener diode voltage regulator with $V_S = 20\text{ V}$, $R_S = 100\ \Omega$, $V_Z = 12\text{ V}$, $R_L = 680\ \Omega$. Determine
- a. Load voltage
 - b. Voltage drop across series resistance R_S
 - c. Current through the Zener diode
45. Subtract 1111_2 from 11001_2 using 2's complement method. Also verify the same by direct subtraction method.
