

**Instructions:**

1. The question paper has four parts A, B, C and D.
2. Part - A is compulsory.
3. Part - D consists of essay type questions and problems together.
4. Circuit diagrams and truth tables must be drawn wherever necessary.
5. Solve the problems with relevant formulas.

**PART A**

**I. Select the correct answer from the choices given:**

**15 x 1 = 15**

1. Vacuum tube diode is 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. Let two resistors having resistance value R each are connected in parallel the effective resistance of the combination is  
a) 2R      b) 3R      c) R/2      d) R/4
4. Sphygmomanometer is an instrument used to measure  
a) Glucose      b) Hemoglobin      c) Temperature      d) Arterial pressure
5. The resistance of an SMD resistor with code 223 is  
a) 223Ω      b) 22.3Ω      c) 22KΩ      d) 22.3KΩ
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. The phase difference between voltage and current in a purely inductive circuit is  
a) 0°      b) 90°      c) 180°      d) 360°
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  $\beta$  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)  $Y = A+B$       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) potentiometer]

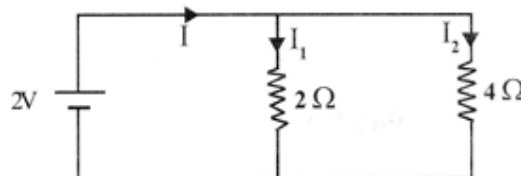
16. DC to DC converters are called .....
17. Number of AC cycles completed in one second is called .....
18. Example for a variable resistor is .....
19. The circuit which eliminates ripples is called .....
20. A pictorial representation of inputs and output states of a logic circuit is called .....

**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. Compare ideal and practical voltage sources.
23. Mention any two advantages of digital thermometer.
24. Distinguish between self inductance and mutual inductance.
25. Determine cutoff frequency of a low pass filter circuit. Given  $R = 1 \text{ k}\Omega$  and  $C = 0.01 \text{ }\mu\text{F}$ .
26. Mention any two applications of a diode.
27. Derive relationship between  $\alpha$  and  $\beta$ .
28. Prove that  $A + \overline{A} \cdot B = A + B$
29. Mention two important specifications of LED.

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

30. Mention any three properties of charges.
31. State and explain KCL and KVL.
32. Explain the construction of carbon composition resistor.
33. Find the total current  $I$  flowing in the circuit. Also find the branch currents  $I_1$  and  $I_2$ .



34. What is the reactance of a  $3 \text{ }\mu\text{H}$  inductor connected to an AC of 230 V, 50 Hz?
35. Write a note on formation of n-type semiconductor.
36. Write the circuit diagram, input and output waveforms of a positive clamper.
37. Compare doping levels and physical size of emitter, base and collector of a transistor.
38. State and prove De-Morgan's theorem.

**PART D (SECTION-1)****V. Answer any FIVE questions:****5 x 3 = 15**

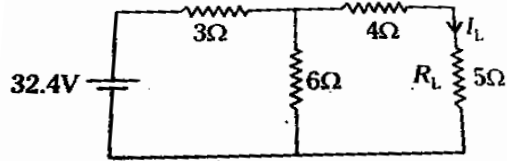
39. Derive an expression for the effective capacitance of two capacitors connected in series.
40. Explain the construction and working of microphone.
41. In a series RLC circuit explain variation of impedance with reference to frequencies.
42. Explain the working of positive clipper circuit.
43. Construct a bridge rectifier circuit and explain.
44. Explain working of two input diode AND gate.

## (SECTION-1)

VI. Answer any TWO questions:

5 x 2 = 10

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



46. A transformer has 500 turns in the primary and 250 turns in the secondary. What is the turns ratio? How much is the secondary voltage with primary voltage of 230V?
47. For the zener diode voltage regulator  $V_S=20V$ ,  $R_S=100\Omega$ ,  $V_Z=12V$  and  $R_L=680\Omega$ . Determine a) load voltage, b) voltage drop across  $R_S$  and c) current through
48. Subtract  $27_{10}$  from  $47_{10}$  using 2's complement method. Verify the same by direct subtraction method.

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