# I PU ELECTRONICS
## PREPARATORY EXAMINATION 2022-23

**Time: 3Hours 15 minutes** **Max Marks: 70**

**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, timing diagrams and truth tables must be drawn wherever necessary.**
5. **Solve the problems with necessary formulas.**

## PART-A

**I. Select the correct answer from the choices given:** **15x1 =15**

**1. Who invented a vacuum tube diode?**

a. JJ Thomson b. Lee De forest c. William Shockley d. JA Fleming

**2. What is the SI unit of current.**

a. Ampere b. Milli ampere c. Volts d. Power

**3. Write the expression for rms value of voltage.**

a. $V_{rms} = \frac{V_m}{\sqrt{2}}$ b. $V_m = \frac{V_{rms}}{\sqrt{2}}$ c. $V_{rms} = V_m$. d. $V_{rms} = V_m\sqrt{2}$

**4. Name the instrument which is used to measure current, voltage, resistance, etc.**

a. Voltmeter b. Ammeter c. Ohmmeter d. Multimeter

**5. Write the symbol of AC ammeter.**

a.  b.  c.  d. 

**6. Which type of capacitor is sensitive to polarities?**

a. Ceramic capacitor b. Electrolytic capacitor c. Polystyrene capacitor d. SMD capacitor

**7. Give an expression for the inductive reactance.**

a. $X_C = \frac{1}{2\pi fc}$ b. $X_L = \frac{1}{\omega c}$ c. $X_L = 2\pi fc$ d. $X_L = 2\pi fL$

**8. Two AC quantities are in phase. What is the value of phase angle between them?**

a. $90^\circ$ b. $0^\circ$ c. $180^\circ$ d. $45^\circ$

**9. What is the value of potential barrier of a silicon diode?**

a. 0.3 b. 0.7 c. 0.5 d. 0.8

**10. Mention the function of the emitter a transistor.**

a. Emit majority charge carriers b. Collect majority charge carriers
c. Collect minority charge carriers d. Emit minority charge carriers

**11. What is a nibble?**

a. Group of 4 bits b. Group of 8 bits c. Group of 2 bits d. Group 16 bits

**12. Write the 2's complement of a $10101_2$?**

a. 01010 b. 01011 c. 11001 d. 01110

**13. Convert $12_{10}$ into binary number.**

a. $1101_2$ b. $1000_2$ c. $1001_2$ d. $1100_2$

**14. Mention the part number of diode.**

a. 1N3019 b. 1N3018 c. 1N4007 d. 1N4148

**15. Name the chemical used for Etching process in PCB designing.**

a. Hydrochloric acid b. Sulphuric acid c. Nitric acid d. Citric acid

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

[ a. conventional flow b. $1k\Omega \pm 5\%$ c. AND d. $90^\circ$ e. heavily ]

16. The flow of current from positive to negative terminal of the battery is called _____ of current.
17. The resistance of four colour band of resistor which has the colour of **Brown-Black-red- Gold** is_____
18. Pure inductor is connected to an AC circuit; the voltage leads current by _____.
19. The emitter is _____doped when compared to collector and base.
20. The _____logic circuit which has high output only when all the inputs are high.

## PART –B

**III Answer any FIVE questions** **5 x 2 = 10**

21. A 12 V battery allows 2 A of current through a resistor. Calculate the power dissipated by the resistor.
22. What are secondary DC-sources? Give an example.
23. Mention any three bio-medical electronic devices.
24. Mention any two types of inductor.
25. Determine the time constant of an RL circuit when R = 10 kΩ and L = 12mH.
26. Mention two conditions of Zener diode act as a voltage regulator.
27. Write the circuit diagram of a Bridge rectifier along with the input and output wave forms.
28. A npn transistor has a DC current gain β of 200. Calculate the base current $I_B$ when the collector current is 4 mA.
29. Mention any two advantages of PCB.

## PART-C

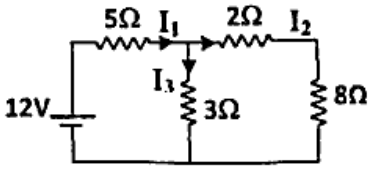
**IV Answer any FIVE questions** **5 x 3 = 15**

30. Discuss on the job opportunities available in the field of electronics.
31. Mention any three limitations of Ohm's law.
32. What are active components? Give one example.
33. Draw the circuit diagram and graph showing voltage across capacitor during charging in RC circuit. Write the time expression for time constant.
34. With a lattice structure, explain how p - type semiconductor is formed.
35. Draw the circuit diagram of positive clipper. Explain its working. Draw its input and output waveform
36. With a diagram explain the working of LED.
37. Explain with the diagram the construction and working of a npn transistor.
38. Simplify the Boolean expression $Y = \overline{\bar{A}B + A\bar{B}}$

## PART-D

**V Answer any FIVE questions** **5 x 5 = 25**

39. State and explain Superposition theorem with an example.
40. With a diagram explain the construction and working of a loud speaker. Mention one application.
41. Explain the working of Half wave rectifier with a circuit diagram. Draw the input and output wave forms.
42. Draw the circuit diagram of Shunt capacitor filter. Explain its working. Draw the input and output wave forms.
43. With a circuit diagram explain the working of DTL NAND gate. Write its truth table and circuit symbol.
44. Determine the branch currents using Kirchhoff's laws. 




45. 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.

46a. 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.

b. Calculate the energy stored in the magnetic field of 100 mH inductor with a current of 80 mA.

47. Subtract $(26)_{10}$ from $(75)_{10}$ using 1's complement method.
48. A series RLC circuit has R = 20 Ω, C = 0.01 μF, L = 10 mH. Calculate frequency, impedance and current at resonance.