



**K22U 1572**

Reg. No. : .....

Name : .....

**IV Semester B.Sc. Degree CBCSS (OBE) Regular/Supplementary/  
Improvement Examination, April 2022  
(2019 Admission Onwards)  
CORE COURSE IN PHYSICS  
4B04PHY : Electronics – I**

Time : 3 Hours

Max. Marks : 40

**PART – A**

Short answer questions. Answer **all** questions. **Each** question carries **1** mark.

1. What is the breakdown mechanism in an ordinary PN junction diode ? What is the use of a series resistance in reverse operation ?
2. What is the importance of the load line of a transistor ?
3. What do you mean by punch-through in a transistor ?
4. Draw the schematic of an n-channel MOSFET.
5. How will you obtain the 2's complement of a binary number ? What is the 2's complement of 10101 ?
6. Describe the truth table for a 3 input OR gate. **(6×1=6)**

**PART – B**

Short essay questions. Answer **any 6** questions. **Each** question carries **2** marks.

7. Draw typical diode forward and reverse current-voltage characteristics illustrating temperature effects.
8. What do you mean by thermal run away of a transistor ? Define the term stability factor.
9. Draw the output characteristics of a transistor under CB configuration indicating the different regions of operation.

P.T.O.



10. Draw a typical self bias circuit for a p-channel JFET.
11. What are the different parts of a MOSFET ? Briefly explain its working principle.
12. Convert the decimal numbers a) 12 b) 25 c) 58 d) 82 to binary.
13. Prove that  $A + AB = A$  using distributive law. Verify the same using a truth table.
14. Simplify the Boolean expression  $\left[ \overline{AB} (C + BD) + \overline{AB} \right] C$  . (6×2=12)

## PART – C

Problems. Answer **any 4** questions. **Each** question carries **3** marks.

15. A 9.1 V zener diode is connected across a load of 1 k $\Omega$  with a series resistance of 680  $\Omega$  and a 20 V supply. Calculate the
  - i) output voltage
  - ii) voltage drop across the series resistor
  - iii) load current and
  - iv) zener current.
16. For an npn transistor connected in CE configuration,  $\beta = 45$  and the voltage drop across the 1 k $\Omega$  collector resistance is 1 V. Determine the base current.
17. A transistor uses voltage divider method of biasing with  $R_1 = 50$  k $\Omega$ ,  $R_2 = 10$  k $\Omega$ ,  $R_E = 1$  k $\Omega$  and  $V_{BE} = 0.1$  V. If  $V_{CC} = 12$  V, find the collector current  $I_C$ .
18. An FET has the parameters  $I_{DSS} = 32$  mA (shorted-gate drain current);  $V_{GS(off)} = -8$  V (gate-source cut-off voltage);  $V_{GS} = -4.5$  V (gate-source voltage). Estimate the drain current.
19. Convert the hexadecimal numbers i) 575 ii) 3A.2F and iii) A85 to decimal.
20. State de Morgan's theorems. Apply de Morgan's theorems to the expression  $\overline{\overline{(A + B)} + C}$ . (4×3=12)



PART – D

Long essay questions. Answer **any 2** questions. **Each** question carries **5** marks.

21. Using a neat circuit diagram, explain the working principle of a centre-tapped transformer based full wave rectifier. Show the input and output waveforms. Discuss the output waveform with capacitor smoothing circuit.
  22. Explain the working principle of a biased npn transistor.
  23. Explain the drain and transfer characteristics of an n-channel JFET.
  24. Discuss the exclusive-OR logic. Give its truth table. Illustrate how an exclusive-NOR gate be obtained from an exclusive-OR gate. **(2×5=10)**
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