

21PHY1C4L

M.Sc. I Semester Degree Examination, April/May - 2023

PHYSICS

ELECTRONICS

(CBCS)

Time : 3 Hours

Maximum Marks : 70

Note : Answer **any five** of the following questions with Question No. **1 compulsory**, each question carries **equal** marks.

1. (a) Obtain the expression for the carrier concentration in a highly doped n-type semiconductor and sketch the variation of Fermi energy with temperature.
(b) Discuss the formation of p-n junction diode. Explain the junction breakdown in reverse bias conditions. **7+7**
2. (a) With a neat circuit diagram, discuss the working of transistor amplifier under CE configuration with necessary equations.
(b) Define the necessary and sufficient conditions to obtain sustained oscillations. **8+6**
3. (a) What is an operational amplifier ? Describe with its block diagram.
(b) Describe the working of first order high pass filter and derive an expression for its cutoff frequency. **7+7**
4. (a) What is K-Map ? Explain the simplification of two and four variable Boolean expression using K-Map.
(b) Explain the working of basic logic gates with truth table. **7+7**
5. (a) Explain the working of J-K flip flop. Mention its limitations.
(b) What is quantization error ? How it can be minimized ? **7+7**
6. (a) Describe the operation characteristics of MOSFET with necessary diagram.
(b) With a neat circuit diagram, explain the working of a differentiator using Op-amp. **7+7**

P.T.O.

7. (a) Reduce the following equation using Boolean equation.
- (i) $(A + B) (A + B) (A + B) = AB$
 - (ii) $A + AB + AB = A + B.$
- (b) Distinguish between latches and flip flop. Mention their significance with relevant example. **7+7**
8. Write a note on :
- (a) Hybrid model equivalent circuit concept
 - (b) Butterworth filter
 - (c) Binary Ripple Counters **5+5+4**

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