D 114600　　　　　　(Pages : 2)　　　　Name...

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FIRST SEMESTER M.Sc. DEGREE (REGULAR/SUPPLEMENTARY) EXAMINATION, NOVEMBER 2024

(CBCSS)

Physics

PHY1C04—ELECTRONICS

(2019 Admission onwards)

Time : Three Hours　　　　　　　　　　　　　　　　Maximum : 30 Weightage

Section A

Answer **all** *questions.*
Each answerable in 7½ minutes.
Each question carries weightage 1.

1. Briefly explain the pinch off voltage.

2. Briefly explain biasing of FETs.

3. Define Population inversion.

4. Briefly explain different types of photodiodes.

5. Explain Open loop gain.

6. Write a short note on dominant pole.

7. Briefly explain the shift register using JK flipflop.

8. Differentiate between static and dynamic RAM

$(8 \times 1 = 8$ weightage$)$

Section B

Answer any **two** *questions.*
Each question carries weightage 5.

9. Outline the construction and operation of semiconductor laser.

10. Explore closed-loop inverting op-amp configuration, deriving expressions for voltage gain, input impedance, output impedance, and bandwidth.

11. Describe the construction and working of a high-pass first order Butterworth filter. Study the frequency response. How is it converted to a second order Butterworth filter.

12. Explore the use of shift registers as counters. Discuss the concept of a ring counter and its advantages in specific applications.

$(2 \times 5 = 10$ weightage$)$

Turn over

Section C

Answer any **four** *questions.*
Each question carries weightage 3.

13. With diagram and voltage truth table explain MOSFET (negative) NAND gate.

14. What is a photoconductor ? Obtain the expression for photocurrent.

15. Design a differentiator to differentiate an output signal that varies in frequency from 10 Hz to about lKHz.

16. Design a second-order low-pass filter at a high cutoff frequency of 1 kHz.

17. With the help of timing diagram and truth table explain the working of JK Master Slave flip-flop.

18. Describe the characteristic equations of D flip-flop and T flip-flop.

19. Using Karnaugh Map solve the given equation to reduce the number of gates used.

$Y = ABCD + \bar{A}BCD + A\bar{B}CD + AB\bar{C}D + ABC\bar{D} \cdot$

$(4 \times 3 = 12$ weightage$)$