FIRST SEMESTER M.Sc. DEGREE EXAMINATION, NOVEMBER 2024

(CBCSS - PG)

(Regular/Supplementary/Improvement)

CC19P PHY1 C04 - ELECTRONICS

(Physics)

(2019 Admission onwards)

Time : 3 Hours　　　　　　　　　　　　　　　　　　　　Maximum : 30 Weightage

Section A

Answer *all* questions. Each question carries 1 weightage.

1. Draw the volt-ampere drain characteristics of a p-channel E-MOSFET.

2. Draw the circuit diagram of a CMOS NAND gate and explain its operation.

3. Give the working principle of an IR emitter. What are its uses?

4. How does an LDR work? Mention any two of its application.

5. Explain difference mode and common mode gains.

6. What is the difference between open loop and closed loop gain of an Op- Amp?

7. Give the characteristics of non inverting amplifier.

8. What is meant by "Race-around" condition in JK flip-flops?

(8 × 1 = 8 Weightage)

Section B

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

9. Draw the circuit of a common source amplifier with load resistor R_d in the drain circuit and an additional resistor R_S in the source to ground circuit. Draw the Thevenin's equivalent circuit looking into the drain. Derive the expressions for voltage gain.

10. What is a tunnel diode ? Explain the principle of working of a tunnel diode, giving its characteristics.

11. Discuss with theory, the working of first order and second order low pass filters.

12. With the help of a block diagram of an 8085 microprocessor, explain its operations.

(2 × 5 = 10 Weightage)

Section C

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

13. Given that I_{DSS} = 5mA and V_p = -3.2 V. Determine I_D at V_{GS} = -2V and -3V. Also determine V_{GS} at I_D = 2.5mA and 5.5mA.

14. Derive the expression for $\Delta\lambda$ between the allowed modes in the longitudinal direction of a semiconductor laser. For a GaAs laser operated at λ= 0.89μm, with n =3.58, L= 300μm, and dn/dλ =2.5μm^{-1}, find $\Delta\lambda$.

15. The slew rate of an Op - Amp is 2V/µs. What is the maximum closed loop voltage gain that can be used when the input signal varies by 0.5V in 10µs

16. Explain the working of Op- Amp as a scale changer

17. Explain the working of astable multivibrator.

18. Design a Mod-5 combination counter using natural binary counting sequence. Also draw the output waveform.

19. Design a D/A converter with R and 2R resistor which converts a three input signal ranging from 000 to 111.

(4 × 3 = 12 Weightage)

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