25P109 (Pages: 2) Name: .....

Reg.No: .....

FIRST SEMESTER M.Sc. DEGREE EXAMINATION, NOVEMBER 2025

(CBCSS - PG)

(Regular/Supplementary/Improvement)

CC19PPHY1C04 - ELECTRONICS

(Physics)

(2019 Admission onwards)

Time : 3 Hours Maximum : 30 Weightage

Section A

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

1. Give a short account of MOSFET.
2. Draw and explain the common source drain characteristics of an n-channel FET.
3. Explain the construction and working of an infrared LED. What are the uses of it?
4. Compare the characteristics of a homojunction and double heterojunction laser.
5. Derive the expression for closed loop gain of inverting amplifier.
6. Why compensation techniques needed in Op- Amp?
7. State the characteristics of an ideal Op-Amp. Why is it desirable to have high CMRR?
8. Explain the internal architecture of 8085 microprocessor.

(8 × 1 = 8 Weightage)

Section B

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

9. (a) Briefly sketch the working of an n-channel JFET. (b) Draw the circuit diagram of common source FET amplifier with un-bypassed source resistance and explain. (c) Draw the low frequency small signal FET equivalent circuit and obtain expressions for the voltage gain and output resistance.
10. With necessary theory explain the working of a p-n junction solar cell and derive the expression for efficiency. What is the physical significance of fill factor? How is it defined and what is the theoretical maximum value possible for it?
11. Derive the expression for output of an op-amp differentiator circuit. Discuss the modifications required for a basic differentiator to make it a practical differentiator. Comment on the frequency response curve and clearly mention the frequency range where differentiation will be possible.

12. Explain the working of a mod 10 counter. Show how decade counters are cascaded to count up to 999?

(2 × 5 = 10 Weightage)

Section C

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

13. Draw the circuit diagrams of NAND gate and NOR gate using MOSFET and explain their working.

14. Explain the principle and working of a tunnel diode with necessary energy level diagrams. Explain the negative differential resistance region. Mention its uses.

15. The input resistance of a differential amplifier is measured using 25 kΩ resistor in series with an input voltage of 5V. What is the value of R_i, if the voltage into the amplifier is 1.5 V.

16. Design a second order band pass filter with a mid band voltage gain of 100, a center frequency of 1 KHz and a 3-dB bandwidth of 100 Hz.

17. Design an astable multivibrator of frequency 1 kHz using an OPAMP with a DC dual supply voltage of 15 V.

18. A truth table has low outputs for inputs 0000 to 0110, a high output for 0111, low output for 1000 to 1001 and don't care states for 1010 to 1111. Using K map to find the simplest logic circuit for this truth table?

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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