FIRST SEMESTER M.Sc. DEGREE EXAMINATION, NOVEMBER 2022
(Regular/Improvement/Supplementary)

PHYSICS
FPHY1C04- ELECTRONICS

Time: 3 Hours   **Maximum Weightage: 30**

Part A: Short answer questions. Answer *all* questions. Each carries *one* weightage.

1.   Explain the frequency dependent parameters of the opamp.

2.   With the help of a circuit diagram, explain how opamp is used as an averaging amplifier.

3.   Distinguish between enhancement and depletion MOSFET.

4.   Obtain the expression for closed loop gain of inverting amplifier using opamp.

5.   Explain the working of CMOS inverter.

6.   Draw the logical circuit of shift register using JK flip-flop.

7.   Write a short note on LDR.

8.   How FET is used for automatic gain control?

$$(8 \times 1 = 8 \text{ weightage})$$

Part B: Essay questions. Answer any *two* questions. Each carries *five* weightage.

9.   Explain the working of opamp as square wave generator. Modify the circuit and hence obtain triangular wave output.

10. What are the advantages of negative feedback in amplifier circuit? Explain how a closed loop non-inverting opamp exhibit is the characteristics of perfect voltage amplifier.

11. Draw and explain the logical circuit of a decade counter.

12. Using the FET small signal equivalent circuit, obtain the expression for voltage gain of Common source and Common drain amplifier at low frequencies.

$$(2 \times 5 = 10 \text{ weightage})$$

Part C: Problems. Answer any *four* questions. Each carries *three* weightage.

13. The following readings were obtained experimentally from FET

V_{GS}	0V	0V	-0.5V
V_{DS}	10V	15V	15V
I_D	10mA	10.5mA	9.5mA

Find the transconductance, drain resistance and amplification factor.

14. Using K-map, solve the given SOP equation $Y= \Sigma m(2,7,9,10,11,13,15)$.

15. Determine the maximum frequency of the input signal to get undisturbed output from a voltage follower when a sinusoidal voltage of peak value 5mV is applied. Slew rate of the opamp is 0.5V/µS.
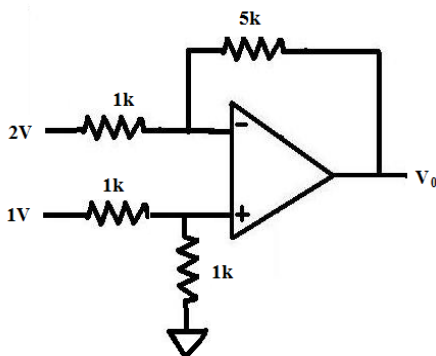
16. What is a photoconductor? Obtain the expression for photocurrent.

17. Briefly explain the working of ring counter.

18. Find the output voltage of the given opamp circuit.
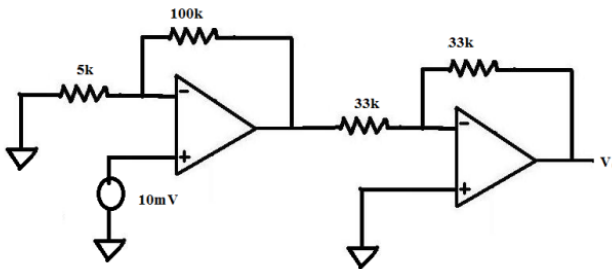
19. Find the output voltage of the given circuit.

(4 × 3 = 12 weightage)