Reg. No ....   Name **22P1047**

M. Sc. DEGREE END SEMESTER EXAMINATION : OCTOBER 2022
SEMESTER 1 : PHYSICS
COURSE : **21P1PHYT04: ELECTRONICS**
(For Regular - 2022 Admission and Supplementary - 2021 Admission)

Duration : Three Hours   Max. Weights: 30

PART A
Answer any 8 questions   Weight: 1

1. Define supply voltage sensitivity? What is meant by poorly regulated power supply?   (R, CO 1)

2. What are the factors that affect the input offset voltage, input bias and input offset currents?   (U, CO 1)

3. What are the characteristics of an ideal op-amp?   (U, CO 1)

4. Explain the difference between (a) inverting and differential summing amplifiers, and (b) inverting and non-inverting averaging amplifiers?   (A, CO 2)

5. What is meant by circuit stability?   (R, CO 2)

6. Explain a differential input and differential output amplifier?   (R, CO 2)

7. List the most commonly used filters?   (U, CO 3)

8. How will you classify band pass filters?   (A, CO 3)

9. List some of the applications of the 555 timer IC?   (R, CO 4)

10. What is meant by modulation? List different types of analog modulation?   (R, CO 4)

(1 x 8 = 8)

PART B
Answer any 6 questions   Weights: 2

11. The 741C op-amp having the following parameters is connected as a closed loop non-inverting amplifier with R_1=1 KΩ and R_F=10 KΩ: A=200,000, R_i=2 MΩ, R_0=75Ω, fo=5Hz, supply voltage=±15 V, output voltage swing=±13 V. Compute the values of A_F, R_{iF}, R_{OF}, f_{oF} and V_{ooT}.   (R, CO 1)

12. Determine the output voltage for an open loop inverting amplifier, if (a) v_{in} =20 mV dc and (b) v_{in} = -50 µV peak sine wave. Assume the Op-amp is 741 (A=200000).   (U, CO 1)

13. Briefly explain a voltage-to-current converter with grounded load?   (A, CO 2)

14. In a differential instrumentation amplifier using a transducer bridge, R_1=1 kΩ, R_F= 4.7 kΩ, R_A= R_B=R_C= 100 kΩ, V_{dc}=+5 V and supply voltages =±15 V. The transducer is thermistor with following specifications: R_T=100 kΩ at a reference temperature of 25°C, temperature co-efficient of resistance =-1 kΩ/°C . Determine the output voltage at 0°C and at 100°C.   (R, CO 2)

15. Determine the low cutoff frequency f_L of a second order high pass Butterworth filter. Also draw the frequency response plot of the same.   (U, CO 3)

16. Explain the working of a square-wave generator using op-amp.   (U, CO 3)

17. Describe the working of a sample and hold circuit?   (R, CO 4)

18. Distinguish between amplitude and frequency modulation?   (R, CO 4)

(2 x 6 = 12)

PART C
Answer any 2 questions   Weights: 5

19. What is a differential amplifier? With a circuit and necessary theory, derive expressions for voltage gain and input resistances?   (R, CO 1)

20. Explain a voltage-to-current converter with floating load. Discuss how it is used in low voltage ac and dc voltmeters?   (R, CO 2)

21. With necessary theory and circuit diagrams, explain the working of (a) wide band-pass filter and (b) a narrow band-pass filter?   (An, CO 3)

22. With the help of suitable diagram, explain the theory and working of a Frequency-to-Voltage Converter?   (An, CO 4)

(5 x 2 = 10)

OBE: Questions to Course Outcome Mapping

CO	Course Outcome Description	CL	Questions	Total Wt.
CO 1	Understand the theoretical aspects of OP-amps	U	1, 2, 3, 11, 12, 19	12
CO 2	Apply the OP-amp circuits for various practical applications	A	4, 5, 6, 13, 14, 20	12
CO 3	Analyze frequency response of op amps	An	7, 8, 15, 16, 21	11
CO 4	Understand basics of communication physics	U	9, 10, 17, 18, 22	11

Cognitive Level (CL): Cr - CREATE; E - EVALUATE; An - ANALYZE; A - APPLY; U - UNDERSTAND; R - REMEMBER;