Reg. No ..... Name **17P145**

MSc DEGREE END SEMESTER EXAMINATION- NOVEMBER 2017

SEMESTER 1 : PHYSICS

COURSE : **16P1PHYT04 ; ELECTRONICS**

(For Regular - 2017 Admission)

Time : Three Hours Max. Marks: 75

Section A (Objective type)
Answer all the questions (1 Mark each)

1. Negative feedback …….
   (a) increases the input and output impedances
   (b) increases the input impedance and bandwidth
   (c) decreases the output impedance and bandwidth
   (d) does not affect impedance or bandwidth
2. The common-mode gain is …….
   (a) very high (b) very low
   (c) always unity (d) unpredictable
3. In op-amp, signal applied at inverting terminal appears at output terminal with a phase
   (a) 0 (b) 90 (c) 180 (d) 45
4. Gain of operational amplifier is
   (a) independent of internal structure
   (b) dependent of internal structure
   (c) depend upon two external resistances
   (d) both b and c
5. How to obtain high rate of accuracy in comparator?
   (a) All of the mentioned (b) High voltage gain
   (c) High CMRR (d) Input offset

(1 x 5 = 5)

Section B (Short answer type)
Answer any Seven (2 Marks each)

6. Draw the equivalent circuit diagram of an Op-amp?
7. Define input offset voltage and explain why it exists in all op-amps?
8. List two special cases of inverting amplifiers. Which one is most widely used and why?
9. What is frequency response? What do you understand by the term, ‘Butterworth response’?

10. What is slew rate? List causes of the slew rate and explain its significance in applications
11. Briefly explain the difference between the dc and ac amplifiers?
12. How does the high frequency model of an op-amp differ from the equivalent circuit of an op-amp? Explain?
13. State two basic criteria required for oscillations in oscillators?
14. What is meant by zero-crossing detector?
15. What is frequency stability? Explain its significance?

(2 x 7 = 14)

Section C (Problems / Short Essays)
Answer any Four (5 Marks each)

16. With the help of suitable circuit diagrams, obtain the expressions for output voltages of an open loop inverting, non-inverting and differential amplifiers?
17. For a closed loop inverting amplifier using IC 741 , determine the value of the output voltage if the input is 1-V pp sine wave at 1 kHz. Also sketch the output waveform. Assume that V_{ooT}=0 V. Given R_1=470 Ω, R_F=4.7 kΩ, A=200,000, R_i=2 MΩ, Ro=75Ω, f_o=5Hz, supply voltage=±15 V and output voltage swing=±13 V
18. Explain a current-to-voltage converter?
19. Describe a voltage-to-current converter with floating load?
20. Design a wide band-reject filter having f_H =200 Hz and f_L= 1 kHz.
21. With the help of circuit diagrams, explain the working of Phase –shift Oscillator?

(5 x 4 = 20)

Section D (Essays)
Answer all questions (12 Marks each)

22(a) (1) With the help of suitable circuit diagrams and necessary theory, derive the expressions for (i) voltage gain and (ii) input resistance of a voltage shunt feedback amplifier.
(2) 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. Given A=200,000, R_i=2 MΩ, Ro=75Ω, f_o=5Hz, supply voltage=±15 V and output voltage swing=±13 V. Compute the values of A_F, R_{iF},R_{oF},f_{oF} and V_{ooT}.

OR

(b) With the help of suitable circuit diagrams, derive the expressions for (i) voltage gain (ii) input resistance and (iii) output resistance of a voltage-series feedback amplifier. Explain why the non-inverting amplifier with feedback is called a perfect voltage amplifier?

23(a) With the help of suitable input and output waveforms, explain how an op-amp can be used as an Integrator?

OR

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

24(a) What are the important characteristics of a Butterworth filter? With the help of a diagram explain the operation of a first order low pass Butterworth filter.

OR

(b) (1)With the help of suitable diagrams, explain the working of a square-wave generator using op-amp. (2) Design a square wave oscillator, so that fo =1 kHz. The op-amp is a 741 with dc supply voltages = ± 15 V.

(12 x 3 = 36)