M Sc DEGREE END SEMESTER EXAMINATIONS - NOVEMBER 2015
SEMESTER: 1, SUBJECT - PHYSICS
COURSE: P1PHYT04 - ELECTRONICS
(Regular- 2015 Admission; Supplementary / Improvement-2014 Admission)

Time: Three Hours   Max. Marks: 75

PART A

(Answer all questions. Each question carries 1 Mark)

1. The output of a op amp increases 4V in 10μs.The slew rate is
   a) 40V/μs   b) 2.5V/μs   c) 0.4 V/μs   d) None of these

2. FET is
   a) unipolar   b) bipolar   c) multipolar   d) none of these

3. The zero level detector is one application of a
   a) Comparator   b) Differentiator   c) Diode   d) Summing amplifier

4. An op-amp has a UGB of 10^6 and a dc gain of 10^5. Its break frequency is …
   a). 0.1   b) 1   c) 10   d) 10^{11}

5. A super heterodyne receiver with an IF of 450 KHz is tuned to a signal of 1200KHz.
   The image frequency in KHz is
    a) 2100   b) 1650   c) 900   d) 750

                                                                        (1 x 5 = 5)

PART - B

(Answer any 5 questions. Each question carries 2 Marks)
6. What is an operational amplifier. What is meant by virtual ground of an op amp?
7. Why integrators are preferred over differentiators in analog computers?
8. Define CMRR. Explain why high CMRR is important in instrumentation amplifiers.
9. Define slew rate of an op amp. What causes the slew rate?
10. What is the difference between compensated and non compensated op- amps?
11. What are Bode plots? Explain its uses.
12. What is resolution and conversion time in ADC?
13. Define frequency modulation.

                                                                        (2 x 5 = 10)

(PTO)

PART - C

(Answer any 3 questions. Each question carries 4 Marks)

14. Explain the working of JFET. Define JFET parameters and establish the relation between them.

15. Determine the output voltage of an op amp for input voltages of $V_1 = 200\mu V$ and $V_2 = 140\mu V$. The amplifier has a differential gain $A_d = 6000$ and the value of CMRR is a) 200 and b) 10^5.

16. Discuss the principle and operation of a summing amplifier.

17. Design a second order band pass filter with a mid band voltage gain of 100, a centre frequency of 1 K Hz and a 3dB bandwidth of 100Hz.

18. Prove that the phase discriminator is a FM demodulator.

(3 x 4 = 12)

PART - D

(Answer **all** questions. Each question carries 12 Marks)

19. a) Sketch and explain the basic structures and characteristics of enhancement mode and depletion mode MOSFETs.

OR

b) What is a differential amplifier? With circuit diagram and necessary theory, derive expressions for voltage gain and input resistances of differential amplifier with a) one op--amp and b) two op amps?

20. a) What is an instrumentation amplifier? Explain the working of instrumentation amplifier using Transducer bridge.

OR

b) Explain with diagrams the operation of an integrator and a differentiator circuits using op amps.

21. a) What are Butterworth filters? Explain the design and working of a first order low pass and high pass filters using op-amp.

OR

b) Describe the working of op amp based a) Wien bridge oscillator and b) Voltage controlled oscillator.

22. a) Discuss the operation of a radio detector circuit. Explain how the circuit could perform amplitude limiting.

OR

(b) Explain the working of a Schmitt trigger circuit using op- amp. Discuss the function of successive approximation A/D converter.

(12 x 4 = 48)

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