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National Institute of Technology Hamirpur (H.P.) -177005

Course Code EC - 222 Course Name: Analog Communication System

## Final Semester Exam. May, 2023

## Time: 03 hrs

## Maximum Marks: 50

2023

1/0

## Note: 1. All questions are compulsory.

Q.No.1(a) Define and explain Frequency Modulation with the help of neat diagram. Derive the formula for the instantaneous value of FM voltage and the modulation index. Also explain your observation based on its frequency spectrum. (7)

(b) In an FM system, if  $m_f$  is doubled by halving the modulation frequency, what will be the effect on the maximum deviation? (3)

Q. No.2 (a) Prove that the balanced modulator produces an output consisting of sidebands only, with the carrier removed. Other than in SSB generation, what application can this circuit have? (5)

(b) Find the carrier and modulating frequencies, the modulation index and the maximum deviation of the FM wave represented by the voltage equation  $v = 12 \sin (6 \times 10^8 t + 5 \sin 1250t)$ . What power will this FM wave dissipate in a 10-ohm resistor? (5)

Q.No.3 (a) Explain in detail the block diagram of Armstrong frequency modulation- system. Also explain the effects of frequency changing on an FM signal. (5)

(b) Draw and explain the block diagram of Superhetrodyne AM receiver and hence explain in detail the major factors influencing the choice of intermediate frequency in any particular system. (5)

Q.NO.4 (a) What is use of squelch circuit in communication receivers? Explain its operation with the help of circuit diagram. (5)

(b) Explain with neat diagram the operation of Foster Seelay phase discriminator for frequency demodulation. (5)

Q. No.5 (a) What is the role of AGC in communication receiver? Draw and explain delayed AGC circuit. (5)

(b) With the help of circuit diagram explain the generation of Pulse width modulation. (5)