

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

T-2 EXAMINATION - October 2018

B.Tech Vth Semester (CSE & IT)

COURSE CODE: 10B11EC514

COURSE NAME: Communication Systems

COURSE CREDITS: 4

MAX. MARKS: 25

MAX. TIME: 1.5Hrs.

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.

- Q1 (a)** What are the conditions when AM and FM have same bandwidth? Discuss the merits and demerits of FM over AM. [1+2=3]
- (b)** Discuss Pre-emphasis and De-emphasis used in FM. [2]
- Q2 (a)** Design an Armstrong indirect FM modulator to generate an FM carrier with frequency of 98.1 MHz and frequency deviation $\Delta f = 75$ kHz. A narrow band FM generator is available at a carrier frequency of 100 kHz and a frequency deviation = 10 Hz. The stock room has an oscillator with an adjustable frequency of 10 to 11 MHz. Also frequency doubler, triplers and quintuplers are available. [3]
- (b)** How will you prove that FM has infinite number of side bands and hence infinite bandwidth theoretically? [2]
- Q3 (a)** Explain the working of superheterodyne receiver for AM reception. How does it outperform over TRF receiver? [2+1=3]
- (b)** A channel has to be accessed by multiple users. What are the techniques you will employ? [2]
- Q4 (a)** An angle modulated signal with carrier frequency $\omega_c = 2\pi \times 10^6$ is described by the equation:
- $$X(t) = 10 \cos(\omega_c t + 3 \sin 2000t + 6 \sin 3000\pi t)$$
- [1+0.5+0.5+0.5+0.5=3]
- Find out the following
- Maximum frequency deviation.
 - Maximum Phase deviation.
 - Power of modulated wave.
 - Modulation index
 - Estimate the bandwidth of FM wave
- (b)** Explain the generation of FM using direct method. State the merits and demerits of this method. [2]
- Q5 (a)** With the help of suitable diagrams explain the working of Foster-Seeley discriminator. [3.5]
- (b)** Relate FM and PM diagrammatically and supported by proper equations. [1.5]
