

Con. 5593-09.

(REVISED COURSE)

SP-7886

(3 Hours)

[ Total Marks : 100

N.B.: (1) Question No. 1 is compulsory.

(2) Attempt any four out of remaining six questions.

(3) Assume suitable data if required.

(4) Figures to the right indicate full marks.

1. (a) Calculate total power and power in each sideband for standard AM transmission that is sinusoidally modulated to depth of 80% if the unmodulated carrier power is 50 kW. 20  
 (b) The carrier frequency of FM broadcast transmitter is 100 MHz and maximum frequency deviation is 75 KHz. If the highest audio frequency modulating the carrier is 15 KHz, what is the approximate bandwidth of the signal.  
 (c) Compare narrow band and wideband FM.  
 (d) Compare PCM and DM.
2. (a) Define Amplitude Modulation and derive the equation for Amplitude Modulated wave. 10  
 (b) A certain transmitter radiates 9 kW with the carrier unmodulated and 10.125 kW when the carrier is sinusoidally modulated. 10  
 Calculate the modulation index.  
 If another sinewave, corresponding to 40 percent modulation, is transmitted simultaneously, determine the total radiated power.
3. (a) With the help of neat circuit diagram and phasor diagram explain the working of Foster - Seeley discriminator. 10  
 (b) Find the carrier and modulating frequencies the modulation index and the maximum deviation of the FM wave represented by the voltage equation  $e = 12 \sin (6 \times 10^8 t + 5 \sin 1250 t)$ . What power will this FM wave dissipate in a  $10 \Omega$  resistor ? 10
4. (a) What is a 'Balanced Modulator' ? Sketch a Balanced Modulator circuit and explain its working. 10  
 (b) Find the Fourier Transform of the following : 10  
 (i)  $\delta(t)$   
 (ii)  $\cos \omega_c t$ .
5. (a) Draw the block diagram of superheterodyne receive and describe the function of each block. 8  
 (b) Explain the following as applicable to Radio Receivers :— 12  
 (i) Fidelity  
 (ii) Image Frequency and its rejection  
 (iii) Tracking  
 (iv) Selectivity.
6. (a) Compare 10  
 (i) FDM and TDM  
 (ii) ASK and FSK.  
 (b) Explain Satellite Communication Systems. List the applications in Satellite Communication. 10
7. (a) How is adaptive Delta Modulation an improvement over linear Delta Modulation. Draw block diagram of adaptive Delta Modulation and explain its working. 10  
 (b) Define Signal to Noise Ratio. Explain the effect of cascade connection on Signal to Noise Ratio. Calculate the overall signal to Noise Ratio at the output in decibels for 3 identical links, given the Signal to Noise Ratio for any one link is 40 dB. 10