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Code No: 154AC

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year II Semester Examinations, November/December - 2020

ANALOG AND DIGITAL COMMUNICATIONS

(Electronics and Communication Engineering)

Time: 2 hours **Max. Marks: 75**

Answer any Five Questions
All Questions Carry Equal Marks

1.a) The signal m(t) in the DSB – SC signal $v(t) = m(t) \cos(\omega_c t + \Theta)$ is to be reconstructed by multiplying v(t) by a signal derived from $v^2(t)$. Show that $v^2(t)$ has a component at the frequency $2f_c$. Find its amplitude.

b) Explain power relations in AM waves. [8+7]

2.a) The signal $v(t) = (1+m \cos \omega_m t) \cos \omega_c t$ is detected using a diode envelope detector. Sketch the detector output when m=2.

b) Consider the signal $\cos [\omega_c t + \phi(t)]$ where $\phi(t)$ is a square wave taking on the values $\pm\pi/3$ every $2/f_c$ sec.
i) Sketch $\cos [\omega_c t + \phi(t)]$
ii) Plot the phase as a function of time
iii) Plot the requency as function of time. [7+8]

3.a) Explain spectrum analysis of sinusoidal FM wave using Bessel functions.

b) If the waveform $\cos(\omega_c t + k \sin \omega_m t)$ is a phase modulated carrier, sketch the waveform of the modulating signal. Sketch the waveform of the modulating signal if the carrier is frequency modulated. [8+7]

4.a) What are the limitations of TRF receiver? How to over come them?

b) What are the characteristics of RF Tuner? Why it is needed in receivers. [8+7]

5.a) A bandpass signal has a spectral range that extends from 20 to 82 kHz. Find the acceptable range of the sampling frequency, f_s.

b) Draw the block diagram of PCM and explain function of each block. [6+9]

6.a) A bandpass signal has a center frequency f_0 and extends from f_0 – 5kHz to f_0 + 5kHz. The signal is sampled at a rate f_s = 25kHz. As the center frequency f_0 varies from 5kHz to 50kHz, find the ranges of f_0 for which the sampling rate is adequate.

b) Compare DPCM, DM and PCM in all aspects. [7+8]

7.a) Describe coherent ASK detector and compare it with non coherent detector.

b) The bit stream 1101110010l is to be transmitted using DPSK. Determine the encoded sequence and the transmitted phase sequence. Show that the phase comparison scheme can be used for demodulating the signal. [6+9]

8.a) What are applications of eye diagrams?

b) Derive the equation for probability of error using BPSK in Base band transmission. [5+10]

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