

2056

B.E. (Electronics and Communication Engineering)
Fourth Semester
EC-401: Communication Engineering

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. I which is compulsory and selecting two questions from each Unit. Use of scientific calculator is allowed.

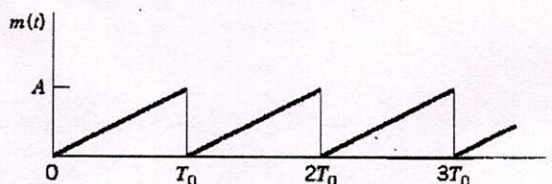
x-x-x

I. Attempt the following:-

- (a) Define image frequency rejection ratio. Give its significance.
- (b) What is the need of pre-emphasis and de-emphasis circuits in FM.
- (c) Draw the Phasor diagram of narrow band FM.
- (d) Why does a matched filter maximize output SNR only at one instant?
- (e) Can ISI occur even in absence of noise? Explain. (5x2)

UNIT - I

II. (a) Draw FM and PM wave for the following input wave.



(b) Explain the working of envelope detector. Also explain the noises present in it. (2x5)

III. (a) A DSB-modulated signal $u(t) = A_m(t) \cos(2\pi f_c t)$ is multiplied with a local carrier $x_L(t) = \cos(2\pi f_c t + \theta)$ and the output is passed through a LPF with a bandwidth equal to the bandwidth of the message $m(t)$. Denoting the power of the signal at the output of the low pass filter by P_{out} and the power of the modulated signal by P_U , plot P_{out} / P_U as a function of θ for $0 \leq \theta \leq \pi$.

(b) Why is PPM more noise immune than PAM but requires higher bandwidth? Explain mathematically. (2x5)

IV. (a) Explain FM detection using PLL method.

(b) Determine Nyquist rate for the following signals. (2x5)

$$x(t) = \frac{\sin(100\pi t) \operatorname{sinc}(200t)}{\pi t}$$

P.T.O.

(2)

UNIT - II

- V. (a) A signal having bandwidth of 3kHz is to be encoded using 8 bit PCM and DM system. If 10 cycles of signal are digitized, state how many bits will be digitized in each case if sampling frequency is 10 kHz? Also find bandwidth required in each case.
- (b) Derive expression for overall SNR in Delta modulation system. (2x5)
- VI. (a) Draw encoding waveforms (i) NRZ unipolar (ii) NRZ polar (iii) NRZ bi-polar (iv) RZ for 1011010011 data stream.
- (b) A baseband digital system uses 4-level PAM along with the raised cosine pulse. The system has frequency response of 3.2KHz. If the binary data is transmitted at 9600bps.
- Then what would be symbol rate and roll-off factor of the transmitted pulse for zero ISI. (2x5)
- VII. (a) Derive that figure of merit in FM systems is quadratic function of the deviation ratio.
- (b) Explain the matched filter in both time and frequency domains. Derive the frequency response and interpret its physical meaning. (2x5)

x-x-x