

[Total No. of Questions - 9] [Total No. of Printed Pages - 3]
(2125)

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B. Tech 4th Semester Examination
Communication Engineering (OS)
EE-4006

Time : 3 Hours

Max. Marks : 100

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt five questions in all selecting one question from each of the sections A, B, C & D. Section E is compulsory. Use of non-programmable calculators is allowed.

SECTION - A

1. (a) What is communication system? Explain with the help of diagram various components of communication system.
(b) How DSB-SC (Double-sideband suppressed carrier) is detected using coherent detection? Discuss the effect of frequency and phase error in coherent detector.
(8+12=20)
2. (a) List the analog pulse modulation techniques. How do analog pulse modulation methods differ from digital pulse modulation techniques?
(b) A modulating signal $20\cos(2\pi \cdot 18 \times 10^4 t)$, angle modulates the carrier $A\cos\omega_c t$.
 - (i) Find the modulation index and the bandwidth for Phase Modulation (PM) system.
 - (ii) Determine the change in the bandwidth and the modulation index PM, if f_m is reduced to 9kHz. Assume $K_p = 18\text{kHz/v}$.
(15+5=20)

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SECTION - B

3. With the help of block diagram explain Amplitude Modulation Receiver (AMR). How Super Heterodyne Receiver is different from Tuned Radio Frequency Receiver? (10+10=20)
4. (a) What is frequency rejection in AMR? For a broadcast super heterodyne AMR having no RF amplifier, the loaded quality factor Q of the antenna coupling circuit is 100. Now, if the intermediate frequency is 455kHz, then determine the image frequency and its rejection ratio at an incoming frequency of 1000kHz.
(b) What are the salient features of radio receiver?
15+5=(20)

SECTION - C

5. What is narrowband Frequency Modulation FM signal? Explain with a block diagram that how a narrowband FM signal is generated. Also draw the phasor for such a signal and compare it with that of AM signal. (20)
6. What is FM demodulator? Explain balance slope detector with suitable diagram. State two limitations of it. (20)

SECTION - D

7. "Pulse-Code Modulated signal carries redundant information." Justify the statement and explain in detail how Differential-Pulse Code Modulation overcomes this. (20)
8. What is quadrature phase shift keying (QPSK)? How quadrature phase shift keying signal is generated? Explain in detail. (20)

SECTION - E

9. Give short answers:

- (a) Write the advantages and disadvantages of digital communication system.
- (b) Why is a high-frequency carrier needed in communication system?
- (c) Define Carson's rule.
- (d) Define the modulation index for amplitude modulation wave in AM system?
- (e) Why there is a need of automatic gain control (AGC) in Super Heterodyne Receiver?
- (f) How binary phase shift signal (BPSK) is generated?
- (g) What is the difference between pre-emphasis and de-emphasis?
- (h) What is Nyquist rate and Nyquist interval?
- (i) Define energy signal and power signal.
- (j) Find the bandwidth of a commercial FM transmission if frequency deviation is $\Delta f = 75\text{kHz}$ and modulating frequency $f_m = 15\text{kHz}$. (10×2=20)