



ENGINEERING & MANAGEMENT EXAMINATIONS, JUNE - 2007
ANALOG COMMUNICATION
SEMESTER - 4

Time : 3 Hours]

[Full Marks : 70

Group - A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following : 10 × 1 = 10
- i) The communication medium causes the signal to be
- | | | |
|---------------|---------------------|--------------------------|
| a) amplified | b) modulated | |
| c) attenuated | d) interfered with. | <input type="checkbox"/> |
- ii) The saving in power in a DSBSC system modulated at 80% is
- | | | |
|-----------|---------|--------------------------|
| a) Nil | b) 80% | |
| c) 75-76% | d) 50%. | <input type="checkbox"/> |
- iii) A 1 MHz carrier is amplitude modulated by a symmetrical square wave of period 100 per sec. Which of the following frequencies will not be present in the modulated signal ?
- | | | |
|-------------|--------------|--------------------------|
| a) 990 kHz | b) 1010 kHz | |
| c) 1020 kHz | d) 1030 kHz. | <input type="checkbox"/> |
- iv) A superheterodyne receiver with an IF of 450 kHz is tuned to a signal of 1200 kHz. The image frequency is
- | | | |
|-------------|--------------|--------------------------|
| a) 750 kHz | b) 900 kHz | |
| c) 1650 kHz | d) 2100 kHz. | <input type="checkbox"/> |
- v) The theoretical bandwidth of FM signal is
- | | | |
|----------------------|-----------|--------------------------|
| a) infinity | b) $2f_m$ | |
| c) $2f_m(1 + \beta)$ | d) 0. | <input type="checkbox"/> |



- vi) If the SNR of the signal is increased then the channel capacity
- a) will increase
 - b) will decrease
 - c) will remain constant
 - d) cannot be determined.
-
- vii) The intermediate frequency used for a superheterodyne AM receiver is
- a) 455 kHz
 - b) 755 kHz
 - c) 545 kHz
 - d) none of these.
-
- viii) A source X which produces five symbols with probabilities $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, $\frac{1}{16}$ and $\frac{1}{16}$.
The source entropy H (X) is
- a) 1.875 b/symbols
 - b) 2.875 b/symbols
 - c) 3 b/symbols
 - d) 5.5 b/symbols.
-
- ix) If each stage had a gain of 10 dB and noise figure of 10 dB, then the overall noise figure of a two-stage cascade amplifier will be
- a) 10
 - b) 1.09
 - c) 1.0
 - d) 10.9.
-
- x) Pre - emphasis in FM systems involves
- a) compression of the modulating signal
 - b) expansion of the modulating signal
 - c) amplification of the lower frequency components of the modulating signal
 - d) amplification of the higher frequency components of the modulating signal.
-
- xi) In phase modulation the frequency deviation is
- a) independent of the modulating signal frequency
 - b) inversely proportional to the modulating signal frequency
 - c) directly proportional to the modulating signal frequency
 - d) inversely proportional to the square root of the modulating signal frequency.
-



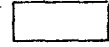
xii) An 8 kHz communication channel has an SNR of 30 dB. If the channel bandwidth is doubled, keeping the signal power constant, the SNR of the modified channel will be

a) 27 dB

b) 30 dB

c) 33 dB

d) 60 dB.



Group - B

(Short Answer Type Questions)

Answer any *three* questions.

3 × 5 = 15

2. a) Define amplitude modulation and modulation index. Use a sketch of sinusoidally modulated AM waveform to help to explain the definition. 2
- b) Derive the expression between the output power of an AM transmitter and the depth of modulation. 3
3. What is angle modulation ? Justify that frequency modulation is an angle modulation. 2 + 3
4. Derive the expression of signal to noise ratio of DSB-SC system. 5
5. a) What do you mean by FDM ? When is it used ? 3
- b) What is Carson's rule ? 2
6. The equation for an FM wave is
- $$S(t) = 10 \sin [5.7 \times 10^8 t + 5 \sin 12 \times 10^3 t]$$
- Calculate :
- a) Carrier frequency
- b) modulating frequency
- c) modulation index
- d) Frequency deviation
- e) Power dissipated in 100Ω . 5



Group - C

(Long Answer Type Questions)

Answer any *three* questions.

3 × 15 = 45

7. a) What is the concept behind NBFM ? Derive its equation. 5
b) Explain how FM can be generated using VCO. 6
c) Discuss about the roles of pre-emphasis and de-emphasis circuit in FM broadcasting. 4
8. a) Draw the block diagram for generation and detection of PCM system. 4
b) What is quantization ? Find the signal to quantization noise ratio for PCM system. 5
c) A signal is sampled at Nyquist rate of 8 kHz & is quantized using 8 bit uniform quantizer. Assuming SNR_q for a sinusoidal signal, calculate bit rate., SNR_q & BW. 6
9. a) State and prove Parseval's Power Theorem. 2 + 4
b) Describe with a block diagram the principle of operation of a square law modulator generating DSBSC. 6
c) Explain the advantages & disadvantages of modulation. 3
10. a) Draw the block diagram of a superheterodyne receiver & explain its working principle. 10
b) Explain the operation of balanced modulator. 5
11. Write short notes on any *three* of the following : 3 × 5
a) Entropy & its properties
b) QCM
c) Thermal noise
d) Power spectral density function
e) Pulse coded modulation.
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