



**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"/> |

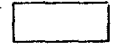
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xii) An 8 kHz communication channel has an SNR of 30 dB. If the channel bandwidth is doubled, keeping the signal power constant, the SNR of the modified channel will be

- 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

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## 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<sub>q</sub> for a sinusoidal signal, calculate bit rate., SNR<sub>q</sub> & 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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