

**M.Sc. ELECTRONICS**  
**THIRD SEMESTER**  
**ELECTRONIC COMMUNICATION SYSTEM**  
**MSE-302**

Duration: 3 Hrs.

Marks: 70

PART : A (OBJECTIVE) = 20  
PART : B (DESCRIPTIVE) = 50

**[ PART-B : Descriptive ]**

Duration: 2 Hrs. 40 Mins.

Marks: 50

**[ Answer question no. One (1) & any four (4) from the rest ]**

1. Define the term modulation index for AM. Draw the single sided frequency spectrum for a single tone amplitude modulated wave. (2+8=10)
2. (a) Prove that the balanced modulator produces an output consisting of sidebands, only with carrier removed. (5+5=10)  
(b) An audio signal describes as  $30\sin(2\pi 2500t)$ 
  - (i) sketch the audio signal
  - (ii) sketch the carrier signal
  - (iii) construct the modulated wave
  - (iv) what is the modulation factor and modulation index
  - (v) what frequencies would show up in a spectrum analysis of the modulated wave.
3. (a) What are the generating methods for SSB-SC signal? (2+8=10)  
(b) Explain the phase shift or phase discrimination method of SSB generation.
4. (a) What will be the bandwidth required for a FM signal if the modulating frequency is 1kHz and the maximum deviation is 10kHz? What is the bandwidth required for a DSB FC(AM) transmission? (4+6=10)  
(b) What is Carson's rule? Explain the PLL method for demodulation of FM signal.
5. (a) Find the Nyquist rate and the Nyquist interval for the signal (5+5=10)  
 $x(t) = 1/2 \pi \sin(2000\pi t) \sin(1000 \pi t)$   
(b) Explain the sampling theorem. What is the effect of under sampling and what should be done in order to avoid the effect?
6. (a) Explain the method for generation of PWM with monostable multivibrator. (5+5=10)  
(b) A bandlimited signal  $x(t)$  is sampled by a train of rectangular pulses of width  $\tau$  and period  $T$ .
  - (i) Find the expression for the sampled signal.
  - (ii) Determine the spectrum of the sampled signal.
7. (a) Derive the equation of voltage and current models of a noisy resistor. (6+4=10)  
(b) Define transistor signal to noise ratio and noise figure of a receiver.

8. (a) Draw the block diagram of superheterodyne receiver and explain the function of each block.
- (b) An amplifier with 10 dB noise figure and 4dB power gain is cascaded with a second amplifier which has a 10 dB noise figure and a 4dB power gain. What is the overall noise figure?

(5+5=10)

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**[ PART-A : Objective ]**

**Choose the correct answer from the following:**

**1×20=20**

1. The highest modulating frequency used in AM broadcast system is:
  - a. 10KHz
  - b. 5KHz
  - c. 15KHz
  - d. 5MHz
2. The bandwidth requirement of SSB modulation technique is:
  - a.  $2f_m$
  - b.  $f_m$
  - c.  $2f_s$
  - d.  $f_s$
3. The saving in power in DSB-SC system modulated at 80% is:
  - a. 88.3%
  - b. 80%
  - c. 50%
  - d. 76%
4. Noise voltage varies in a resistor as:
  - a.  $\sqrt{4KTBR}$
  - b.  $4KTBR$
  - c.  $2KTBR$
  - d.  $2\sqrt{KTBR}$
5. Which of the following is an analog communication system?
  - a. PCM
  - b. Differential PCM
  - c. Delta PCM
  - d. PAM
6. In PCM, the biggest advantage as compared to AM is:
  - a. Larger bandwidth.
  - b. Larger noise.
  - c. Incompatibility with TDM system.
  - d. Instability to handle analog signals.
7. In FM signal having modulating index  $m_f$  is passed through a frequency tripler. The modulating index output of tripler:
  - a.  $m_f/3$
  - b.  $m_f$
  - c.  $3m_f$
  - d.  $9m_f$
8. The modulation system which is used for video modulation in television broadcast:
  - a. DSB AM with carrier
  - b. SSB
  - c. VSB
  - d. SSB with carrier
9. The maximum frequency deviation for commercial FM broadcast is:
  - a. 50KHz
  - b. 15KHz
  - c. 25KHz
  - d. 75KHz
10. A product modulator yields:
  - a. A full AM signal
  - b. A DSB SC signal
  - c. A VSB signal
  - d. An SSB signal
11. An FM signal can be detected by using:
  - a. An LPF
  - b. A PLL
  - c. A discriminator
  - d. An average detector
12. The most suitable method for detecting a modulated signal  $(2.5+5 \cos w_m t) \cos w_c t$  is:
  - a. Envelope detector
  - b. Synchronous detector
  - c. Radio detector
  - d. Both a and b
13. Following is not advantage of FM over AM is:
  - a. Noise immunity
  - b. Fidelity
  - c. Capture effect
  - d. Sputtering effect
14. A narrowband FM does not have the following feature:
  - a. It has two sidebands.
  - b. Both sidebands are equal in amplitude.
  - c. Both sidebands have same phase difference with respect to carrier.
  - d. It does not show amplitude variations.



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15. Johnson noise is:
- Always black.
  - Never white.
  - White for all practical purpose.
  - Depends on temperature.

16. Thermal noise is independent of:
- Bandwidth
  - Temperature
  - Centre frequency
  - Boltzmann's constant

17. Which of the following is digital?
- AM
  - FM
  - PPM
  - PAM

18. Pre- emphasis is basically what type of filter?
- High pass filter
  - Low pass filter
  - Band pass filter
  - Band reject filter

19. The carrier swing of FM signal is:
- $2 \Delta w_m$
  - $\Delta w_m$
  - $2 w_m$
  - $2 \Delta w$

20. The depth of modulation of AM wave is:
- $V_{max} + V_{min} / V_{max} - V_{min}$
  - $V_{max} - V_{min} / V_{max} + V_{min}$
  - $V_{max} / V_{min}$
  - $V_{max} / V_{min}$

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Course : .....

Semester : ..... Roll No : .....

Enrollment No : ..... Course code : .....

Course Title : .....

Session : ..... 2017-18 ..... Date : .....

**Instructions / Guidelines**

- The paper contains twenty (20) / ten (10) questions.
- Students shall tick (✓) the correct answer.
- No marks shall be given for overwrite / erasing.
- Students have to submit the Objective Part (Part-A) to the invigilator just after completion of the allotted time from the starting of examination.

Full Marks	Marks Obtained
20	

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Scrutinizer's Signature

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Examiner's Signature

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Invigilator's Signature