# BRAINWARE UNIVERSITY

## Term End Examination 2018 - 19

**Programme – B.Tech. in Computer Science & Engineering**

**Course Name – Electronic Communication Concepts**

**Course Code – EC301**

(Semester – 3)

**Time allotted: 3 Hours** **Full Marks: 70**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

## Group –A

(Multiple Choice Type Question) 10 x 1 = 10

1. *Choose the correct alternative from the following*

(i) In a communications system, noise is most likely to affect the signal
   a. at the transmitter
   b. in the channel
   c. in the information source
   d. at the destination

(ii) What is the ratio of modulating power to total power at 100 percent modulation?
   a. 1:3
   b. 1:2
   c. 2:3
   d. none of these

(iii) Which of the following modulated signals can be detected by an envelop detector?
   a. DSB-SC
   b. DSB-FC
   c. FM
   d. SSB-SC

(iv) A carrier is simultaneously modulated by two sine waves with modulation indices of 0.3 and 0.4; the total modulation index
   a. is 1
   b. cannot be calculated unless the phase relations are known
   c. is 0.5
   d. is 0.7

(v) One of the drawbacks of FM signal is

a. high noise
b. limited range
c. low signal strength
d. none of these

(vi) In generation of modulated signal, a varactor diode can be used for

a. FM generation only
b. AM generation only
c. PM generation only
d. both AM and PM generation

(vii) FM signal can be converted into AM signal using

a. frequency discriminator
b. square law detector
c. slope detector
d. none of these

(viii) Thermal noise power is proportional to

a. B
b. $\sqrt{B}$
c. $\frac{1}{B^2}$
d. $B^2$

(ix) The biggest disadvantage of PCM is

a. its inability to handle analog signals
b. the high error rate which its quantizing noise introduces
c. its incompatibility with TDM
d. the large bandwidths that are required for it

(x) Number of sidebands in FM signal

a. 2
b. 1
c. 0
d. none of these

## Group – B

(Short Answer Type Questions) 3 x 5 = 15

Answer any *three* from the following

2. The equation of a frequency modulated voltage is E = 10 sin ($10^8$ t + 3 sin $10^4$ t) volts. Determine (i) r. m. s. value of modulated voltage (ii) carrier frequency (iii) modulating frequency (iv) modulation index and (v) frequency deviation. 5

3. Draw the block diagram of electronic communication system and explain the function of each block. 5

4. Differentiate between PAM, PWM and PPM signals. 5

5. State Sampling theorem. Explain alising effect and how it is reduced? 5

6. Distinguish between analog communication and digital communication systems. 5

## Group – C

(Long Answer Type Questions) 3 x 15 = 45

Answer any *three* from the following

7. (a) Explain amplitude modulation, derive the expression for modulated wave of a single tone DSBFC and also obtain the frequency spectrum. 1+5

   (b) Compare and contrast DSB-SC system and SSB-SC system. 4

   (c) A certain transmitter radiates 10 KW with unmodulated carrier and 12 KW when the carrier is sinusoidally modulated. Calculate the modulation index. If another sine wave corresponding to 50% modulation is transmitted simultaneously, determine the total radiated power. 5

8. (a) Draw the circuit diagram of balanced slope detector and explain its operation. 5

   (b) In FM system, the modulating frequency $f_m$ is 1 KHz, the modulating voltage is 2 Volts and the maximum deviation is 6 KHz. If the modulating voltage is raised to 4 volts that what is the new maximum deviation? If the modulating voltage is further increased to 8 volts and modulating frequency is reduced to 500 Hz, what will be maximum deviation? 5

   (c) Compare and contrast FM and PM system. 5

9. Write short notes on any three of the following 3×5=15

   (a) Envelope detector
   (b) Thermal noise
   (c) Flicker noise
   (d) Shot noise
   (e) VSB modulation

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|---|---|---|---|
| 10. | (a) | With the help of block diagrams explain the transmitter and receiver of pulse code modulation. | 6 |
| | (b) | Derive the relations for signalling rate and transmission bandwidth in PCM system. | 5 |
| | (c) | Compare and contrast uniform and non-uniform quantization. | 4 |
| 11. | (a) | With necessary block diagram explain generation and detection of BASK signal. | 8 |
| | (b) | Define QPSK signal and explain the generation of this signal. | 3+4 |

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