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**B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2017**

Computer Science and Engineering

Common to : Biomedical Engineering/Information Technology

**Time : Three Hours**

**Maximum : 100 Marks**

**Answer ALL questions**

**PART - A**

**(10×2=20 Marks)**

1. An amplifier operating over the frequency range of 455 to 460 KHz has a  $200\text{ k}\Omega$  input resistor. What is the RMS noise voltage at the input to this amplifier if the ambient temperature is  $17^\circ\text{C}$  ?
2. Find the modulating frequency and maximum deviation of the PM wave represented by  $v(t) = 12 \sin (6 + 10^8 t + 5 \cos 1250 t)$ .
3. Draw the FSK signal for the binary message 1011001.
4. Define bandwidth efficiency.
5. List out the standards organization for data communication.
6. Define coding efficiency of a PCM system.
7. Calculate the entropy of four possible messages  $\{Q_1, Q_2, Q_3, Q_4\}$  which is transmitted with probabilities  $\{1/8, 3/8, 3/8, 1/8\}$ .
8. What is the principle advantage of sequential decoding of convolution code ?
9. Differentiate GSM over CDMA.
10. What is Bluetooth technology ? And mention its application.



## PART – B

(5×13=65 Marks)

11. a) i) Derive the expression for the instantaneous voltage of AM wave. (7)
- ii) For an AM DSBFC transmitter with an unmodulated carrier power  $P_c = 100W$  that is modulated simultaneously by three modulating signals with coefficients of modulation  $m_1 = 0.2$ ,  $m_2 = 0.4$  and  $m_3 = 0.5$ , determine :
- 1) Total coefficient of modulation
  - 2) Upper and lower sideband power
  - 3) Total transmitted power. (6)
- (OR)
- b) i) Draw the block diagram of Armstrong indirect FM transmitter and describe its operation. (9)
- ii) Discuss the advantages and disadvantages of angle modulation. (4)
12. a) i) A BPSK modulator with a carrier frequency of 70 MHz and an input bit rate of 10 Mbps, determine the following :
- 1) maximum and minimum upper and lower side frequencies
  - 2) minimum Nyquist bandwidth and
  - 3) Baud rate. (6)
- ii) With a block diagram explain the working of coherent binary FSK transmitter and receiver. (7)
- (OR)
- b) i) Determine the baud, minimum bandwidth and bandwidth efficiency for an 8-PSK system operating with an information bit rate of 24 kbps. (6)
- ii) Draw the block diagram of 8-QAM transmitter and explain its working. (7)
13. a) i) Describe the following data communications codes : Baudot, ASCII and EBCDIC. (6)
- ii) Explain the generation of PCM signal with a block diagram. (7)
- (OR)
- b) i) Explain the working of a two station data communication circuit with a block diagram. (7)
- ii) Describe the generation and demodulation of PPM signal with necessary waveforms. (6)



14. a) Five source messages are probable to appear as  $m_1 = 0.4$ ,  $m_2 = 0.15$ ,  $m_3 = 0.15$ ,  $m_4 = 0.15$ , and  $m_5 = 0.15$ . Determine the coding efficiency for
- 1) Shannon-Fano coding
  - 2) Huffman coding (13)
- (OR)
- b) i) Derive the expression for mutual information and channel capacity. (7)
- ii) What are the types of error control coding ? Describe the working of viterbi decoding algorithm. (6)
15. a) i) Briefly describe the advanced mobile telephone system. (6)
- ii) Discuss in detail about the architecture of GSM with necessary diagram. (7)
- (OR)
- b) i) Describe the concept of frequency reuse, channel assignment and hand-off in a cellular system. (7)
- ii) Briefly discuss about the different multiple access schemes. (6)

## PART – C

(1×15=15 Marks)

16. a) i) The first stage of a two-stage amplifier has a voltage gain of 10, a  $600\Omega$  input resistor, a  $1600\Omega$  equivalent noise resistance and a  $27k\Omega$  output resistor. For the second stage, these values are  $25,81k\Omega$ ,  $10k\Omega$  and  $1M\Omega$  respectively. Calculate the equivalent input noise resistance of this two stage amplifier. (5)
- ii) Write short notes on :
- 1) Data communications hardware
  - 2) Serial and parallel interface. (10)
- (OR)
- b) i) Draw the block diagram of CDMA encoder and decoder and briefly explain its working. (8)
- ii) Briefly discuss the generation of convolution code with an example. (7)