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Question Paper Code : 80290

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B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

Third Semester

Computer Science and Engineering

CS 6304 – ANALOG AND DIGITAL COMMUNICATION

(Common to Information Technology and Fourth Semester Biomedical Engineering)

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. List the sources of external and internal noise.
2. Differentiate frequency and phase modulation.
3. Define minimum shift keying.
4. For a 8 PSK system operating with an information bit rate of 24 kbps. Determine bandwidth efficiency.
5. Name the standard organizations for data communications.
6. Define pulse time modulation.
7. Find the entropy of the source alphabet {s0,s1 ,s2} with respective probabilities { 1/4, 1/4,1/2}.
8. When a binary code is said to be cyclic code?
9. What are the steps involved in Handoff process?
10. Mention the three most commonly used multiple accessing schemes.

PART B — (5 × 13 = 65 marks)

11. (a) (i) A receiver connected to an antenna resistance is 50Ω has an equivalent noise resistance of 30Ω. Calculate the receiver's noise figure in decibels and its equivalent noise temperature. (7)

(ii) A 1000 KHz carrier is simultaneously modulated with 300 Hz, 800 Hz and 2 KHz audio sine waves. Find the frequencies present in the output. (6)

Or

(b) (i) Derive the expression for the instantaneous voltage of SSB wave. (7)

(ii) A 25 MHz carrier is modulated by a 400 Hz audio sine wave. If the carrier voltage is 4V and the maximum frequency deviation is 10 KHz and phase deviation is 25 radians. Write the equation of this modulated wave for (1) FM (2) PM. If the modulating frequency is now changed to 2 KHz, all else remaining constant. Write a new equation for FM and PM. (6)

12. (a) Describe the generation and detection of binary FSK signal with necessary diagram and equation. (13)

Or

(b) (i) If a digital message input data rate is 8 Kbps and average energy per bit is 0.01 unit. Find the bandwidth required for transmission of the message through BPSK, QPSK, BFSK, MSK and 16PSK. (8)

(ii) Compare the various digital modulation schemes. (5)

13. (a) (i) Explain the working of two station data communication circuit with a block diagram. (7)

(ii) Discuss the various data communication codes and its significance. (6)

Or

(b) (i) Describe the two methods of error correction in data communication. (6)

(ii) Explain the generation of PCM signal with a block diagram. (7)

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 $m_5 = 0.15$. Find coding efficiency for (i) Shannon-Fano coding (ii) Huffman coding. (13)

Or

(b) Explain the concept of code generation and decoding of correlation code. (13)

15. (a) (i) Describe the working of global system for mobile communication. (6)

(ii) Briefly explain the concept of frequency reuse and channel assignment in CDMA. (7)

Or

(b) (i) Explain the principle of working of satellite communication with a block diagram. (8)

(ii) Briefly explain about the Bluetooth technology. (5)

PART C – (1 × 15 = 15 marks)

16. (a) The generator polynomial of a (15, 11) Hamming code is given by $g(x) = 1 + x + x^2$. Design encoder and syndrome calculator for this code using systematic form. (15)

Or

(b) (i) A data bit sequence consists of the following string of bits 10 11 10 10. Analyze and draw the nature of waveform transmitted by BPSK transmitter. (8)

(ii) A 400 W carrier is amplitude modulated to a depth of 100%. Calculate the total power in case of the AM and DSBSC techniques. How much power saving in watts is achieved for DSBSC? If the depth of modulation is changed to 75%, then how much power in W is required for transmitting the DSBSC wave? Compare the power required for DSBSC in both cases and comment on the reason for change in the power levels. (7)

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