

**B.Tech Odd Semester (CBCS) Exam.,
December—2016**

INFORMATION TECHNOLOGY

(5th Semester)

Course No. : IT-502

(Data Communication)

Full Marks : 75

Pass Marks : 30

Time : 3 hours

- Note :*
1. Attempt **five** questions, taking **one** from each Unit.
 2. Begin each answer in a new page.
 3. Answer parts of a question at a place.
 4. Assume reasonable data wherever required.
 5. The figures in the margin indicate full marks for the questions.

UNIT—I

1. (a) Deduce the expression for the power content in an AM wave. 7
- (b) A modulating signal $10\sin(2 \times 10^3 t)$ is used to modulate carrier signal $30\sin(2 \times 10^5 t)$. Determine the depth of modulation, percentage modulation, frequencies of side bands with their amplitudes. Also, calculate the bandwidth of the modulated signal. 8

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(Turn Over)

2. (a) How is modulation index defined in frequency modulation? Show the relation between FM and PM. Also, show how FM can be derived using PM and vice versa. 1+3+3=7
- (b) A 107.6 MHz carrier signal is frequency modulated with a 7kHz sine wave. The resultant FM signal has a frequency deviation of 50 kHz. Determine the following : 3+3+2=8
 - (i) The carrier swing of the FM signal
 - (ii) Highest and lowest frequencies attained by the modulated signal
 - (iii) Modulation index of the FM wave

UNIT—II

3. (a) Explain in detail about regenerative repeaters. 6
- (b) The binary data 101100110101 is transmitted over a baseband channel. Encode the data stream into RZ, NRZ, AMI, Manchester and differential Manchester codes. 9
4. (a) Define HDB signalling and B8ZS line code. Encode the following data stream in HDB3 and B8ZS 3+4=7
1011000011000 000000011

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(Continued)

(3)

- (b) With a schematic diagram, explain the principle of digital multiplexing. How are digital multiplexers classified? 5+3=8

UNIT—III

5. (a) With a schematic diagram, explain circuit switching. How is circuit switching different from packet switching? 4+3=7
- (b) Write short notes on HDTV and video compression. 4+4=8
6. What is synchronous optical network (SONET)? Explain the architecture and working principle of SONET. Mention two applications of it. 3+(5+5)+2=15

UNIT—IV

7. (a) Define noise figure. With the circuit diagram, explain the steps to calculate noise figure. Determine the noise figure in decibels for a receiver connected to an antenna with resistance 50 . The equivalent noise resistance of this receiver is 30 . 1+5+2=8
- (b) Derive the mathematical expression for binary phase-shift keying (BPSK). 7

(4)

8. Explain in detail the concept of differential phase-shift keying (DPSK). Compare BPSK with DPSK. 10+5=15

UNIT—V

9. Explain in detail the concept of spread spectrum. Also discuss its performance in data communication. 10+5=15
10. Write short notes on the following : 5×3=15
- (a) CDMA
- (b) TDMA
- (c) FDMA

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