

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)**

**CLASS: BE
BRANCH: ECE**

**SEMESTER: V
SESSION : MO/2019**

SUBJECT : EC5205 DATA COMMUNICATION

TIME: 1.5 HOURS

FULL MARKS: 25

INSTRUCTIONS:

1. The total marks of the questions are 30.
 2. Candidates may attempt for all 30 marks.
 3. In those cases where the marks obtained exceed 25 marks, the excess will be ignored.
 4. Before attempting the question paper, be sure that you have got the correct question paper.
 5. The missing data, if any, may be assumed suitably.
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- Q1 (a) What is crosstalk? How can it be minimized in a twisted pair cable? [2]
(b) Differentiate between attenuation and attenuation distortion. [3]
For a channel with an intended capacity of 20 Mbps, the bandwidth of the channel is 3 MHz. Assuming only White thermal noise, what Signal-to-Noise ratio (in dB) is required to achieve this capacity?
- Q2 (a) Why is it necessary to provide the error and flow control at the Transport layer also while it is already being provided at the Data link layer? [2]
(b) Differentiate between primitives and Protocol Data Units (PDUs). Draw the time sequence diagram for service primitives in case of confirmed and non-confirmed services. [3]
- Q3 (a) What do you understand by self-clocking differential code? Give an example of such a coding scheme. [2]
(b) What is Companding? Where is it employed? How the variable step size is achieved by Companding using ROM? [3]
- Q4 (a) What SNR ratio is required to achieve a bandwidth efficiency of 1.0 for PSK? Assume that the E_b/N_0 for a required bit error rate of 10^{-7} is 11.2 dB. Calculate the SNR for QPSK also. [2]
(b) Differentiate between Pulse Code Modulation (PCM) and Differential Pulse Code Modulation (DPCM). A video signal for a colour television is band-limited to 4.6 MHz. Find out the bandwidth requirement for the following two schemes [3]
i) PCM (10-bit codes), ii) Delta Modulation
- Q5 (a) A data word of 3-bits is encoded into 7-bits codeword. The original data rate without adding redundant bits is 9000 bps. Find out the following: [2]
i) Rate of redundancy, ii) Code rate, iii) Data rate requirement after addition of redundant bits.
(b) For a message $M= 1011000110110100101$, compute the frame to be transmitted if the Generator polynomial $P(x)$ is given as $x^5 + x^4 + x^3 + X + 1$. [3]
- Q6 (a) In a modem protocol, which are the conditions to be satisfied before the modem asserts \overline{CTS} low? [2]
(b) During transmission, the ASCII code of 'R' (52H) has changed to ASCII code of 'Z' (5AH). [3]
Show how the error can be detected and corrected using Hamming code correction.

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