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**F Reg. No. :**

**Question Paper Code: 51P23**

M.E. DEGREE EXAMINATION, NOV 2017

First Semester

Communication Systems

15PCM103-MODULATION AND CODING TECHNIQUES

(Regulation 2015)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART - A (5 x 3= 15 Marks)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. | Draw the state and trellis diagram for miller code. CO1-U | | | |
| 2. | Compare linear equalization and decision feedback equalization. CO2- Ana | | | |
| 3. | Find the channel capacity of the BSC. CO3-App | | | |
| 4. | Distinguish TCM from conventional coding. CO4-Ana | | | |
| 5. | State the principle of turbo coding. CO5-U | | | |
|  | PART –B (5 x 14= 70Marks) | | | |
|  |  |  |  |  |
| 6. | (a) | Derive the power spectral density of Linearly modulated signals. | CO1- App | (14) |
|  |  | Or |  |  |
|  | (b) | Sketch the phase-tree, the state trellis, and the state diagram for binary CPFSK and quaternary CPFSK. | CO1- U | (14) |
|  |  |  |  |  |
| 7. | (a) | Derive the minimum mean squared error for zero forcing decision feedback equalizer (DFE-ZF) | CO2- App | (14) |
|  |  | Or |  |  |
|  | (b) | Derive the weight vector update equation of the LMS algorithm for Linear equalizer. | CO2- App | (14) |
|  |  |  |  |  |
| 8. | (a) | Write short notes on Sphere packing and random coding bound. | CO3- U | (14) |
|  |  | Or |  |  |
|  | (b) | Write short notes on different channel models. | CO3- U | (14) |
|  |  |  |  |  |
| 9. | (a) | Derive the eight state Trellis code for 8-PSK modulation. | CO4 -App | (14) |
|  |  | Or |  |  |
|  | (b) | Illustrate set partitioning of Four –state Trellis-coded modulation with 8-PSK signal constellation | CO4- App | (14) |
|  |  |  |  |  |
| 10. | (a) | Compare turbo coding performance over Rayleigh channels & Gaussian channels. | CO5- Ana | (14) |
|  |  | Or |  |  |
|  | (b) | Discuss Low density parity check (LDPC) code with suitable example. | CO5- Ana | (14) |
|  |  |  |  |  |
|  |  | PART - C (1 x 15 = 15 Marks) |  |  |
| 11. | (a) | Explain the RLS algorithm with the exponentially weighted factor. | CO2- U | (15) |
|  |  | Or |  |  |
|  | (b) | Evaluate using mathematical description of the Soft output  Viterbi algorithm (SOVA) along with its implementation. | CO5- E | (15) |