

Reg. No. :

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**Question Paper Code: U1205**

M.E. DEGREE EXAMINATION, DEC 2025

First Semester

Communication Engineering

21PCM105 – ADAPTIVE DIGITAL COMMUNICATION

(Regulations 2021)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART - A (5 x 20 = 100 Marks)

1. (a) Explain the principle of IQ modulation and demodulation and Summarize the characteristics of ricin channels. **CO1-U** (20)  
Or  
(b) Discuss the BER performance of DPSK, M-PSK and M-DPSK in detail with suitable example. **CO1-U** (20)
2. (a) Compute the transfer function and impulse response of duo binary systems which is used to control the ISI with appropriate diagram. **CO2-App** (20)  
Or  
(b) Determine the frequency-domain transfer function of the MMSE equalizer, explain how the equalizer balances the trade-off between ISI mitigation and noise amplification. **CO2-App** (20)
3. (a) The polynomial of a 2 ary PN sequence generator  $f(x) = x^3+x+1$ . Draw the PN sequence generator and Calculate the set of PN sequences. A generator polynomial for (7,4) cyclic code is given by  $g(p)=p^3+p+1$ . Obtain the systematic code for message 1011. **CO2-App** (20)  
Or  
(b) Use Shannon's Channel Coding Theorem to calculate the channel capacity in bits per second for this system. Explain the steps involved in this calculation and interpret the result in terms of the maximum achievable data rate for reliable communication. **CO2-App** (20)

4. (a) A convolutional code is described by the following generator sequence  $g_1 = (1, 0, 0)$ ,  $g_2 = (1, 1, 0)$  and  $g_3 = (1, 1, 1)$ . **CO2-App** (20)
- Draw the encoder diagram for this code.
  - Draw the state and trellis diagram for this code.
  - Find the code word corresponding to the message sequence (1010101)

Or

- (b) Give the procedure to draw trellis diagram and computation of received code vector using Viterbi diagram using a suitable encoder structure. Derive an expression of probability of error of convolutional coder. **CO2-App** (20)

5. (a) Explain in detail of any two methods to reduce peak-to-average power ratio in multicarrier OFDM system. **CO1-U** (20)

Or

- (b) (i) Explain about the parameters required for OFDM system design **CO1-U** (20)  
(ii) Draw the block diagram of OFDM transmitter and receiver. Explain them in detail.