Name:.....
Roll No:.....

MAR ATHANASIUS COLLEGE OF ENGINEERING
KOTHAMANGALAM – 686666
(Govt. Aided Autonomous Institution)
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

B. TECH SECOND SERIES EXAMINATION, OCTOBER 2026

(S5 ECE A & B) B24EC3T03 ANALOG AND DIGITAL COMMUNICATION

Max. Marks: 40 Duration: 1.5 Hours

PART A
Answer all questions. Each question carries 3 marks.

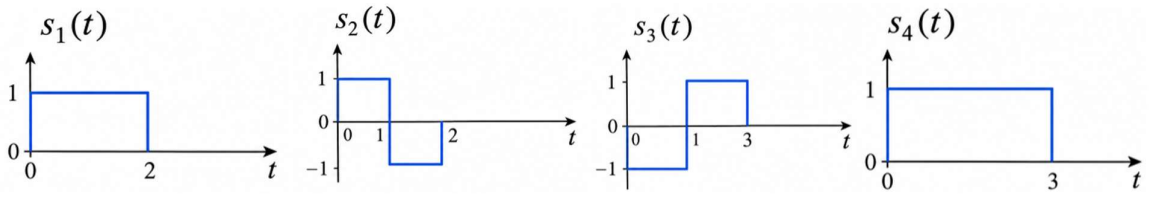
1. State the sampling theorem for a band-limited signal and define Nyquist rate. (CO3)
2. A sensor output varies from -5V to $+5\text{V}$ and is digitized using a 6-bit uniform quantizer. Determine the quantization step size and maximum quantization error. (CO3)
3. Given a set of basis functions, how would you determine whether the functions form an orthonormal set? (CO4)
4. Given a communication system, explain how signal space can be used to represent different signals. Also explain how its corresponding signal vector is obtained. (CO4)

PART B
Answer all questions. Each question carries 14 marks.

5. a. Derive the expression for the signal-to-quantization noise ratio (SQNR) of a uniform quantizer with L quantization levels. (CO3)

   b. Illustrate the operation of a DPCM transmission system using a suitable block diagram and show how prediction reduces the bit rate compared with conventional PCM. (CO3)

6. Given the signals $s_1(t), s_2(t), s_3(t)$and $s_4(t)$, design and express these signals in terms of orthonormal basis functions. (CO4)



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Nurture technically competent professionals in Electronics and Communication Engineering equipped with the skills to address global challenges.

Foster socially responsible technocrats and entrepreneurs who contribute positively to society through their expertise and leadership.