

**THE KAVERY ENGINEERING COLLEGE***(An Autonomous Institution)***UG/PG DEGREE END SEMESTER THEORY EXAMINATIONS, APRIL-MAY 2026****Fourth Semester****Electronics & Communication Engineering****EC3491 - COMMUNICATION SYSTEMS****Regulations - 2021****Duration : 3 Hrs****Maximum : 100 Marks****PART – A(ANSWER ALL QUESTIONS) (Marks 10\*2=20)**

| Q.No | Questions                                                                                                                            | BLT | CO | Marks |
|------|--------------------------------------------------------------------------------------------------------------------------------------|-----|----|-------|
| 1.   | Calculate the bandwidth of the modulated signal given by $S(t)=45[1+0.6\cos(250t)] \cos(4800\pi t)$ .                                | K2  | 1  | 2     |
| 2.   | Predict the value of modulation index for FM signal having a carrier swing of 100 KHz when the modulating signal frequency is 8 KHz. | K2  | 1  | 2     |
| 3.   | Recall the significance of sampling theorem.                                                                                         | K1  | 2  | 2     |
| 4.   | For a PAM transmission of voice signal with $W=3$ kHz, Calculate $B_T$ if $f_s=8$ kHz and $\tau=0.1 T_s$ .                           | K2  | 2  | 2     |
| 5.   | Differentiate PCM and DPCM.                                                                                                          | K2  | 3  | 2     |
| 6.   | Comment on the error correction and error detection abilities of a block codes using Hamming distance.                               | K2  | 3  | 2     |
| 7.   | Outline the waveform for the binary data sequence 101100 modulated under a) FSK b) PSK.                                              | K2  | 4  | 2     |
| 8.   | Sketch the constellation diagram of 16-QAM.                                                                                          | K2  | 4  | 2     |
| 9.   | Mention the nyquist criterion for zero ISI. Plot the impulse response of an ideal nyquist channel.                                   | K2  | 5  | 2     |
| 10.  | Draw the structure of correlation receiver.                                                                                          | K1  | 5  | 2     |

**PART – B (ANSWER ALL QUESTIONS) (Marks 5\*16 = 80)**

| Q.No | Questions                                                                                                                                                                                    | BLT | CO | Marks |
|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----|-------|
| 11.  | a Compare the bandwidth, power requirement, advantages and disadvantages of DSB-FC, DSB-SC, SSB and VSB systems and examine the reasons for their evolution.                                 | K4  | 1  | 16    |
|      | Or                                                                                                                                                                                           |     |    |       |
|      | b Examine the working of super heterodyne receiver with a neat block diagram and compare it with Tuned radio frequency receiver.                                                             | K4  | 1  | 16    |
| 12.  | a Develop an expression for the noise in AM system, with the assumption that AWGN noise is added in the channel. Compare its performance with FM system.                                     | K4  | 2  | 16    |
|      | Or                                                                                                                                                                                           |     |    |       |
|      | b Interpret the distribution of quantization errors in uniform quantizers and derive the relationship between the number of bits used in the encoder and signal to quantization noise ratio. | K4  | 2  | 16    |
| 13.  | a i Explain with neat block diagram of Delta Modulation transmitter and receiver system and derive its expression of quantization noise.                                                     | K2  | 3  | 12    |
|      | ii Show how noise can affect a PCM system and how it can be reduced.                                                                                                                         | K2  | 3  | 4     |

**Or**

|     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |    |   |    |
|-----|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|---|----|
| 14. | b   | A rate 1/3 convolution encoder has generating vectors as $g_1 = (100)$ , $g_2 = (111)$ and $g_3 = (101)$ .<br>a. Sketch the encoder configuration.<br>b. Draw the code tree, state diagram and Trellis diagram.<br>c. If the input message sequence is 10110, determine the output of the encoder.<br>d. Draw the Trellis diagram and extract the transmitted message bits using Viterbi algorithm for the received sequence.<br>$r = \{101, 110, 101, 010, 101, 110, 011\}$ | K2 | 3 | 16 |
|     | a   | Discuss the operation of QPSK with signal space diagram and also describe how it produces the original sequence with the power spectral density and minimum bit error rate.<br><b>Or</b>                                                                                                                                                                                                                                                                                     | K3 | 4 | 16 |
|     | b i | Construct and explain the transmitter & receiver structure of a non-coherent Phase Shift Keying and sketch the signal space diagram.                                                                                                                                                                                                                                                                                                                                         | K3 | 4 | 10 |
|     | ii  | Discuss about the carrier Synchronization in detail.                                                                                                                                                                                                                                                                                                                                                                                                                         | K3 | 4 | 6  |
|     | a   | Draw the structure of the matched filter and obtain the expression for the signal to noise ratio at the output of the matched filter along with relevant properties.<br><b>Or</b>                                                                                                                                                                                                                                                                                            | K4 | 5 | 16 |
| 15. | b   | Discuss the probability of error for the digital modulation techniques with suitable expressions.                                                                                                                                                                                                                                                                                                                                                                            | K4 | 5 | 16 |

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