Code No: 154AC **R18**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech II Year II Semester Examinations, April/May - 2023
ANALOG AND DIGITAL COMMUNICATIONS
(Common to ECE, ECM)

Time: 3 Hours **Max. Marks: 75**

Note: i) Question paper consists of Part A, Part B.
ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.
iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A

(25 Marks)

1.a) Define analog Modulation and list different types of analog modulations. [2]
b) A Radio transmitter radiates 10 KW and carrier power is 8.5 KW. Calculate modulation index. [3]
c) Define Carrier swing and Frequency deviation. [2]
d) Compare narrow band and wide band FM. [3]
e) What is the threshold effect? [2]
f) Explain the image frequency rejection of a radio receiver. [3]
g) What is the bandwidth requirement of a PCM system? [2]
h) Distinguish between PAM and PWM. [3]
i) Describe the condition of orthogonality of two BFSK systems. [2]
j) Compare the average power requirement of QPSK and BPSK. [3]

PART – B

(50 Marks)

2. How AM is generated using square law modulator? Derive relevant expressions. [10]

OR

3. With necessary circuit diagram and waveforms, explain how DSB-SC wave is generated using:
a) Balance Modulator
b) Ring Modulator. [5+5]

4.a) Discuss the generation of FM wave using direct method.
b) Discuss the detection of FM wave using zero crossing detector. [5+5]

OR

5.a) An FM wave with modulation index $\beta = 1$ is transmitted through an ideal band pass filter with mid band frequency fc and bandwidth is 5fm, where fc is the carrier frequency and fm is the frequency of the sinusoidal modulating wave. Determine the amplitude spectrum of the filter output.
b) Explain the concept of pre emphasis and de-emphasis. [5+5]

6. Draw the block diagram of AM transmitter using low level modulation. Explain the significance of each block. [10]

OR

7.a) Discuss about frequency stability in FM Transmitter.

b) List out the advantages and disadvantages of TRF receiver. [5+5]

8.a) Explain quantization error and derive an expression for maximum SNR in a PCM system that uses linear quantization.

b) What is slope overload distortion and granular noise in Delta Modulation? How it is removed in ADM? [5+5]

OR

9.a) A voice frequency signal band limited to 3 MHz is transmitted with the use of the DM system. The pulse repetition frequency is 30,000 pulses per second, and the step size is 40mV. Determine the maximum possible speech signal amplitude to avoid a slope overload.

b) Compare all pulse modulation systems. [6+4]

10.a) Explain the process of generating ASK signals.

b) Describe the process of detecting Coherent BPSK signals. [5+5]

OR

11.a) Explain how ISI occurs in base-band binary data transmission system.

b) Find the Probability of error of Integrate and Dump circuit. [5+5]

---ooOoo---