

**B.E. INSTRUMENTATION AND ELECTRONICS
ENGINEERING FOURTH YEAR FIRST SEMESTER
EXAMINATION - 2025**

TELEMETRY AND REMOTE CONTROL

Time : Three hours

Full Marks : 100

CO1: TELEMETERING SIGNALS AND THEIR TRANSFORMS.

Answer any one of the following.

1. (a) Find out the Fourier Transform of a Unit step function. 8
(b) State and prove the Convolution Theorems. 8
© Distinguish between Binomial, Poisson and Gaussian distributions. 4
2. (a) Discuss the importance of uniform sampling theorem in connection with modern telemetering systems. 3
(b) State and prove the uniform sampling theorem. 10
(c) A bandlimited signal $g(t)$ is sampled at the Nyquist rate. Describe a method for the reconstruction of the original signal from its samples. 7

CO2: CODES AND CODING.

Answer any one of the following.

3. (a) Write down the properties of a line code used in communication systems ? 4
(b) With the help of pulse diagrams, explain different types of line codes. 12
(c) Describe, in tabular form, their relative advantage and disadvantages. 4
4. (a) How can you generate pulse amplitude modulated (PAM) signals using an emitter follower circuit ?
Comment on the demodulation of such a signal using a diode envelope detector circuit. 10
(b) With the help of waveform diagrams, explain the generation of pulse time modulated (PTM) signals by direct and indirect methods. 10

CO3: TDM AND FDM SYSTEMS, MODEMS, WIRELESS WAVE PROPAGATION.

Answer any two of the following.

5. (a) Draw the block diagram of a TDM-PAM receiver and explain briefly the function and necessity of each unit. 8
- (b) For a TDM-PAM receiver, explain,
 - i) the clock recovery process,
 - and ii) the channel synchronization techniques. 12
6. (a) What is meant by the pulse code modulation (PCM) ? Discuss the advantages and disadvantages of such a modulation over other modulation techniques. 5
- (b) Draw the simple block diagrams for the transmission and reception of a Pulse Code Modulated (PCM) signal and explain their functions. 5
- (c) What are meant by the Eye Patterns and Companding in connection with PCM systems? 4+6
7. (a) How can you generate ASK, FSK and PSK signals using,
 - i) sinusoidal carriers,
 - ii) rectangular carriers ? 10
- (b) What is a costa loop ? With the help of block diagram and necessary derivations, explain the demodulation of a BPSK signal using a costa loop. 10

CO4: SATELITE AND OPTICAL TELEMETRY

Answer any one of the following.

8. (a) Write down the advantages and disadvantages of using geostationary satellites for telemetering purpose. 4
- (b) What are the most popular frequency bands used in satellite telemetry? Write down the advantages and disadvantages of using such frequency bands. 6
- (c) Explain the function of a satellite transponder. 5
- (d) Write down the methods used for multiple access in satellite telemetry. 5
9. (a) How the propagation of light is supported in a fibre optical cable ? Explain with diagrams. 5
- (b) With the help of block diagram, describe the basic scheme of a coherent optical fibre Communication system. 10
- (c) What is meant by Wavelength Division Multiplexing ? 5