Ref. No. : Ex/IEE/PC/H/T/411/2024

B.E. INSTRUMENTATION AND ELECTRONICS ENGINEERING FOURTH YEAR FIRST SEMESTER EXAMINATION - 2024

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. 10
   (b) State and prove the Frequency Translation Theorem in connection with the Fourier Transform. 10

2. (a) State and prove the uniform sampling theorem. 12
   (b) A bandlimited signal f(t) is sampled at the Nyquist rate. Describe a method for the reconstruction of the original signal from its samples. 8

CO2: CODES AND CODING.

Answer any one of the following:-

(a) With the help of pulse diagrams, explain different types of line codes used in communication systems. 14
(b) Describe, in tabular form , their relative advantage and disadvantages. 6

4. (a) How can a pulse amplitude modulated (PAM) signal be generated using an emitter follower circuit with an npn transistor.
   Comment on the demodulation of such a signal using a diode envelope detector circuit. 14
   (b) With the help of circuit and waveform diagrams, explain the generation of pulse time modulated (PTM) signals using IC 555's.
   (No description is necessary) 6

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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. 6
   (b) What are meant by the Eye Patterns and Companding in connection with PCM Systems . 7+7

7. (a) How can ASK, FSK and PSK signals be generated using
   i) sinusoidal carriers
   and ii) rectangular pulse carriers ? 12
   (b) Distinguish between a BPSK and a QPSK signal. Write down their merits and demerits. 8

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. 5
   (b) With the help of block diagram, explain the function of a satellite transponder. Also describe its spectral assignments. What are meant by uplink and downlink frequencies ? 10
   (c) 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