Ref. No.: Ex/MI201/2019

M.SC. INSTRUMENTATION SCIENCE FIRST YEAR SECOND SEMESTER EXAM- 2019

SUBJECT: **COMMUNICATION SYSTEMS**

Time: 4 Hours | Full Marks: 100

Part - I

Use separate Answer Script for each group

Answer any five questions

1. What do you mean by modulation? Why we need modulation in communication system? What are different types of modulations? Derive the power relations for single-tone amplitude modulated wave. Determine the percentage of power saving when the carrier wave and one of the sidebands are supressed in an AM wave modulated to a depth of 50%.
2. Explain with a neat circuit diagram the working of an AM wave generator and envelope detector circuit.
3. What are the principal merits and limitations of FM? What is reactance modulator? Explain with a circuit the working of a reactance modulator for FM generation. Plot the input and modulated waveform of FM waves.
4. State the sampling theorem in time domain. What is Nyquist rate and Nyquist interval? Write short note on Analog Pulse Modulation methods. Find the Nyquist rate and Nyquist interval for the signal $x(t) = \frac{1}{2\pi}\cos(3000\pi t)\cos(1000\pi t)$
5. With the help of neat diagram, explain Pulse Code Modulation (PCM). What are the various important aspects related to PCM?
6. What do you mean my multiplexing? State the advantages of digital multiplexing. Describe the basic concept and principle of Time Division Multiplexing (TDM). Why is synchronization needed in TDM system?
7. What are T-Lines? Describe important terms related to a T1 Carrier system.

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Part - II
Use separate Answer Script for each group
Answer any five questions

1. Explain Optical-Fibre or Fibre-Optic Telemetry System with proper block diagram 10

2. What is Transmission Error? How can you minimize transmission error in this telemetry system? Explain Current telemetry with block diagram and also interpret on the merits and limitation this type of telemetry system 10

3. Describe Sending-End Scheme and Receiving-End Scheme of Single-Channel PCM/Digital Telemetry System. 10

4. Depict Satellite Radio Telemetry System to measure long distance measurement 10

5. How can we characterize antennas used for receiving, as in radio astronomy, rather than for transmitting? Explain the importance of waveguide horns. 10

6. What is feed Antenna? State the strong reciprocity theorem and weak reciprocity theorem and explain them. 10

7. What are the basic coherent binary modulation techniques? Explain them with waveform.

8. Explain the basic concept, advantages and drawbacks of M-ARY modulation technique. Draw the geometric representation of 4-QAM and 8-QAM system. 10