M. Sc (Instrumentation) 2nd Year, 2nd Semester Examination, 2017

Subject: Principles of Analog and Digital Communication Time: 4 Hours
Full Marks: 100

Group- A
Section -I

Answer any four questions:

1. Describe basic structure of any communication system with a neat diagram. Briefly describe the need for modulation. What are the parameters to be considered while choosing a communications systems? 4+3+3
2. (a) Describe envelope detector circuit
   (b) One input to an AM DSBFC modulator is a 500 KHz carrier with a peak amplitude of 32V. The second input is a 12 KHz modulating signal whose amplitude is sufficient to produce a 14Vp change in the amplitude of the envelope. Determine the following:
   i. Upper and lower side frequencies
   ii. Modulation coefficient and Percent modulation
   iii. Maximum and minimum amplitudes of the envelope. 4+6
3. Describe briefly the operation of a Square Law Modulator with a clear diagram. Describe the meaning of each term in the following expression:
   $Vam(t) = 10 \sin(2\Pi 500kt) - 5\cos(2\Pi 515kt) + 5\cos(2\Pi 485kt)$ 5+5
4. Describe in detail operation of Ring modulator for DSB-SC modulation. 10
5. What is Super Hetero Dyne receiver; describe its different parts. What is Image Frequency? What is Image Frequency Rejection Ratio; describe its significance. 4+2+4
6. Judge yourself Angle modulation over Amplitude modulation. Also provide difference between Frequency Modulation (FM) and Phase Modulation (PM) 7+3

Section -II

Answer any one question:

7. a) What is Radio or Wireless Telemetry System? briefly explain? b) Draw a block diagram of Satellite Radio Telemetry System with proper labeling 7+3
8. Explain Direct Current Telemetry System with its Principle,diagram, Sending-End Scheme,Receiving-End Scheme,merits/demerits. 10

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M.Sc.(Instrumentation) Examination 2017
2nd year 2nd semester

Subject: Principle of Analog and Digital communication **Paper: XVII(T-401)**
Full marks:100 **Time: 4 hours**

Group-B

Answer any five questions

1. What are the elements of communication system? Describe an analog communication system in details. 3+7
2. Describe sampling. What are different methods of sampling. Describe Nyquist theorem. 3+4+3
3. What is digital modulation? What are different digital modulation techniques? Describe PSK modulation with suitable diagram. 3+3+4
4. Describe quadrature modulation hardware with its functioning. Describe quadrature demodulation. 5+5
5. What is necessity for constellation analysis? Give quadrature error example in case of QPSK constellation. How it becomes if there is modulator imbalances? How constellation changes if there is ISI? 2+2+3+3
6. Calculate BER for BPSK communication

   [P_e = ½ erfc $\sqrt{Eb/No}$ where symbols have their usual meaning] 10

7. What is phase locked Loop (PLL) ? Describe a PPL with suitable diagram as deduce the close loop transfer function

   $$H(s) = K' F(s) /\{ s + K' F(s)\}$$

   Where symbols have their usual meaning. 2+8