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Fifth Semester B.E. Degree Examination, July/August 2021
Principles of Communication Systems

Time: 3 hrs.   Max. Marks:100

Note: *Answer any FIVE full questions.*

1 a. Explain in detail, the working of switching modulator with suitable block diagram and necessary derivations. **(08 Marks)**

   b. Using the message signal $M(t) = \dfrac{1}{(1+t^2)}$. Determine and sketch the modulated wave for amplitude modulation with the following values : i) $\mu = 50\%$ ii) $\mu = 100\%$. **(06 Marks)**

   c. Explain the concept of VSB transmission for analog and digital transmission. **(06 Marks)**

2 a. Derive an equation for SSB modulated wave for which upper sideband is retained. **(07 Marks)**

   b. Explain how Costas receiver is used for demodulating DSB – SL signal. **(07 Marks)**

   c. With relevant block diagram, explain the working of FDM transmitter and receiver. **(06 Marks)**

3 a. Derive the equation of frequency modulated wave. Define :
      i) Modulation index
      ii) Maximum deviation of frequency modulated single. **(06 Marks)**

   b. With neat circuit diagram, explain FM demodulation using balanced slope detector. **(07 Marks)**

   c. With a neat block diagram, explain the concept of super hetero dyne receiver. **(07 Marks)**

4 a. With relevant diagram, explain direct method generation of FM using Hartley oscillator and how frequency stability is achieved. **(08 Marks)**

   b. When a 50.4MHz carrier is frequency modulated by a sinusoidal AF modulating signal. The highest frequency reached is 50.405MHz. Calculate :
      i) Frequency deviation produced
      ii) Carrier swing of the wave
      iii) Lowest frequency reached. **(06 Marks)**

   c. Explain the linear model of PLL using relevant diagram and suitable expressions. **(06 Marks)**

5 a. Explain shot noise and thermal noise with relevant diagrams and expressions. **(06 Marks)**

   b. Show that the figure of merit for DSBSC system is unity using suitable expressions. **(08 Marks)**

   c. Why Preemphasis and Deemphasis are required. Explain how they are implemented. **(06 Marks)**

6 a. What is White Noise? Explain the power spectral density and auto correlation function. **(07 Marks)**

   b. The average noise per unit BW measured at the front end of the AM receiver is 10^{-3}W/Hz. The modulated wave is sinusoidal with a carrier power of 80KW and side band power of 10KW per side band. The message band width is 4KHz. Determine the SNR_0 of the system and FOM(Figure of Merit). **(06 Marks)**

   c. Explain about FM threshold effect and its reduction method. **(07 Marks)**

7	a.	What are the advantages of digital signal over analog signal?	(04 Marks)
	b.	State and prove sampling theorem for band limited signals.	(08 Marks)
	c.	With neat block diagram, explain the generation of PPM waves.	(08 Marks)
8	a.	With neat block diagram, explain the generation PAM waves.	(08 Marks)
	b.	Describe the effect of noise in pulse position modulation.	(06 Marks)
	c.	Explain the working of TDM system with necessary block diagram.	(06 Marks)
9	a.	Explain the construction and regeneration of PCM signal.	(10 Marks)
	b.	Explain the construction of Delta modulation signal.	(06 Marks)
	c.	Write short notes on vocoder.	(04 Marks)

10   a.   What is quantization noise? Derive the output signal to noise ratio of the uniform quantizer.
               (07 Marks)

      b.   To transmit a bit sequence 10011011. Draw the resulting waveform using :
          i) Unipolar NRZ   ii) Polar NRZ   iii) Unipolar RZ
          iv) Bipolar RZ   v) Manchestor (split phase).   **(06 Marks)**

      c.   Explain how digitization of video and MPEG is achieved with relevant diagram.   **(07 Marks)**

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