CBCS SCHEME

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18EC53

Fifth Semester B.E. Degree Examination, June/July 2023
Principles of Communication Systems

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. Explain the generation of AM wave using switching modulator. **(08 Marks)**

b. With neat block diagram, explain the working of Costas loop. **(06 Marks)**

c. Using the message signal $m(t) = \frac{t}{1+t^2}$, obtain the expression for AM wave when the percentage modulation are : i) 50% ii) 100% iii) 125%. **(06 Marks)**

OR

2 a. Explain the generation of DSBSC wave using ring modulator. **(08 Marks)**

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

c. An audio frequency signal $m(t) = 5 \sin 2\pi (10^3)t$ in used to amplitude modulate a carrier of $c(t) = 100 \sin 2\pi (10^6)t$. If modulation index $\mu = 0.4$, find :
i) Side band frequencies
ii) Amplitude of each side band
iii) B.W.
iv) Efficiency of AM wave. Draw the frequency spectrum. **(06 Marks)**

Module-2

3 a. Explain the direct method of generating for waves. **(08 Marks)**

b. Write neat block diagram explain the operation of FM stereo system. **(08 Marks)**

c. A FM wave is given by
$S(t) = 10\cos [2\pi \times 10^6 + 0.2 \sin (2000\pi t)]$
Find out :
i) Carrier frequency
ii) Modulating frequency
iii) Power in the modulated signal
iv) B.W using Carson's rule. **(04 Marks)**

OR

4 a. With a neat diagram explain FM demodulation using balanced slope detector. **(07 Marks)**

b. What is angle modulation? Obtain the time domain expression for PM wave. **(07 Marks)**

c. A sinusoidal modulating wave form of amplitude 5V and a frequency of 1KHz is applied to an FM generator that has a frequency sensitivity constant of 40Hz/V. Find :
i) Frequency deviation ii) Modulation index. **(06 Marks)**

Module-3

5 a. Obtain the expression for Noise equivalent band width. **(07 Marks)**

b. Prove that FOM of AM receiver using envelope detector is $\frac{\mu^2}{2+\mu^2}$. **(07 Marks)**

c. Explain the use of pre-emphasis and de-emphasis in an FM system. **(06 Marks)**

OR

6 a. Prove that FOM as a DSBSC receiver in ONE. **(08 Marks)**

b. Define :
i) Shot Noise
ii) Thermal Noise
iii) White Noise. **(06 Marks)**

c. Write neat block diagram explain the FM threshold reduction. **(06 Marks)**

Module-4

7 a. What are the advantages of digital signal transmission over analog signal transmission? **(04 Marks)**

b. State and prove the sampling theorem for low pass signals. **(08 Marks)**

c. A signal $m(t) = 10\cos(20\pi t)\cos(200\pi t)$ is sampled at the rate of 250 samples/second.
i) Sketch the spectrum of sampled signal
ii) Specify the cut off frequency for the ideal reconstruction filter so as to recover m(t) from $m_f(t)$
iii) Specify the Nyquist rate for the signal m(t). **(08 Marks)**

OR

8 a. Explain the generation of PAM signals with neat block diagram. **(08 Marks)**

b. With neat block diagram, explain the generation of PPM signal. **(08 Marks)**

c. Write short notes on TDM with neat block diagram. **(04 Marks)**

Module-5

9 a. Prove that $(SNR)_{0dB} = 1.8 + 6n$ for an uniform quantizer. **(08 Marks)**

b. With neat block diagram, explain the construction and regeneration of PCM signal. **(08 Marks)**

c. Write a short note on VOCODER. **(04 Marks)**

OR

10 a. Explain the construction of Delta modulation signal and explain its disadvantages. **(08 Marks)**

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

c. To transmit a bit sequence 10011011. Draw the resulting wave form using :
i) Unipolar signaling.
ii) Polar signaling.
iii) Rectangular RZ type.
iv) Bipolar RZ.
v) Manchester. **(05 Marks)**

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