

# CBCS SCHEME



USN

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  $m(t) = 5 \sin 2\pi (10^3)t$  is 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  
 $S(t) = 10 \cos [2\pi \times 10^6 t + 0.2 \sin (2000\pi t)]$   
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  $m_s(t)$   
 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  $(SNR)_{dB} = 1.8 + 6n$  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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