CBCS SCHEME

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18EC53

Fifth Semester B.E. Degree Examination, June/July 2025
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. Illustrate the item domain and frequency domain characteristics of standard amplitude modulation produced by a single tone. **(10 Marks)**

b. Explain switching modulator with circuit diagram and characteristic curve. **(10 Marks)**

OR

2 a. Explain the generation of DSBSC wave using a ring modulator. **(07 Marks)**

b. Explain the scheme of generation and demodulation of VSB modulated wave with relevant spectrum of signals and mathematical expressions. **(07 Marks)**

c. Explain with block diagram of FDM system. **(06 Marks)**

Module-2

3 a. From the fundamentals deduct an expression of WBFM and plot its frequency spectrum. **(10 Marks)**

b. What is frequency modulation? Deduct the expression for a narrow band FM signal. Represent a narrow band FM signal with neat phasor diagram. **(08 Marks)**

c. A FM signal has sinusoidal modulation with $W = 15\,kHz$ and modulation index $\beta = 2$. Using Carson's rule determine the transmission bandwidth and deviation ratio. Assume $\Delta f = 75$ kHz. **(02 Marks)**

OR

4 a. With relevant mathematical analysis and block diagrams show the reconstruction of message signal from FM wave using PLL. **(10 Marks)**

b. Explain the generation of FM wave using a neat block diagram and necessary equations. **(06 Marks)**

c. A Carrier is frequency modulated by a sinusoidal modulating signal of frequency 3 kHz resulting in a frequency deviation of 10 kHz.
(i) What is the bandwidth occupied by the modulated waveform?
(ii) If the amplitude of the modulating signal is increased by a factor of 2 and its frequency is lowered to 1 kHz. Determine the new bandwidth. **(04 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 over analog signal? **(06 Marks)**

b. State sampling theorem and explain same with neat sketches and equation. **(07 Marks)**

c. Explain with block diagram for TDM. **(07 Marks)**

OR

8 a. Explain with diagram the generation of PPM waves. **(07 Marks)**

b. Explain the detection of PPM waves. **(07 Marks)**

c. Explain the following terms :
i) Under sampling
ii) Over sampling
iii) Nyquist rate. **(06 Marks)**

Module-5

9 a. What is Quantization? Why it is required in digital communication? Explain symmetric quantizer of midtread and midrise type. **(08 Marks)**

b. With neat block diagram, explain the working of PCM system. **(08 Marks)**

c. What is companding? Explain different laws of companding. **(04 Marks)**

OR

10 a. What is Quantization noise? Derive the expression for O/P signal to Noise Ratio of a Quantizer. Consider a sinusoidal modulating signal of amplitude AM which uses all representation levels provided. Calculate the $(SNR)_O$ for the O/P of quantizer of the above signal. **(08 Marks)**

b. What is Delta modulation? Explain the same with block diagrams. **(06 Marks)**

c. Write a note on VOCODER. **(06 Marks)**

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