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**17EC44**

## Fourth Semester B.E. Degree Examination, June/July 2023
## Principle of Communication System

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 waves using square – Law modulator. **(06 Marks)**
   b. Discuss the concept of costs receiver in DSB.S.C wave. **(06 Marks)**
   c. With a neat block diagram, explain frequency division multiplexing system. **(08 Marks)**

**OR**

2  a. The output voltage of a transmitter is given by $400 (1 + 0.4 \cos 6280t) \cos 3.14 \times 10^7 t$. The voltage is fed to a load of $600\Omega$ resistance. Determine :
   i)   Carrier frequency
   ii)  Modulating fly
   iii) Carrier power
   iv)  Total power o/p. **(08 Marks)**
   b. Explain the generation DSBSC waves by using Ring – modulator. **(08 Marks)**
   c. Mention the disadvantages of vestigial sideband modulation. **(04 Marks)**

### Module-2

3  a. The carrier swing of a frequency – modulated signal is 70KHz and the modulating signal is a 7KHz sine wave. Determine the modulation index of the FM signal. **(04 Marks)**
   b. Explain the generation of FM using Armstrong method. **(06 Marks)**
   c. Starting from block diagram of PLL obtain its non –linear version of FM detected signal. **(10 Marks)**

**OR**

4  a. Mention the comparison of AM and FM system. **(06 Marks)**
   b. With the help of diagram, explain the working of FM stereo – multiplexing. **(07 Marks)**
   c. Explain the working of super – heterodyne FM receiver with block diagram. **(07 Marks)**

### Module-3

5  a. Define probability and Axioms of probability. **(07 Marks)**
   b. A perfect cubic die is thrown find the probability that :
   i)  An even number comes up
   ii) A perfect square cone up. **(06 Marks)**
   c. Determine the Noise equivalent bandwidth for LPF. **(07 Marks)**

**OR**

6  a. Define mean, correlation cross –correlation and covariance function. **(08 Marks)**
   b. Define Probability Density Function (PDF) and its properties of PDF. **(08 Marks)**
   c. Calculate the noise voltage at the input of a ratio receivers RF amplifier, using a deivce that has $100\Omega$ equivalent noise resistance and a $200\Omega$ input resistor. The B.W of the amplifier is 1MHz and temperature is 25°C. **(04 Marks)**

### Module-4

**7**  a.  Derive the expression for figure of merits of DSB – SC receiver. **(10 Marks)**
     b.  Explain about pre-emphasis and de-emphasis in FM in detail. **(10 Marks)**

### OR

**8**  a.  Show that the noise in AM receives is $\dfrac{\mu^2}{2+\mu^2}$ using coherent detection. **(10 Marks)**

     b.  Explain FM threshold reduction using graph and block diagram. **(10 Marks)**

### Module-5

**9**  a.  Explain the generation of pulse amplitude modulation with necessary waveforms and equation. **(10 Marks)**
     b.  With the help of block diagram, describe voice codes (VOCODER). **(05 Marks)**
     c.  An analog waveform with bandwidth 15KHz is to be quantized with 200 levels and transmitted via binary PCM signal. Find the rate of transmission and bandwidth required. if 10 such signal are to be multiplexed, find the bandwidth requirement. **(05 Marks)**

### OR

**10**  a.  Distinguish between PAM, PWM and PPM. **(06 Marks)**
     b.  Explain the generation and reconstruction of pulse code modulation. **(07 Marks)**
     c.  Find the Nyquist rate and Nyquist interval for the following signal.

$$m(t) = \frac{1}{2\pi}\cos(4000\pi t)\cos(1000\pi t).$$ **(07 Marks)**

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