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# B. M. S. College of Engineering, Bengaluru - 560019

**Autonomous Institute Affiliated to VTU**

## JAN / FEB - 2021 Semester End Main Examinations

**Programme: B.E.** **Semester: V**
**Branch : Electronics and Communication Engineering** **Duration: 3 hrs.**
**Course Code: 19EC5PCCT1** **Max Marks: 100**
**Course: Communication Theory -1** **Date: 28.01.2021**

**Instructions**: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may suitably assumed.

**Important Note:** Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
Revealing of identification, appeal to evaluator will be treated as malpractice.

B.M.S.C.E.-ODD SEM 2021

### UNIT - I

1. a) State and explain three properties of autocorrelation function **07**

   b) Consider a composite wave obtained by adding a non-coherent carrier $A_c\cos(2\pi f_c t+\Phi)$ to a DSBSC wave $\cos(2\pi f_c t)m(t)$. This composite wave is applied to an ideal envelope detector. Find the resulting detector output. Evaluate this output for **07**
   i) $\Phi=0$ ii) $\Phi\neq0$ & $|m(t)| \ll A_c/2$

   c) Explain the following **06**
      i. Random Variable
      ii. Random Process
      iii. mean

**OR**

2. a) Discuss the working principle of diode switching modulator. Write down the relevant equations, waveforms and spectrum **10**

   b) Show that $P_t = P_c(1+\frac{\mu^2}{2})$ for Standard AM **04**

   c) Evaluate mean and variance of a random variable X which is uniformly distributed **06**

### UNIT – II

3. a) Derive an expression for SSB modulated wave for which upper side band is retained. **08**

   b) State and prove the properties of Hilbert Transform **06**

   c) Show that VSB modulated wave can be demodulated by using envelope detector. **06**

## UNIT – III

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| 4. | a) | Analyze a suitable oscillator circuit to generate frequency modulated wave whose instantaneous frequency is proportional to the amplitude of message m(t). What are its disadvantages? Explain how to overcome this? | **10** |
| | b) | Explain the FM demodulation using frequency discriminator. | **10** |

**OR**

| | | | |
|---|---|---|---|
| 5. | a) | Show that the bandwidth of WBFM is infinity and specify the amplitude of carrier and sidebands. | **10** |
| | b) | Explain with neat diagram demodulation of FM using PLL | **10** |

## UNIT - IV

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|---|---|---|---|
| 6. | a) | Explain Thermal noise and Shot noise | **04** |
| | b) | Show that Figure of Merit (FOM) of DSBSC receiver is unity | **08** |
| | c) | Explain pre-emphasis and de-emphasis in FM receiver | **08** |

## UNIT - V

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|---|---|---|---|
| 7. | a) | Define Digital Communication. With neat block diagram explain the principle of digital communication system. | **06** |
| | b) | State and prove the sampling theorem for low pass signal | **08** |
| | c) | The signal $g(t) = 10\cos(20\pi t)\cos(200\pi t)$ is sampled at the rate of 250 samples per second.<br>(i) Determine the spectrum of the resulting sampled signal. (ii) Specify the cutoff frequency of the ideal reconstruction filter so as to recover g(t) from its sampled version. (iii) What is the Nyquist rate for g(t)? | **06** |

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