

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT  
TEST-3 EXAMINATION- JUNE -2016

B.Tech IV Semester

COURSE CODE: 10B11EC413

MAX. MARKS: 35

COURSE NAME: Analogue Communications

COURSE CREDITS: 03+01

MAX. TIME: 2 HRS

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*Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means. Each question carries five marks.*

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1. Find the energy spectral density of the rectangular pulse defined as  $x(t) = 10 \text{rect}(t/\tau)$  where  $\tau$  is the total duration of the rectangular pulse existing from  $-\tau/2$  to  $\tau/2$ .
2. Draw the transmitter and receiver block diagram of AM-DSB-SC and obtain the signal to noise ratio(SNR) at the output of the receiver.( Assume additive white Gaussian noise )
3. Give the equation for an FM modulated signal and explain what do you mean by *capture effect* in FM receiver.
4. A continuous signal is given by  $x(t) = 8 \cos(200\pi t)$ . Determine the Nyquist's rate. Draw the spectrum of the sampled signal if this signal is sampled at lower than the Nyquist's rate and higher than the Nyquist's rate. Is there any problem, if the signal is sampled at lower than the Nyquist's rate? How do you avoid this?
5. List the properties of the cumulative distribution function. The probability density function of a random variable  $X$  is given as  $f_X(x) = \frac{1}{A^2}(x + A)$  for  $x < 0$  and  $f_X(x) = \frac{1}{A^2}(-x + A)$  for  $x \geq 0$ . Find out the mathematical expression for the cumulative distribution function.
6. Draw the block diagram of PAM and explain in brief about the each element in the block diagram.
7. Write briefly about the following.
  - a. Relationship between the auto-correlation function and the convolution.
  - b. Ergodic random process.
  - c. Frequency division multiplexing.
  - d. Hilbert's transform properties.
  - e. Phase locked loop block diagram.