Reg. No. | | | | | | | | | | |

Question Paper Code: **11284**

B.E./B.Tech.Degree Examinations, April/May 2011
Regulations 2008

Fourth Semester

Electronics and Communication Engineering

EC 2252 Communication Theory
(Common to PTEC 2252 Communication Theory for B.E.(Part -Time) Third Semester ECE - Regulations 2009)

Time: Three Hours Maximum: 100 marks

Answer ALL Questions

Part A - (10 x 2 = 20 marks)

1. What are the advantages of Vestigial Side Band?
2. Calculate the local oscillator frequency if incoming frequency is f_1 and translated carrier frequency is f_2.
3. Distinguish between narrow band FM and wide band FM.
4. What is meant by detection? Name the methods for detecting FM signals.
5. Write the Rayleigh and Rician probability density functions.
6. What is white noise? State its power spectral density.
7. Compare the noise performance of DSBSC receiver using coherent detection with AM receiver using envelope detection.
8. What are the methods to improve FM threshold reduction?
9. Define entropy function.
10. Differentiate between lossless and lossy coding.

Part B - (5 x 16 = 80 marks)

11. (a) With a help of a neat diagram, explain the operation of an envelope detector. Why does negative peak clipping take place? (16)

OR

11. (b) (i) Compare the characteristics of DSBFC, DSBSC, SSBFC, SSBSC, VSB schemes. (10)

(ii) Explain the concept of FDM with a suitable block diagram. (6)

12. (a) (i) Derive the expression for the single tone frequency modulation and draw its frequency spectrum. (8)

(ii) An angle modulated wave is described by the equation $V(t) = 10\cos(2 \times 10^6 \pi t + 10\cos 2000\pi t)$. Find (1) Power of the modulated signal (2) Maximum frequency deviation
(3) Bandwidth. (8)

OR

12. (b) (i) A 100 kHz carrier is frequency modulated to produce a peak deviation of 800 Hz. This FM signal is passed through a 3 by 3 by 4 frequency multiplier chain, the output of which is mixed with an oscillator signal and the difference frequency taken as the new output. Determine the frequency taken as the new output. Determine the frequency of the oscillator required to produce a 100 kHz FM output and the peak deviation of the output. (4)

(ii) With necessary diagrams explain the operation of slope detector for demodulating FM signal. (12)

13. (a) State and prove four properties of Gaussian process. (16)

OR

13. (b) (i) Derive the representation of narrowband noise in terms of envelope and phase components and list out its properties. (10)

(ii) Consider two amplifiers are connected in cascade. First stage amplifier has gain and noise figure as 10 dB and 2 dB. Second stage has noise figure of 3 dB. Calculate total noise figure. (6)

14. (a) (i) Sketch the block diagram of DSB-SC/AM system and derive the figure of merit. (8)

(ii) Using superheterodyne principle, draw the block diagram of AM radio receiver and briefly explain it. (8)

OR

14. (b) (i) Explain pre-emphasis and De-emphasis in detail. (10)

(ii) Compare the performances of AM and FM systems. (6)

15. (a) Using Huffman code I, encode the following symbols. (8)
S = [0.3, 0.2, 0.25, 0.12, 0.05, 0.08,]
Calculate

(i) Average codeword length (3)

(ii) Entropy of the source (3)

(iii) Code efficiency and (1)

(iv) Redundancy (1)

OR

15. (b) (i) State and prove the properties of mutual information. (10)

(ii) The channel transition matrix is given by $\begin{bmatrix} 0.9 & 0.1 \\ 0.2 & 0.8 \end{bmatrix}$. Draw the channel diagram and determine the probabilities associated with outputs assuming equi probable inputs. (6)