

Sub. Title : Communication Theory

Date : 8.04.2015

Sub. Code : EC6402

Branch : ECE

Duration : 180 Minutes

Max. Marks: 100

Part A - (10 x 2 = 20) Answer all questions

1. What are the advantages of converting the low frequency signal into high frequency signal?
2. Compare Bandwidth and power requirement in terms of carrier power P_C , for AM, DSB-SC and SSB.
3. Define the modulation index of FM.
4. What is Carson's rule?
5. Find the mean value of $X(t) = A \cos(2\pi f_0 t + \theta)$ distributes on 0 to π radians.
6. Define central limit theorem.
7. Define noise figure.
8. What is White noise?
9. Define entropy and its properties.
10. Define mutual information and channel capacity.

Part B - (5 x 16 = 80) Answer the questions as per the choice.

11. a) i. Explain the generation of SSB SC signal using phase shift method. (8)
- ii. Suggest a scheme for recovering the message signal from the signal $s(t) = 2m(t)\cos 2\pi f_c t$. (8)
- Explain the same.

Or

- b) i. An AM signal is generated by modulating the carrier $f_c = 800\text{MHz}$ by the signal $m(t) = \sin 3000\pi t + 0.5\cos 5000\pi t$. The AM signal $s(t) = 100[1+m(t)]\cos 2\pi f_c t$ is fed to a 50 ohm load.
- 1) Determine the average power in the carrier and in the sidebands. (5)
 - 2) Find the modulation index and peak power delivered to the load. (5)
- ii) Explain the function of switching modulator in the generation of AM signal. (6)
12. (a) Derive the expression for wideband FM. (16)

Or

- (b) (i) Explain the Armstrong method to generate FM signal. (10)
- (ii) How is the phase and frequency modulation are related? Explain. (3)
- (iii) Differentiate Narrowband and Wideband FM. (3)
13. (a) Explain in detail about transmission of a random process through LTI filter. (16)
- Or
- (b) What is PSD? Calculate power by using sinusoidal waveform where phase is varied. (16)

14. (a) Prove Figure of merit of **DSB-SC** by using coherent detection is unity.

(16)

Or

(b).i. What is threshold effect? How to improve threshold reduction by using Pre-emphasis and De-emphasis filters.

(12)

ii. Explain in detail about equivalent noise temperature.

(4)

15. (a) i. Find the Huff man coding for the probabilities

$P=\{1/2, 1/4, 1/8, 1/16, 1/16, 1/32, 1/64, 1/128, 1/256, 1/256\}$ and the efficiency of the code.

(12)

(ii) State Shannon's theorem and explain

(4)

Or

(b). Find the capacity of the channel and entropies shown in figure.

(16)

