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Question Paper Code : 91446

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2019

Fourth Semester

Electronics and Communication Engineering

EC 6402 – COMMUNICATION THEORY

(Regulations 2013)

(Common to PTCE 6402 – Communication Theory for B.E. (Part-Time) Third Semester – Electronics and Communication Engineering Regulations 2014)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A **(10×2=20 Marks)**

1. Compare conventional DSB-AM over DSB-SC ?
2. Draw the block diagram of SSB-AM generator.
3. Define lock in range and dynamic range of a PLL.
4. A carrier is frequency-modulated with a sinusoidal signal of 2 kHz resulting in a maximum frequency deviation of 5KHz. Find the bandwidth of the modulated signal.
5. State Central Limit Theorem.
6. Define Auto correlation function.
7. Specify the cause of threshold effect in AM systems.
8. Define capture effect.
9. Define channel capacity.
10. A source generates 3 message with probabilities of 0.5, 0.25, 0.25. Calculate source entropy.

PART – B (5×13=65 Marks)

11. a) i) Explain with suitable diagrams the generation of AM using square law method. Also derive its efficiency. (7)

ii) Explain the demodulation of AM using envelope detection. (6)

(OR)

b) i) Explain with block diagram the super heterodyne receiver. (7)

ii) Explain the Hilbert Transform with an example. (6)

12. a) i) Derive an expression for a single tone FM signal with necessary diagrams and draw its frequency spectrum. (8)

ii) An angle modulated wave is described by
$v(t) = 100 \cos(2 * 10^6 \pi t + 10 \cos 2000 \pi t)$. Find :

i) Power of the modulating signal,

ii) Maximum frequency deviation,

iii) Band width. (5)

(OR)

b) i) Explain the Armstrong method of FM generation. (7)

ii) Draw the circuit diagram of a Foster-Seely discriminator and explain its working with relevant phasor diagrams. (6)

13. a) In a binary communication system, let the probability of sending a 0 and 1 be 0.3 and 0.7 respectively. Let us assume that a 0 being transmitted, the probability of it being received as 1 is 0.01 and the probability of error for a transmission of 1 is 0.1.

i) What is the probability that the output of this channel is 1 ? (7)

ii) If a 1 is received, then what is the probability that the input to the channel was 1 ? (6)

(OR)

b) What is CDF and PDF ? State their properties. Also discuss them in detail by giving examples of CDF and PDF for different types of random variables. (13)

14. a) i) Classify the different noise sources and its effect in real time scenario. (7)

ii) Discuss the effects of noise in cascaded system. (6)

(OR)

b) Derive an expression for signal to noise ratio for an AM signal, with assumption that the noise added in the channel is AWGN. Compare its performance with FM system. (7+6)

15. a) State and explain Shannon's source coding theorem. (13)

(OR)

b) A discrete memoryless source has five symbols x1, x2, x3,x4 and x5 with probabilities 0.4, 0.19, 0.16, 0.15 and 0.15 respectively attached to every symbol.

i) Construct a Shannon-Fano code for the source and calculate code efficiency. (7)

ii) Construct the Huffman code and compare the two source coding techniques. (6)

PART – C (1×15=15 Marks)

16. a) i) Give brief account of discrete memoryless channel. (8)

ii) Derive expression for channel capacity using Hartley law. (7)

(OR)

b) Comment and explain on the role of pre-emphasis and de-emphasis circuit on SNR improvement. (15)