



(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 121601

Roll No.

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B. Tech.

(SEM. VI) THEORY EXAMINATION, 2014-15

ADC

Time : 3 Hours]

[Total Marks : 100

Note : Answer all the questions.

1 Answer any four parts :

5×4=20

- (a) Explain the working of Phase shift method for SSB-SC generation with block diagram. Draw the spectrum of SSB-SC.
- (b) Derive an expression for effective modulation index of a multi tone modulated A.M.
- (c) The equation of an A.M. wave is $x(t) = 100 [1 + 2\cos(6280t)] \cos(2\pi \times 10^6 t)$ find all the frequency present.
- (d) Define vestigial side band modulation. Describe the working of frequency discrimination method for VSB generation and calculate the bandwidth of VSB modulation.
- (e) Describe briefly the operation of super heterodyne receiver with proper block diagram. What is drawback of tuned radio frequency receiver?

- 2 Answer any four parts : 5×4=20
- (a) A single tone FM is represented by the voltage equation as $v(t) = 25\cos[9 \times 10^7 t + 5\sin 1650 t]$. Find the following :
- (i) Carrier frequency
 - (ii) Modulating Frequency
 - (iii) Modulation index
 - (iv) Maximum deviation
- (b) What is the difference between direct and indirect methods of FM generation? Explain the working of varactor diode method for FM generation.
- (c) Define signal to noise ratio and noise figure of a receiver. Derive a relation between noise figure and equivalent noise temperature.
- (d) Two resistors 20 k ohm and 50 k ohm are at room temperature. Calculate the thermal noise voltage, for bandwidth of 100 kHz.
- (i) For two resistors in series.
 - (ii) For two resistors in parallel.
- (e) Write comparison between A.M. and F.M. and derive the equation for F.M. wave.

- (b) Describe delta modulation systems. What are its limitations? How can they be overcome? Compare it with differential PCM.
- (c) Write short notes on-
- (i) Granularity & slope-overload error in delta modulation.
 - (ii) Non uniform quantization and its applications.
- (d) A Television signal having a bandwidth of 4.2 MHz is transmitted using binary PCM system. Given that the number of quantization levels is 512. Determine:
- (i) Code word length.
 - (ii) Transmission Bandwidth
 - (iii) Final bit rate
 - (iv) Output S/N ratio.

- 4 Answer any two parts : 10×2=20
- (a) Explain the working of the coherent ASK receiver and obtain the expression for probability of error.
- (b) Draw the block diagram of Transmitter and Receiver of BPSK. Explain its working-and also calculate probability of error.
- (c) Why FSK is preferred over ASK? Give reason, How FSK is generated and obtain the expression for its bandwidth. Briefly discuss regarding its frequency spectrum.

- 3 Answer any two parts : 10×2=20
- (a) In what way a pulse code modulation is different from other modulation system. What makes it a digital system? What are the advantages and application of PCM?

5 Answer any two parts :

10×2=20

- (a) Design binary Huffman code for a discrete source of five independent symbols A, B, C, D and E with probabilities 0.4, 0.2, 0.3, 0.08 and 0.02 respectively such that the variance of code word length is minimum.
- (b) Consider a sequence of symbols generated by a source with their probabilities of occurrence as given below

Symbol	S 1	S2	S3	S4	S5	S6	S7	S8	S9
Probability	0.22	0.19	0.15	0.12	0.08	0.06	0.06	0.07	0.05

Determine the code words of the symbols using Shannon- Fano coding technique. Also determine the average code word length.

- (c) Define information and entropy. Find an expression for the channel capacity of a continuous channel.
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