USN

17EC44

Fourth Semester B.F. Degree Examination, Dec.2019/Jan.2020
Principles of Communication Systems

Time: 3 hrs. Max . Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module_1

1 a. Describe time-domain analysis of amplitude modulation with relevant spectrum. **(08 Marks)**

b. Explain with neat circuit working of switching modulator with relevant signals. **(07 Marks)**

c. Explain COSTAS RECEIVER with neat block diagram. **(05 Marks)**

OR

2 a. Describe coherent detection of DSB-SC signal waves with block diagram and spectra. **(08 Marks)**

b. Explain the Frequency Translation with block diagram and relevant spectra. **(07 Marks)**

c. Explain Time-Domain approach in VSB transmission of analog and digital television. **(05 Marks)**

Module-2

3 a. Explain single tone-frequency modulation. Derive necessary FM equation. **(08 Marks)**

b. Calculate the carrier swing, carrier frequency freq deviation and modulation index for an FM wave, which reaches max freq of 99.047 MHz and minimum frequency o f 99.023 MHz. The frequency of modulating signal is 7 kHz. **(08 Marks)**

c. Explain Direct Method of generating FM wave. Draw block diagram of Generating WBFM wave with frequency stabilization. **(04 Marks)**

OR

4 a. Explain FM demodulation using PLL. Develop non-linear model of PLL. **(10 Marks)**

b. Explain with block diagram FM Stereo Multiplexing. **(10 Marks)**

Module-3

5 a. Derive expression for overall noise figure when two-port network are in cascade. **(08 Marks)**

b. For the network connection shown in Fig.Q5(b), determine overall noise figure and also find equivalent noise temperature.

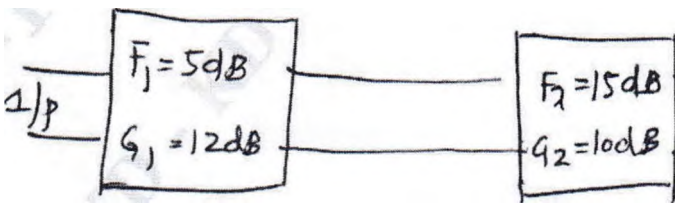

Fig.Q5(b) **(07 Marks)**

c. Explain: (i) Thermal noise (ii) White noise **(05 Marks)**

OR

6 a. Explain noise equivalent bandwidth and show that effective bandwidth B, = $\frac{1}{4RC}$ (06 Marks)

b. Define equivalent noise temperature. Define Te = Te, + $\frac{Te_{,,}}{G}$ + $\frac{Tea+}{G,G,}$ ..... (08 Marks)

c. Mention properties of auto-correlation function. (06 Marks)

Module-4

7 a. Discuss noise in AM Receiver. Derive FOM = $\frac{Ka^2 P_{,,2,,Pm}}{1+ Ka^2}$ (10 Marks)

b. Explain the need of pre-emphasis and de-emphasis in FM. Derive I = $\frac{2W_3}{3Ef^2 ' ELM' I df}$ (10 Marks)

OR

8 a. Discuss threshold effect in FM. (08 Marks)

b. Derive expression for FOM in case of FM, FOM = $\frac{3K^2.1^3}{}$ (12 Marks)

Module-5

9 a. A continuous time signal X(t) has a bandwidth F3 = 10 kHz and it is sampled at F, = 22 kHz using 8bit/sample. The signal is properly scaled. So that IX(n)I < 128 for all n.

(i) Determine your best estimate of the variance of the quantization error af, .

(ii) We want to increase the sampling rate by 16 times. How many bits per samples you would use in order to maintain the same level of quantization? (08 Marks)

b. State and prove sampling theorem. (08 Marks)

c. Mention advantages of digital communication. (04 Marks)

OR

10 a. Explain TDM with neat block diagram. (10 Marks)

b. Find the Nyquist rate and Nyquist interval for:

i) m, (t) = $\frac{1}{27c}$cos(40007c0cos(10007rt)

ii) m, = $\frac{\sin 5007rt}{7tt}$ (10 Marks)

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