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Code No. : 31303

VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD
B.E. (E.C.E.) III Year I-Semester (Main) Examinations, Nov./Dec.-2016

Analog Communication

Time: 3 hours

Max. Marks: 70

Note: Answer ALL questions in Part-A and any FIVE from Part-B

Part-A (10 × 2 = 20 Marks)

1. State the conditions to perform envelope detection of AM signal.
2. With respect to coherent detection, discuss the effect of phase error in the local carrier signal.
3. Compare Narrow Band FM and Wide band FM signals.
4. Discuss the significance of Pre and De-emphasis in FM system.
5. In AM super heterodyne receiver, the incoming RF signal frequency is 1200 KHz and the loaded Q of the antenna coupling network is 60 find the Image Frequency and its rejection ratio.
6. Define Sensitivity and Selectivity of radio receivers.
7. Calculate the total noise voltage generated by two parallel resistors 10 K Ω and 2 K Ω operating at 27 $^{\circ}$ C with a bandwidth of 20 KHz.
8. Define noise equivalent bandwidth.
9. A speech signal is observed to occupy the frequency range 300-4000 Hz. Suggest a suitable frequency to sample and reconstruct this signal. What is the minimum sampling rate? Justify your answer.
10. In what way PPM is superior to PAM and PWM?

Part-B (5 × 10 = 50 Marks)

11. a) Explain the generation and detection of Vestigial Sideband signal. [6]
b) Compare different linear modulation techniques with respect to power requirement, transmission bandwidth, circuit complexity, application area. [4]
12. a) Draw the block diagram of Armstrong method of indirect FM generation. Explain the function of each block. If the crystal oscillator frequency is 200 KHz, initial frequency deviation is limited to 0.2 KHz and message bandwidth is 5 KHz, Suggest a suitable value for mixer oscillator frequency and frequency multiplication factors to achieve final carrier frequency of 100 MHz and maximum frequency deviation 75 KHz. [7]
b) Explain the working of ratio detector to demodulate an FM signal. [3]
13. a) Differentiate between low level and high level modulation. [4]
b) With a block diagram explain working of TRF receiver. Discuss the demerits and the remedies. [6]
14. a) Derive the expression for Figure of Merit of FM system. [7]
b) Describe various types of internal noise sources. [3]
15. a) State and prove sampling theorem for low pass signals. [5]
b) With relevant circuit diagrams and waveforms explain how PWM signal can be generated and detected. [5]

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16. a) Find the Hilbert Transform of the signal $m(t) = 3 \sin 2\pi 10^4 t$. Discuss the properties of Hilbert Transform. [6]

b) A single tone FM signal is given by $s(t) = 10 \cos(\omega_1 t + 5 \sin \omega_2 t)$. Find the maximum frequency deviation, maximum phase deviation, transmission power and bandwidth, where $f_1 = 91 \text{ MHz}$ and $f_2 = 3 \text{ KHz}$. [4]

17. Write short notes on any *two* of the following:

a) Classification of radio transmitters. [5]

b) Noise figure of cascaded stages [5]

c) Flat-top sampling [5]
