

II B. Tech II Semester Regular Examinations, April - 2018

ANALOG COMMUNICATION

(Electronics & Communication Engineering)

Time: 3 hours

Max. Marks: 70

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- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
 2. Answer **ALL** the question in **Part-A**
 3. Answer any **FOUR** Questions from **Part-B**
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PART -A

1. a) As related to AM, what is over modulation, under modulation and 100% modulation?
- b) What are the Advantages of SSB?
- c) List the properties of Bessel function
- d) What are the advantages of Superhetrodyne receiver over Tuned radio frequency receiver?
- e) What is thermal noise?
- f) Draw PWM and PPM waveforms.

PART -B

2. a) What is the principle of Amplitude modulation? Derive expression for the AM wave and draw its spectrum.
- b) A modulating signal of $2 \cos 5000t$ is amplitude modulated over a carrier signal of $5 \cos 20000t$. Find the modulation index, LSB and USB frequencies, bandwidth and the ratio of Side Band Power to the Total Power of AM wave.
3. a) Explain the generation of SSB signal using balanced modulator and phase shifter
- b) Obtain a relationship between carrier and side band powers in an SSBSC wave and explain how power distribution takes place in SSB SC system.
4. a) Explain Armstrong method of generation of FM signal.
- b) Distinguish between FM and PM by giving its mathematical analysis.
5. a) Explain the Characteristics of RF section.
- b) Discuss briefly the similarities and differences between FM and AM receivers.
6. a) Explain the effect of Noise in DSB system.
- b) Discuss about Effective noise temperature and Noise figure
7. a) With a neat sketch explain the Time Division Multiplexing
- b) Explain the demodulation of PWM, with a neat circuit diagram and waveforms.



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PART -A

1. a) A transmitter radiates 15 kW without modulation and 20.125 kW after modulation. Determine depth of modulation.
- b) What are the disadvantages of DSB-FC.
- c) What is the bandwidth required for an FM wave in which the modulating frequency signal is 2 kHz and the maximum frequency deviation is 12 kHz?
- d) What is meant by image frequency? Explain.
- e) Write the expression for PSD of Thermal Noise?
- f) What is PAM? What are the drawbacks of PAM.

PART -B

2. a) An audio frequency signal  $10 \sin 2\pi \times 500t$  is used to amplitude modulate a carrier of  $50 \sin 5\pi \times 10^5 t$ . Calculate
  - i. Modulation index
  - ii. Side band frequencies
  - iii. BW required
- b) With a neat sketch explain the FDM.
3. a) Draw the circuit diagram of balanced modulator using transistors and show that it produces DSB-SC wave.
- b) Draw the block diagram for the generation of a VSB signal and explain the principle of operation
4. a) Describe the frequency analysis of Angle modulated waves. Explain their Bandwidth requirements.
- b) Compare the noise performance of AM and FM Systems
5. a) Describe the operation of variable reactance type and phase modulated FM transmitter.
- b) What is the significance of AGC circuit? Differentiate between simple, delayed and amplify AGC and explain the function with the help of neat diagram
6. a) Explain the effect of Noise in SSB system
- b) With neat sketch explain the significance of Pre-emphasis and De-emphasis.
7. a) Explain the generation of PPM, with a neat circuit diagram and wave forms
- b) What is multiplexing? Explain with suitable example?



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PART -A

1. a) Define Amplitude modulation. What are its applications?
- b) What is VSB? What is its significance?
- c) Differentiate between phase and frequency modulation.
- d) Write in detail about the limiter used in FM receiver.
- e) Give the frequency domain representation of Noise.
- f) Distinguish between TDM and FDM.

PART -B

2. a) When a signal  $m(t) = 3 \cos(2\pi \times 10^3 t)$  modulates a carrier  $c(t) = 5 \cos(\pi \times 10^6 t)$ , find the modulation index and transmission bandwidth if the modulation is AM.
- b) Explain the Square law method of demodulating an AM wave
3. a) Obtain a relationship between carrier and side band powers in DSBSC wave and explain how power distribution takes place in DSB SC system.
- b) Explain the detection of DSB signals using COSTAS Loop
4. a) Explain the principle of Angle Modulation. Derive and explain phase deviation, Modulation index, frequency deviation and percent modulation
- b) Distinguish between Narrow band FM over Wide band FM
5. a) Explain the effect of feedback on the performance of AM transmitter.
- b) With neat sketch explain the principle of operation of Super heterodyne receiver.
6. a) Write short notes on Modeling of Noise Sources.
- b) Explain about noise in AM systems.
7. a) Explain the generation of PWM with a neat circuit diagram and wave forms
- b) What are the advantages and disadvantages of PPM over PWM



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PART -A

1. a) Draw the phasor diagram of AM signal.
- b) What are the advantages of VSB-AM?
- c) A carrier of frequency 100 MHz is frequency modulated by a signal  $x(t)=20\sin(200\pi \times 10^3 t)$ . What is the bandwidth of the FM signal if the frequency sensitivity of the modulator is 25 kHz per volt?
- d) Distinguish between low level and high level transmitters
- e) Write short notes on Thermal noise and shot noise
- f) What are the different types of Pulse modulation techniques?

PART -B

2. a) A modulating signal of  $2 \cos 5000t$  is amplitude modulated over a carrier signal of  $5 \cos 20000t$ . Derive expressions for the modulation index, LSB and USB frequencies, Bandwidth and the ratio of Side Band Power in the Total Power of AM wave.
- b) Explain the process of demodulating an AM wave using diode detector
3. a) Discuss the generation of SSB signal using phase discrimination method.
- b) Explain the applications of different AM Systems
4. a) With a neat sketch explain the principle of operation of Phase locked loop.
- b) Compare the advantages and disadvantages of angle modulation with amplitude modulation
5. a) Discuss the frequency stability of FM transmitter.
- b) Write short notes on Frequency changing and tracking
6. a) What is Noise figure? Find the Average Noise Figure of cascaded networks
- b) Discuss threshold effect in angle modulation systems
7. a) Explain the generation of PAM, with a neat circuit diagram and wave forms
- b) Compare and contrast TDM and FDM.

