

Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
FOURTH SEMESTER B.TECH DEGREE EXAMINATION(S), DECEMBER 2019

**Course Code: EC208**

**Course Name: ANALOG COMMUNICATION ENGINEERING**

Max. Marks: 100

Duration: 3 Hours

**PART A**

*Answer any two full questions, each carries 15 marks.*

Marks

- 1 a) Explain thermal noise in amplifiers. Write down the expression for the noise power and derive the expression for noise voltage. (8)
- b) Derive the spectrum for sinusoidally modulated AM wave and draw the spectrum. (7)
- 2 a) A receiver consists of an amplifier which has a noise temperature of 100 K and a gain of 30 dB. The output of the amplifier is connected to a mixer which has a noise figure of 15dB. Calculate the noise temperature of the mixer and the overall noise temperature of the receiver referred to the input. (6)
- b) Draw the circuit diagram of a BJT collector modulator for AM and explain its working with waveforms. (9)
- 3 a) Define noise factor and derive the expression for the output noise power of an amplifier in terms of noise factor. (6)
- b) The antenna current of an AM transmitter, 30% modulated by a sine wave is 10 A. It increases to 10.75 A while modulated by another sine wave simultaneously. What is the modulation index due to the second wave? (6)
- c) Mention the need for modulating a signal before transmission. (3)

**PART B**

*Answer any two full questions, each carries 15 marks.*

- 4 a) Derive the expression for the output of a sinusoidally modulated FM wave. Define various parameters in the expression. (8)
- b) Explain the operation of a doubly balanced diode ring modulator with the help of a diagram. (7)
- 5 a) A sinusoidal modulating waveform of maximum amplitude 4 V and a frequency of 1 KHz is applied to an FM generator, which has a frequency deviation constant of 5000 Hz/volt. Calculate the maximum frequency deviation, modulation index, and bandwidth. (6)

- b) Explain the working of a balanced modulator using FET. Derive the expression for its output voltage. (9)
- 6 a) What are the drawbacks of a tuned radio frequency (TRF) receiver? With the block diagram of a super-heterodyne receiver, explain that they do not suffer from these drawbacks. (10)
- b) What is compressed SSB? (5)

### PART C

*Answer any two full questions, each carries 20 marks.*

- 7 a) With the help of a circuit diagram, explain the working of a JFET reactance modulator. (10)
- b) Explain the concept of pre-emphasis and de-emphasis with the help of circuit diagram, and frequency response curves. (10)
- 8 a) Explain Armstrong method of FM generation. (10)
- b) With necessary curves and circuit diagrams, explain the working of FM slope detector and balanced detector. (10)
- 9 a) With the help of circuit diagram, explain the working of a varactor diode modulator. (10)
- b) What are the basic functions of a telephone set? (5)
- c) Explain the set of procedures for completing a local telephone call. (5)

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