Code No: 115AK

R13

# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
## B. Tech III Year I Semester Examinations, November - 2015
## ANALOG COMMUNICATIONS
### (Electronics and Communication Engineering)

Time: 3 hours                                                           Max. Marks: 75

**Note:** This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

## PART - A                                                             (25 Marks)

1.a) What is Amplitude modulation? Define modulation index of an AM signal.        [2]
  b) Draw the Amplitude Modulation waveforms with modulation index (m)=1, m<1, m>1.
                                                                                  [3]
  c) Compare AM with DSB-SC and SSB-SC.                                           [2]
  d) For 100% modulation what is the relationship between the voltage amplitudes of the side band.                                                                      [3]
  e) Define the term modulation index for AM and FM.                             [2]
  f) Derive the formula for instantaneous value of FM voltage.                   [3]
  g) What is the need of pre-emphasis and de-emphasis in FM transmission?        [2]
  h) Calculate the thermal noise power appearing across a 20k$\Omega$ resistor at 25$^0$C temperature with an effect noise bandwidth of 10KHZ.                            [3]
  i) Explain single polarity and double polarity PAM.                            [2]
  j) Explain simple and delayed AGC.                                             [3]

## PART - B                                                             (50 Marks)

2. What is the principle of amplitude modulation? Derive expression for the AM wave and draw its spectrum.                                                                 [10]

**OR**

3. For an Am DSBFC wave with peak unmodulated carrier voltage $V_c$=10Vp, a load resistance $R_L$= 10 $\Omega$ and a modulation co efficient m = 1. Determine
   a) Power of carrier, upper and lower side band
   b) Total power of modulate wave
   c) Total sideband power
   d) Draw the power spectrum.                                                   [2+2+3+3]

4. With a neat diagram explain how a SSB wave is generated using Phase Discriminator method with only USB and rejecting the LSB.                                           [10]

**OR**

5. Derive an expression for SSB Modulated wave for which upper sideband is retained.
                                                                                  [10]

6. Explain the principle of Angle Modulation. Derive and explain phase deviation, Modulation index, frequency deviation and percent modulation.                         [10]

**OR**

7. Derive the expression for the frequency modulated signal. Explain what is meant by narrowband FM and wideband FM using the expression.                                 [10]

8. Draw and explain the pre-emphasis and de-emphasis circuits with a neat diagram. What is their function? [10]

**OR**

9. Derive the effective noise temperature of a cascade amplifier. Explain how the various noises are generated in the method of representing them. [10]

10.a) Draw and explain block diagram of double conversion FM receiver.
   b) What do you mean by pulse modulation and define types of pulse modulation? [6+4]

**OR**

11. What is AGC? Draw and explain a simple AGC circuit and what are the different types of AGC explain them. [10]

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