

RAJ KUMAR GOEL INSTITUTE OF TECHNOLOGY & MANAGEMENT, GZB
1st Sessional Examination 2017-18 (Odd Semester)

Roll No.:
Year/Branch: 4/ EN
Max Time: 1Hours 30 Minute

Subject Name: ADC
Subject Code: NEC 702A
Max Marks: 50

SECTION-A

Q.1 Attempt all parts carry equal marks. Write answer of each part in short. (2x5=10)

- a) Enlist the need of modulation.
- b) Calculate percentage power saving for SSB-SC signal as compared to DSB-SC signal for 90% Modulation.
- c) Discuss Image frequency & its rejection ratio.
- d) Draw the block diagram of communication system.
- e) What is frequency deviation? Write the Carson's Rule for bandwidth of FM signal.

SECTION-B

Note: Attempt any five questions from this section. (5x5=25)

- Q.2** The antenna current of AM transmitter modulated to a depth of 40% by an audio sine wave is 11 Ampere. It increases to 12 Amp, as a result of simultaneous modulation by another sine wave. What will be the modulation index due to second sine wave?
- Q.3** Compare DSB-FC, DSB-SC, SSB-SC and VSB with respect to frequency spectrum, bandwidth and power.
- Q.4** A 400KW carrier is amplitude modulated to a depth of 100%. Calculate total power for AM & DSB-SC. How much power saving is achieved in DSB-SC if modulation percentage is reduced to 75%.
- Q.5** Draw & Explain Envelope detector circuit for AM detection along with appropriate time constant range.
- Q.6** Compare FM & PM signal. How are they related to each other?
- Q.7** A single-tone FM signal is given by $V(t) = 10 \sin (16\pi * 10^6 t + 20 \sin 2 \pi * 10^3 t)$ volts. Determine the modulation index, modulating frequency, frequency deviation, carrier frequency & the power of the FM signal.
- Q.8** Prove that the balanced modulator produces an output consisting of sidebands only with carrier removed.
- Q.9** Show that AM is linear while FM is non-linear.

SECTION-C

Note: Attempt any two questions from this section. (7.5x2=15)

- Q.10.** Draw the block diagram of superheterodyne receiver and discuss the role of each block. Compare TRF & Superheterodyne receiver.
- Q.11** Evaluate the effect of phase and frequency error in the local oscillator on synchronous detection.
- Q.12** Consider the DSB-SC signal $s(t) = A_c \cos (2\pi f_c) * m(t)$, where $m(t)$ is message signal and $A_c \cos (2\pi f_c)$ is carrier wave. This modulated signal is applied to square law device characterized by $Y(t) = s^2(t)$ the output is next applied to a narrow band filter with a pass band magnitude response 1, mid band frequency f_m and bandwidth Δf is small enough to treat the spectrum of $Y(t)$ as essentially constant inside the pass band filter. Show that the filter output is the energy of message signal.