

RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

SECOND YEAR [BATCH 2014-17]

B.A./B.Sc. FOURTH SEMESTER (January – June) 2016

Mid-Semester Examination, March 2016

Date : 18/03/2016

ELECTRONICS (General)

Time : 12 noon – 1 pm

Paper : IV

Full Marks : 25

1. Answer the following questions with proper justification :

- a) Discuss the limitations of AM. [2]
 - b) 'FM is more powerful than AM' —Justify. [1]
 - c) Prove that $P_{DSBSC} = \frac{1}{3} P_{AM}$ [where P stands for Power, DSBSC stands for Double side Band Suppressed Carrier, AM stands for Amplitude Modulation] [1]
 - d) State Carson's Formula of FM Bandwidth. [1]
2. a) Compare Over Modulation, Under Modulation & Perfect Modulation for the case of AM. [2]
- b) Discuss the interpretations of Power Spectrum of AM signal. [2]
- c) Evaluate— [6]
- i) Modulation index and Percent Modulation
 - ii) Antenna current when modulation index is changed to 0.8 considering that the antenna current of an AM transmitter is 8Amp when only carrier signal is transmitted. It increases to 8.93 Amp when the carrier signal is modulated by a sinusoidal signal.

OR,

Consider an angle modulated signal $x_c(t) = 100 \cos[2\pi f_c t + 5 \sin(2\pi f_m t)]$. Assume FM and $f_m = 1\text{KHz}$. Evaluate the frequency modulation index and approximate bandwidth of FM signal. Also evaluate the approximate bandwidth of FM signal when modulating frequency is halved and double respectively. [10]

3. Evaluate the WBFM expression with proper explanation.

OR,

[10]

An FM modulator operates at carrier frequency of 500KHz with frequency deviation sensitivity of 1.5KHz/V. A PM modulator also operates at carrier frequency of 500KHz with phase deviation sensitivity of 0.75 rad/V. If both FM modulator & PM modulator are modulated by the same modulating signal having peak amplitude of 2V and modulating frequency of 2KHz then prove that frequency modulation index and phase modulation index have same values.

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