BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)

CLASS: BE **SEMESTER: VI**
BRANCH: IT **SESSION : SP/2020**

SUBJECT : IT6021 COMMUNICATION THEORY

TIME: 1.5 HOURS **FULL MARKS: 25**

INSTRUCTIONS:
1. The total marks of the questions are 30.
2. Candidates may attempt for all 30 marks.
3. In those cases where the marks obtained exceed 25 marks, the excess will be ignored.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. The missing data, if any, may be assumed suitably.

Q1 (a) What are the sufficient conditions for signal to be Fourier transformable? [2]
(b) Define energy and power of a signal. Evaluate the energy of an exponential pulse $X(t) = e^{-at} u(t)$. [3]

Q2 (a) Define unit impulse function and find its Fourier transform. [2]
(b) Apply the property of Fourier transform to obtain the spectrum of RF pulse and plot it. [3]

Q3 (a) Find the expression for single tone amplitude modulated signal and draw its time domain and frequency domain waveforms. [2]
(b) Derive the relationship between carrier power and total power for AM wave. Prove that in AM, maximum average power transmitted by an antenna is 1.5 times the carrier power. [3]

Q4 (a) Describe Costas receiver for demodulating DSBSC signal and explain how phase control is provided in this. [2]
(b) How the SSB signal is demodulated by using a Coherent demodulator. Determine the effect of error on demodulation. What will be the effect of this error if the input is DSB-SC in place of SSB? [3]

Q5 (a) Give Carlson's rule to determine the transmission bandwidth of FM wave. [2]
(b) Derive an expression for single tone narrowband frequency modulated wave and draw NBFM modulator. [3]

Q6 (a) When the modulating frequency in an FM system is 400 Hz and the modulating voltage is 2.4 v, the modulation index is 60. Calculate the maximum deviation. What is the modulation index when modulating frequency is reduced to 250 Hz and the modulating voltage is simultaneously raised to 3.2 v. [2]
(b) Compare Amplitude Modulation and Angle Modulation with their applications. [3]

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