

JK LAKSHMIPAT UNIVERSITY, JAIPUR

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination November 2018

B. Tech in ECE Engineering, Semester V

Roll No.....

COURSE CODE: ECE 507

Time: 3 hours

Max. Marks: 80

COURSE TITLE: Analog and Digital
Communication

Instructions to students:

1. Do not write anything other than your roll number on question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.

Q.1A	Objective type multiple choice questions (10 questions @ 1 mark)	10
i.	The amplitude spectrum of a Gaussian pulse is (A) uniform (B) a sine function (C) Gaussian (D) an impulse function	
ii.	Find the Hilbert transform $m_h(t)$ of signal $m(t)=\sin(\omega_1 t) \cos(\omega_2 t)$. Assume $\omega_1 > \omega_2$ (A) $\cos(\omega_1 t) \cos(\omega_2 t)$ (B) $\sin(\omega_1 t) \sin(\omega_2 t)$ (C) $\sin(\omega_1 t) \cos(\omega_2 t)$ (D) $\cos(\omega_1 t) \sin(\omega_2 t)$	
iii.	In a double sideband (DSB) full carrier AM transmission system, if the modulation index is doubled, then the ratio of total sideband power to the carrier power increases by a factor of (A) Two (B) Four (C) Eight (D) Sixteen	
iv.	A 1 MHz sinusoidal carrier is amplitude modulated by a symmetrical square wave of period 100 μ sec. Which of the following frequencies will not be present in the modulated signal? (A) 990 kHz (B) 1010 kHz (C) 1020 kHz (D) 1030 kHz	
v.	A 10 MHz carrier is frequency modulated by a sinusoidal signal of 500 Hz, the maximum frequency deviation being 50 KHz. The bandwidth required, as given by the Carson's rule is (A) 550 Hz (b) 101 KHz (C) 50.5 KHz (D) 110 KHz	
vi.	Aperiodic signals are example of (A) Power signal (B) Energy Signal (C) Both (D) None of above	

vii.	Consider the frequency modulated signal $10 [\cos 2\pi \times 10^5 t + 5 \sin(2\pi \times 1500 t) + 7.5 \sin(2\pi \times 1000 t)]$ with carrier frequency of 10^5 Hz. The modulation index is (A) 12.5 (B) 10 (C) 7.5 (D) 5	
viii.	An analog voltage in the range 0 to 8 V is divided in 16 equal intervals for conversion to 4bit digital output. The maximum quantization error (in V) is (A) 0.25 (B) 0.50 (C) 0.75 (D) 1.0	
ix	Compression in PCM refers to relative compression of (A) higher signal amplitudes (B) lower signal amplitudes (C) lower signal frequencies (D) higher signal frequencies	
x.	In binary data transmission DPSK is preferred to PSK because (A) coherent carrier is not required to be generated at the receiver (B) for a given energy per bit, the probability of error is less (C) the 180° phase shifts of the carrier are unimportant (D) more protection is provided against impulse noise	

Q.2	Short answer type questions (4 questions @ 2.5 marks)	10
A	Define Noise Temperature, how is it related to noise figure?	
B	What is Capture effect, how does it improve S.N ratio ?	
C	What is sampling theorem and what is its physical significance?	
D	What are advantages of TDM, can it be used for analog signals?	
Q.3A	Find the Fourier transform of Triangular waveform of period T	05
Q.3B	Find convolution of $x(t) = u(t) - u(t-3)$ with $h(t) = u(t) - u(t-2)$	05
Q.4A	Derive the expression for Noise Figure for two amplifiers in cascade.	05
Q.4B	What is the level of input signal required for an output $S/N = 5$ dB in a receiver with $NF = 3$ dB and Bandwidth $B = 0.2$ MHz?	05
Q.5A	What is Single Sideband Modulation? Show the spectrum for SSB using upper sidebands?	05
Q.5B	How can we demodulate SSB-SC modulated wave?	05
Q.6A	Draw the block diagram of Armstrong Transmitter.	05
Q.6B	Explain why two stage multiplication is used for Armstrong transmitter.	05
	OR	
Q.6B	Draw the block diagram for frequency stabilization system used in FM transmitters.	05

Q.7 Explain how Pulse code modulation is done, using an illustration for analog waveform and showing the different quantization levels? 10

Q.8 What is Quantization error. How can it be minimized? 10

OR

Q.8 What are the main features of QAM? Explain 16bit QAM showing the constellation diagram. 10