University of Mumbai
Examination June 2021
Examinations Commencing from 1st June 2021
Program: **Electronics and Telecommunication**
Curriculum Scheme: Rev2019
Examination: SE Semester IV
Course Code: ECC4405 and Course Name: Principles of Communication Engineering

Time: 2 hour   Max. Marks: 80

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Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	Which of the following steps is not included in the process of reception?
Option A:	Decoding
Option B:	Encoding
Option C:	Storage
Option D:	Interpretation
2.	A receiver has a noise figure of 2.04dB. What is the equivalent noise temperature of that receiver?
Option A:	154K
Option B:	200K
Option C:	174K
Option D:	300K
3.	Ionospheric propagation is also called as------
Option A:	Sea wave propagation
Option B:	Ground wave propagation
Option C:	Sky wave propagation
Option D:	Line of sight propagation
4.	A 400W carrier is modulated to a depth of 75%. Calculate the total power in the modulated wave.
Option A:	512.5W
Option B:	400 W
Option C:	200 W
Option D:	612 W
5.	The Vmax p-p value of an AM signal as observed on DSO as 5.9 divisions and the Vmin p-p is observed as 1.2 divisions. Calculate the modulation index
Option A:	1
Option B:	0.3
Option C:	0.8
Option D:	0.662
6.	The primary benefit of SSB AM is
Option A:	Reduction in the power consumption
Option B:	Reduction in the bandwidth requirement

Option C:	Simple circuit
Option D:	Less costly
7.	The balanced modulator produces which frequencies at its output
Option A:	Carrier frequency
Option B:	Modulating signal frequency
Option C:	Sum and difference of modulating and carrier frequencies
Option D:	Product of modulating and carrier frequencies
8.	The time constant of R & C in diode detector is chosen to be ------ compared to the period of carrier signal
Option A:	Long
Option B:	Short
Option C:	Equal
Option D:	Double
9.	Vestigial sideband modulation is normally used for
Option A:	HF point-to-point communications
Option B:	Satellite broadcasting
Option C:	TV broadcasting
Option D:	stereo broadcasting
10.	The ratio of frequency deviation and modulating signal frequency is called as
Option A:	Deviation ratio
Option B:	Frequency ratio
Option C:	Modulation index
Option D:	Modulation ratio
11.	What is the maximum bandwidth of an FM signal with a deviation of 30 kHz and a maximum modulating signal of 5 kHz using Carson's rule?
Option A:	70 KHz
Option B:	35 KHz
Option C:	80KHz
Option D:	40 KHz
12.	Which of the following is not a disadvantage of FM over AM?
Option A:	Wide bandwidth
Option B:	Complex circuit
Option C:	Noise immunity
Option D:	Less area of reception
13.	_____ is used in entertainment broadcasting, while _____ is employed for communications.
Option A:	Wideband FM, Narrowband FM
Option B:	Narrowband FM, Wideband FM
Option C:	Wideband FM, Wideband FM
Option D:	Narrowband FM, Narrowband FM
14.	A pre-emphasis circuit provides extra noise immunity by
Option A:	boosting the bass frequencies

Option B:	amplifying the higher audio frequencies
Option C:	pre amplifying the whole audio band
Option D:	converting the phase modulation to FM
15.	In a broadcast superheterodyne receiver, if the intermediate frequency is 455 KHz, the image frequency and rejection ratio at 25 MHz is
Option A:	2.59 MHz, 0.72
Option B:	100 MHz, 7.22
Option C:	28 MHz, 0.72
Option D:	25.91 MHz, 7.22
16.	Which of the following is not an effect of high value of intermediate frequency?
Option A:	Poor selectivity
Option B:	Poor adjacent channel rejection
Option C:	Poor image frequency rejection
Option D:	Tracking difficulties
17.	Calculate the Nyquist rate for sampling when a continuous time signal is given by $x(t) = 5 \cos 100\pi t + 10 \cos 200\pi t - 15 \cos 300\pi t$
Option A:	300Hz
Option B:	600Hz
Option C:	150Hz
Option D:	200Hz
18.	In pulse width modulation,
Option A:	Amplitude of the carrier pulse is varied
Option B:	Synchronization is not required between transmitter and receiver
Option C:	Instantaneous power at the transmitter is constant
Option D:	Frequency of the pulse is varied
19.	The digital modulation scheme in which the step size is not fixed is
Option A:	Delta modulation
Option B:	Adaptive delta modulation
Option C:	DPCM
Option D:	PCM
20.	Multiplexers in early TDM/PAM telemetry systems used a form of rotary switch known as a
Option A:	Telemetry
Option B:	Mixer
Option C:	Commutator
Option D:	Rotator

Q2 (20 Marks)	Solve any Four out of Six	5 marks each
A	If an amplifier has bandwidth B=20 KHz and a total noise power N = 2 X 10^{-17} W. determine the total noise power if bandwidth i) increases to 40 KHz ii) decreases to 10 KHz.	
B	Explain any four radio receiver characteristics. Why is AFC required in radio receivers?	
C	Draw and explain Foster Seeley detector in short	
D	Explain pre-emphasis and De-emphasis in detail.	
E	Draw the transmitter and receiver of the FDM signal. Also draw the frequency spectrum of FDM signal	
F	Calculate the percentage power saving when the carrier and one of the sidebands are suppressed in an AM wave modulated to a depth of (a) 100 percent and 50 percent.	

Q3 (20 Marks Each)	Solve any Two Questions out of Three	10 marks each
A	Explain the indirect method of FM generation in detail along with the phasor diagrams	
B	Derive the expression of an Amplitude modulated wave. Draw the time domain and frequency domain waveforms. Also derive the bandwidth of AM	
C	Explain the generation and detection of PPM waveforms in detail. Mention the advantages and disadvantages of PPM compared to other pulse modulation techniques	

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Question Number	Correct Option (Enter either 'A' or 'B' or 'C' or 'D')
Q1.	B
Q2.	C
Q3.	C
Q4	A
Q5	D
Q6	B
Q7	C
Q8.	A
Q9.	C
Q10.	C
Q11.	A
Q12.	C
Q13.	A
Q14.	B
Q15.	D
Q16.	C
Q17.	A
Q18.	B
Q19.	B
Q20.	C