

**K. J. Somaiya Institute of Technology, Sion, Mumbai-22**  
(Autonomous College Affiliated to University of Mumbai)

April – May 2024 (B.Tech) Program: Electronics and Telecommunication_Scheme I/II: <u>IIB</u> Examination: SY Semester: IV Course Code: EXC404 and Course Name: Principles of Communication Engineering		
Date of Exam: 21-05-24	Duration: 2.5 Hours	Max. Marks: 60

Instructions: (1) All questions are compulsory. (2) Draw neat diagrams wherever applicable. (3) Assume suitable data, if necessary.				
		Max. Marks	CO	BT level
<b>Q 1</b>	<b>Solve any six questions out of eight:</b>	<b>12</b>		
i)	State significance of SNR	2	CO1	U
ii)	Draw the waveform for modulation index is 100%, less than 100% and More than 100%	2	CO2	Ap
iii)	Describe Deviation ratio in FM	2	CO3	U
iv)	What do you mean by heterodyning?	2	CO4	U
v)	What is aliasing? How can it be prevented?	2	CO5	U
vi)	Write the Advantages of TDM.	2	CO6	U
vii)	At a room temperature of 290K, calculate the thermal noise power generated by resistors of 100Ω and the bandwidth is 1MHz	2	CO1	Ap
viii)	A transmitter transmits 10 KW of power without modulation and 12KW after modulation. What is the modulation index	2	CO4	Ap
<b>Q.2</b>	<b>Solve any four questions out of six.</b>	<b>16</b>		
i)	A 10KW carrier wave is amplitude modulated at 80% depth of modulation by the modulating signal. Calculate the sideband power, total power and transmission efficiency of AM wave	4	CO2	Ap
ii)	Draw a block diagram of TDM technique and explain the functioning of each block.	4	CO6	U
iii)	Compare ideal sampling, natural sampling and flat top sampling	4	CO5	U

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iv)	Explain the operation of the varactor diode FM generator with the help of circuit diagram.	4	CO3	U
v)	Explain any four receiver parameters	4	CO4	U
vi)	Differentiate between analog and digital communication system	4	CO1	U
<b>Q.3</b>	<b>Solve any two questions out of three.</b>	16		
i)	Explain wired channel in communication system	8	CO1	U
ii)	Draw a neat block diagram of an AM radio receiver and explain the function of each block with waveforms.	8	CO4	U
iii)	Describe how pulse amplitude modulation (PAM) works and the methods used to demodulate PAM signals.	8	CO5	U
<b>Q.4</b>	<b>Solve any two questions out of three.</b>	16		
i)	Derive the expression for AM, Show that the spectrum of AM waves contains upper and lower sidebands. Write the expression of theoretical bandwidth for AM and transmitter power	8	CO2	Ap
ii)	If a FM wave is represented by the equation $V = 10 * \sin(8 * 10^8 t + 4\sin(1000t))$ . Determine 1. Carrier frequency 2. Modulating frequency. 3. MI 4. Maximum Deviation 5. Bandwidth	8	CO3	Ap
iii)	Draw FDM in the telephone system of 3600 channel capacity with 16.984MHz bandwidth. Combine 12 voice channels and each channel occupies the bandwidth of 4KHz. Carrier frequency in the range of 60 to 108KHz range.	8	CO6	Ap

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