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DATA COMMUNICATION & TELEMETRY

Time Allotted: 3 Hours Full Marks: 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP - A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following :

 $10 \propto 1 = 10$

- i) For generation of PAM signal we have to use
 - a) sample and hold circuit
 - b) weinbridge oscillator circuit
 - c) smith trigger circuit
 - d) integrator circuit.
- ii) The bandwidth of FM is
 - a) less than
 - b) equal to
 - c) greater than
 - d) less than equal to

the bandwidth of AM.

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iii)	The figure of merit for a satellite transmitter is				
	a)	G/T ratio	b)	C/N ratio	
	c)	EIRPd)	non	e of these.	
iv)	v) The telemetry system used as wireless telemetry			ireless telemetry system	
	is				
	a)	Voltage telemetry syste	em		
	b)	c) Current telemetry system			
	c) Frequency telemetry system				
	d)	none of these.			
v)	In voltage telemetry system the preferred Singal to Nois				
	ratio	o is			
	a)	< 0.5	b)	> 0.5 & < 1.0	
	c)	> 1.0 & < 2.0	d)	> 2.0.	
vi)	At the receiving side of FDM/FM/FM system, the fil			M/FM system, the filter	
	used	l is			
	a)	LPF	b)	BPF	
	c)	Band reject filter	d)	none of these.	
vii)	Theoretically the bandwidth required in FM is			ired in FM is	
	a)	Zero	b)	Unity	
	c)	10	d)	Infinite.	
viii)		d pass filter is requi ultiplexing in which sys		t the receiver side for	
	a)	TDM			
	b)	FDM			
	c)	Both FDM and TDM			
	d)	Neither FDM nor TDM	,		
2.7		2			



- ix) The signal to quantization noise ratio in an N-bits PCM system
 - a) Depends upon the sampling frequency employed
 - b) Indepedent of the value of N
 - c) Increases with increasing the value of N
 - d) Decreases with increasing the value of N.
- x) Time Division Multiplexing is preferred because
 - a) it require less power
 - b) it needs lesser bandwidth
 - c) more than one massage can be transmitted simultaneously over a common channel
 - d) none of these.
- xi) Which one of the following is not advantage of TDM over FDM?
 - a) TDM has simpler instrumentation
 - b) TDM is not vulnerable in the usual source of the FDM inter-channel cross-talk
 - c) TDM can achieve minimum bandwidth over FDM without loss of cross-talk immunity.
- xii) In a Go-Back-N ARQ, if the range of sequence number is 0 to 63, then what will be the window size?
 - a) 65

b) 63

c) 64

d) 6.

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	xiii)	In HDLC field defines the beginning and
		end of a frame.
		a) flag b) address
		c) control d) FCS.
	xiv)	A 56 K modem can download at a rate of
		Kbps and upload at a rate of
		Kbps.
		a) 33·6; 33·6 b) 33·6; 56·6
		c) 56·6; 33·6 d) 56·6; 56·6.
		GROUP – B
		(Short Answer Type Questions)
		Answer any <i>three</i> of the following. $3 \times 5 = 15$
2.	a)	Define modulation. 2
	b)	Why do we need modulation?
3.	a)	Define the term telemetry.
	b)	Draw and explain the general block diagram of a
		telemetry system.
4.	a)	What is the main disadvantage of SSB signal generation
		using selective filtering methods?

Why are voice signals suitable for SSB signal generation

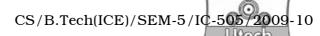
Draw the block diagram how SSB signal generate using phase shift methods. $1\,\frac{1}{2}\,+\,1\,\frac{1}{2}\,+\,2$

using selective filtering methods?

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b)

c)



5. a) Show that output singal-to-quantization noise ratio (SNR) on a PCM system is

$$(SNR)_0 = \left(\frac{S}{Nq}\right) = \frac{3}{2} L^2 \text{ or } \left(\frac{S}{Nq}\right)_{dR} = 1.76 + 20 \log L$$

where L is the number of quantization level.

- b) In binary PCM system, the output signal-toquantization noise ratio is to be held to minimum of 40dB. Determine the number of quantization levels and find the output signal-to-quantization noise ratio. 3 + 2
- 6. What is the difference between serial and parallel transmission? What is the difference between simplex, duplex and half-duplex systems? 2 + 3
- 7. Discuss about the major components of Telephone Network.What is the difference between Inter-and Intra-Local AccessTransport Areas?2 + 3

GROUP - C

(Long Answer Type Questions)

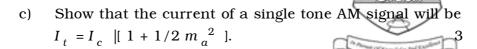
Answer any *three* of the following. $3 \times 15 = 45$

8. a) Show that the power of single tone AM signal will be

$$P_t = P_c [1 + 1/2 m_a^2].$$
 3

A 500 watts carrier is modulated to a depth of
80 per cent. Find the total power in the amplitude modulated wave. Assume the modulating singal to be a sinusoidal one.

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- d) Describe how High Level AM take place.
- e) The antenna current of an AM transmitter is 10A, if only the carrier is sent, but it increases to 9·25A, if the carrier is modulated by a single sinusoidal wave. Determine the percentage modulation. Also find the antenna current if the percent of modulation changes to 0·7.
- 9. a) Draw the block schematic diagram of TDM/PCM/FM system of telemetering and make appropriate labels, both on the transmitting and receiving sides. What is a time frame in the system?
 - b) Discuss about clock recovery cricuit. 5
 - c) Why is synchronization necessary in all TDM systems?

2

3

- 10. a) What is the main advantages of DPCM over PCM?
 - b) What are the main limitations in delta modulation?
 - c) How can slope overload error be reduced by adaptive delta modulation (ADM) ? Describe with necessary diagram.
 - d) A signal of bandwidth $f_m=3.5$ kHz is transmitted using a binary companded PCM with $\mu=150$. Find out the transmission bandwidth and output signal-to-quantization noise ratio (SNR) $_0$. 2+3+7+3

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11. a) Define LAN, MAN and WAN.

3

3

- b) What are the parameters for choosing a good transmission media?
- c) Explain the construction of twisted pair cable. What is the difference between UTP and STP? 2+3
- d) Explain the construction of coaxial cable. What is the difference between thick and thin coaxial cable? 2+3
- 12. a) What are three popular ARQ mechanisms?
 - b) How does ARQ correct an error?
 - c) Discuss about the sender and receiver sliding windowsin Go-Back-N ARQ technique.6
 - d) The antenna current of an AM transmitter is 8 amps when only carries is sent, but it increases to 8.96 amps when the carrier is modulated by a single tone sinusoid.
 - i) Find modulation index
 - ii) Find the antenna current when the depth of modulation changes to 0.8 amps. 5



- 13. Write short notes any *three* of the following :
 - a) Modem
 - b) Asynchronous and synchronous data transfer modes
 - c) Narrow band FM
 - d) Delta modulation
 - e) Phase-locked loop
 - f) Sample and hold circuit.

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