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**SARDAR PATEL UNIVERSITY**  
**M. Sc. Electronics (III Semester) Examination**  
**Monday, 3<sup>rd</sup> December 2012**  
**2.30 p.m. to 5.30 p.m.**

**PS03CELE02 : Digital and Microwave Communication Systems**

**Total Marks : 70**

<b>Q.1</b>	Give the correct/nearest answer (statement) for the following Multiple Choice Questions (Statements)	<b>8 X 1 = 8 Marks</b>
A.	The Shannon-Hartley law relates	
1.	Noise power to bandwidth	
2.	Antenna gain to frequency	
3.	Transmission losses to Noise	
4.	Information carrying capacity to S/N ratio	
B.	Time-Division Multiplexing	
1.	Can be used with PAM only.	
2.	Combines five groups into a super group.	
3.	Stacks 24 channels in adjacent frequency slots.	
4.	Interleaves pulses in time-domain belonging to different transmissions.	
C.	Regarding a geostationary satellite which of the following statement is correct	
1.	It appears to every body on Earth.	
2.	It remains stationary above the earth.	
3.	It hangs motionless in space about 36000 km above earth.	
4.	It travels around the earth in 24 hours.	
D.	The bandwidth required for base band signal in telephony is	
1.	0.3 to 3.4 kHz	
2.	Less than 9 MHz	
3.	Up to 20 kHz	
4.	Up to 30 KHz	
E.	The signal to quantization noise ratio in a PCM system depends on	
1.	Number of quantization levels	
2.	Sampling rate	
3.	Message signal bandwidth	
4.	None of the above	
F.	Noise Figure is	
1.	A measure of noise temperature of a receiver	
2.	A measure of the available noise power from non thermal sources	
3.	Same as physical temperature of body	
4.	The relative increase of the noise power to the increase in signal power.	

Q. Which of the following is common between earth and a geostationary satellite	
1.	Same acceleration
2.	Same velocity
3.	Same angular velocity
4.	Same gravitational force
II. As sampling frequency increases the guard band	
1.	becomes smaller
2.	remains same
3.	becomes larger
4.	none of above

Q.2 Short Questions (Any Seven)	
1.	Define system gain.
2.	What is quantization error?
3.	What is a data communication topology?
4.	What is a DCE?
5.	Contrast Carrier-to-Signal ratio and Signal-to-Noise ratio.
6.	Define balanced modulator.
7.	What do you mean by Fade Margin?
8.	Define expanding
9.	Define data communication protocol.

Q.3 Long Questions:	
(a) Explain the block schematics and waveforms of the Binary Phase Shift Keying (BPSK) transmitter and receiver. Also, compute the transmitter signal bandwidth of DPSK signal	(6)
(b) Determine the minimum bandwidth required for a BPSK modulator with a carrier frequency of 40 MHz and an input bit rate of 500 kbps. Sketch the output spectrum	(6)

OR

(b) Describe the meaning and importance of quantization error in a PCM System	
Q.4 (a) Why is synchronous communication more efficient than asynchronous communication?	(6)
(b) Explain the use of start and stop bits in asynchronous transmission. Why are they unnecessary in synchronous transmission?	(6)

OR

(b) Determine Block Check Sequence (BCS) for the following data and CRC generating polynomial	
$G(X) = x^3 + x^2 + x^1 + x^0 = 10010101$ and $P(X) = x^5 + x^4 + x^3 + x^0 = 110011$	

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$$\text{and } P(X) = x^5 + x^4 + x^3 + x^0 = 110011$$

Q.5	(a) What is Multiplexing? Why it is needed? What are the two basic forms of multiplexing?	(6)
	(b) Show diagrammatically and also with explanation, how channels are combined into groups, groups into supergroups and so on, when FDM is generated in a practical system.	
Q.6	OR	
	(b) Describe the basic structure of Microwave repeater in communication systems	
Q.6	(a) Explain with respect to a microwave communication (i) System Gain (ii) Fade Margin (iii) Free Space Path Loss.	(6)
	(b) Discuss with respect to satellite communication system (i) Look angles (ii) Transponder	
	OR	
	(b) Explain the concept of frequency reuse and cell splitting in mobile communication system.	

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