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No. of printed pages : 3

# SARDAR PATEL UNIVERSITY
## M. Sc. Electronics (III Semester) Examination
Monday, 3rd December 2012
2.30 p.m. to 5.30 p.m.
### PS03CELE02 : Digital and Microwave Communication Systems

Total Marks : 70

| Q.1 | Give the correct/nearest answer (statement) for the following Multiple Choice Questions (Statements) | 8 X 1 = 8 Marks |
|---|---|---|
| | **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. | |

| | | | |
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| | **G.** 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 | |
| | **H.** As sampling frequency increases the guard band | | |
| | 1. | becomes smaller | |
| | 2. | remains same | |
| | 3. | becomes larger | |
| | 4. | none of above | |

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| **Q.2** | **Short Questions (Any Seven)** | | **7 X 2 = 14 Marks** |
| | 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 companding | |
| | 9. | Define data communication protocol. | |

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| **Q.3** | **Long Questions:** | **12 X 4 =48Marks** |
| | (a) Explain the block schematics and waveforms of the Binary Phase Shift Keying (BPSK) transmitter and receiver. Also. compute the transmitter signal bandwidth of BPSK signal | (6) |
| | (b) Determine the minimum bandwidth and baud for a BPSK modulator with a carrier frequency of 40 MHz and an input bit rate of 500kbps. Sketch the output spectrum | (6) |
| | OR | |
| | (b) Describe the meaning and importance of quantization error in a PCM System | (6) |
| **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. $$G(X) = x^7 + x^4 + x^2 + x^0 = 10010101$$ $$\text{and } P(X) = x^5 + x^4 + x^1 + x^0 = 110011$$ | (6) |

| 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. | (6) |
| | OR | |
| | (b) Describe the basic structure of Microwave repeater in communication systems | (6) |
| Q.6 | (a) Explain with respect to a microwave communication<br>(i) System Gain<br>(ii) Fade Margin<br>(iii) Free Space Path Loss. | (6) |
| | (b) Discuss with respect to satellite communication system<br>(i) Look angles<br>(ii) Transponder | (6) |
| | OR | |
| | (b) Explain the concept of frequency reuse and cell splitting in mobile communication system. | (6) |

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