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SARDAR PATEL UNIVERSITY

M.Sc. (Physics) (IV Semester) Examination

Day & Date: Friday, 24/4/2015.

Time: 2.30 p.m. to 5.30 p.m.

Subject: Signal Processing and Satellite Communication

Paper No. PS04EPHY03

Instructions:

(a) Figure to the right indicates marks. **Total Marks :70.**

(b) All questions are compulsory.

Q.1 **Write answer of all questions by showing your choice against the question number.** **(8)**

1. TDM is a process used in _____ communication.
   (a) data (b) digital (c) analog (d) analog and digital
2. In _____ repeaters, the information package can be processed.
   (a) baseband (c) IF
   (b) heterodyne (d) IF and heterodyne
3. The band width in optical fiber communication is more than _____.
   (a) 10^3 (c) 10^6
   (b) 10^9 (d) 10^{12}
4. In transceivers, the transmitter and receiver are connected _____.
   (a) Connected back to back
   (b) Transmitter and receivers are at some distances
   (c) Transmitter and receiver are placed at different places
   (d) (a) and (b)
5. The 90° phase shifter is not used in _____ for generation of SSB.
   (a). Third Method
   (b). Filter Method
   (c). Phase Shift Method
   (d). Superhetrodyne
6. In Television broadcast, _____ video modulation polarity is used.
   (a). negative
   (b). positive
   (c). ground
   (d). Both negative and positive
7. The total power of an AM wave is proportional to the carrier power and the proportionality constant is _____

   (a). $1+\frac{m^2}{4}$ (b). $1-\frac{m^2}{2}$

(c). $1+\frac{m^2}{2}$ (d). $1-\frac{m^2}{4}$

8. In colour television the chromatic content is obtained by combination of _____ luminescence.
   (a). red, green and blue
   (b). red, green and yellow
   (c). red, green and black
   (d). red, green and white

Q.2 Attempt **any SEVEN** of the following: **(14)**

1. Estimate the video bandwidth required for TV transmission.
2. Give the requirements of a faithful video reproduction in a television broadcast system. Indicate which of these are met in a black and white broadcast.
3. Discuss in short the basic reactance modulator for generation of frequency modulation.
4. Discuss the Phase Modulation (PM) method and its modulation index.
5. Define signal to noise ratio and noise figure.
6. What is GSM? Mention the advantages of GSM.
7. What is sampling theorem? What is its importance?
8. Draw the waveform expected in PCM and explain it.
9. Write the full form of TDM. Explain it briefly.

Q.3(a) With schematic circuit diagram, explain Grid-Modulated Class C amplifier for generation of amplitude modulated (AM) wave. **(6)**

Q.3(b) With schematic circuit diagram, mathematically discuss in details the Phase-Shift method for generation of SSB signal **(6)**

OR

Q.3(b) Discuss in detail the types and sources of noise occurring in the signals during communication. **(6)**

Q.4(a) Draw block diagram and explain the working of Tuned Radio-Frequency (TRF) receiver. **(6)**

Q.4(b) What is angle modulation and how it differs from the amplitude modulation? In angle modulation also state the difference between FM and PM. Discuss in brief about the frequency spectrum of an FM wave. **(6)**

OR

Q.4(b) Draw block diagram of black and white TV system. Explain the processes of scanning, blanking and synchronization of electron beam used to generate and reproduce video information. **(6)**

Q.5(a) What is meant by pulse amplitude modulation? Taking necessary example, explain the process of pulse amplitude modulation. **(6)**

Q.5(b) Discuss the process of frequency shift keying in detail. **(6)**

OR

Q.5(b) Using necessary block diagrams, describe the uplink and downlink models used in microwave satellite communication. **(6)**

Q.6(a) Why the structure of cells used in cellular technology is hexagonal? Using the complete cell structure, discuss the cellular technology in detail. **(6)**

Q.6(b) Write the full form of IMEI number. With the help of necessary example, explain the description of IMEI number. **(6)**

OR

Q.6(b) Write the principle of CDMA. Discuss in detail the code division multiplexing. What are the advantages of CDMA? **(6)**

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