

SARDAR PATEL UNIVERSITY
M.Sc. (Physics) IV Semester Examination

Day & Date : Saturday, 9/4/2016

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

Subject: Signal processing and Satellite Communication

Paper No. PS04EPHY03

Total Marks : 70

Instructions:

- (a) Figure to the right indicate marks.
 (b) All questions are compulsory.

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

1. In optical fiber communication, _____ is used as photodetector.
 (a). photodiode (b). LED
 (c). solar cell (d). rectifying diode
2. In digital modulation, if the single polarity waveforms are analyzed, then it is known as _____.
 (a). PCM (b). delta modulation
 (c). PAM (d). PTM.
3. The check digit in IMEI number is of _____ digits.
 (a). 1 (b). 3
 (c). 4 (d). 5
4. The speed of communication is very high in _____.
 (a). FDMA (b). TDMA
 (c). CDMA (d). FDMA and TDMA combination
5. In Amplitude Modulation, if modulation index $m = 1$, the lower side band power will _____.
 (a). $\frac{V_c^2}{4R}$ (b). $\frac{V_c^2}{8R}$ (c). $\frac{V_c^2}{2R}$ (d). $\frac{V_c}{8R^2}$
6. In Frequency Modulation, if modulating frequency f_m is constant and deviation δ increases than the frequency bandwidth _____.
 (a). decreases (b). remains constant
 (c). increases (d). may increase or decrease
7. In Third method of SSB generation, the number of balanced modulators used is _____.
 (a). one (b). two
 (c). three (d). four
8. In the basic reactance modulator for Frequency Modulated (FM) wave generation, the gate-to-source impedance must be _____ the drain-to-gate impedance.
 (a). greater than (b). lesser than
 (c). equal to (d). none of them

- Q.2. Attempt any SEVEN of the following. (14)**
1. Write down the sampling theorem and explain its importance.
 2. Mention the advantages of optical fibers.
 3. What is transceiver? What is its use in mobile handsets?
 4. Explain the meanings of FDMA, TDMA and CDMA.
 5. With suitable AM wave diagram derive the equation of modulation index m in terms of V_{\max} and V_{\min} .
 6. Calculate the percentage power saving when the carrier and one of the side bands are suppressed in an AM wave modulated to a depth of (a) 100% and (b) 50%.
 7. How in television system the continuous motion of object is possible?
 8. Why in filter method, LC filters are not used?
 9. Write down the equation for guard band. What is its significance?

- Q.3. (a) What is the use of modulation in communication system? Using mathematical expressions explain amplitude modulation (AM) in detail and derive the power relation in AM wave. (6)**
- (b) Define signal-to-noise ratio and noise figure of a receiver. When might the later be a more suitable piece of information than the equivalent noise resistance? (6)**

OR

- (b) Using mathematical expressions explain frequency modulation (FM). Discuss in details the frequency spectrum of the FM wave. (6)**

- Q.4. (a) With necessary circuit diagram discuss the grid modulated Class C amplifier for generation of AM wave. (6)**
- (b) Draw necessary block diagram and employing mathematical expression explain the Phase-shift method for generation of single side band. (6)**

OR

- (b) With necessary block diagram, explain the working of television (TV). (6)**

- Q.5. (a) What is PCM? Taking necessary example, explain its importance. (6)**
- (b) What is meant by frequency shift keying? Explain the process involved in the shift of frequency in case of FSK. (6)**

OR

- (b) Draw the block diagram of optical fiber communication link. Describe each block in detail. (6)**

- Q.6. (a) Why the cell structure is hexagonal in cellular technology? Discuss the idea about cell requirement and structure and principle of operation of cellular technology. (6)**

- (b) Write down the full form of IMEI. What is its importance? With the help of necessary example, explain the identification of IMEI number. (6)**

OR

- (b) Give a comparison between GSM and CDMA techniques used in wireless communication. (6)**
