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SEAT No. _____

No. of Printed Pages : 2

SARDAR PATEL UNIVERSITY

M. Sc. (Physics) IV Semester Examination

Day and Date: Saturday, 23rd March, 2019

Time: 10.00 am to 1.00 pm

Subject: Signal Processing and Satellite Communication

Paper No: PS04EPHY23

Total Marks: 70

Q.1 Multiple Choice Questions. (8)

- (1) The GSM technology leads to 2G network when _____ is used.
(a) FDMA (b) TDMA (c) CDMA (d) TDMA and CDMA
- (2) Fast modems use _____ network.
(a) simplex (b) duplex (c) half duplex (d) full duplex
- (3) In cellular telephone network, the shape of each cell is _____.
(a) hexagonal (b) circular (c) triangular (d) rectangular
- (4) The noise is minimum in _____ analog modulation process.
(a) AM (b) SSB (c) FM (d) PM
- (5) A 100% suppressed carrier of an AM wave leads to _____ % power saving
(a) 150 (b) 100 (c) 66.66 (d) 50
- (6) _____ is a method for generation of FM waves.
(a) filter method (b) plate modulated class C amplifier
(c) third method (d) reactance modulator
- (7) _____ noise becomes less significant at frequencies above 30 MHz.
(a) flicker (b) atmospheric (c) industrial (d) transit time
- (8) In _____ IC 4016 is used for modulation if an input signal is analog in nature.
(a) PCM (b) PAM (c) PDM (d) PTM

Q.2 Short questions (Attempt any seven) (14)

- (1) Give a classification of all modulation processes.
- (2) Why the shape of a cell in cellular mobile technology is always hexagonal?
- (3) Which are two synchronization techniques used in MODEMS? Mention the difference between these two techniques.
- (4) What is transceiver? Where is it used?
- (5) Draw the block diagram of optical fiber communication link.
- (6) Taking necessary example, explain the time domain and frequency domain representations of a signal.
- (7) What is SSB modulation? How is it advantageous over double sideband full carrier (DSBFC) AM?
- (8) What is super heterodyne receiver? Explain briefly.
- (9) Write the Carson's rule for required bandwidth of F. M. wave to pass through a communication system. When is it applicable?

(1)

(P.T.O.)

- Q.3 (a) Define noise and give its characteristics in reference to electronic communication. Discuss in detail the internal noise in communication systems. (6)
- (b) Define and explain the followings. (6)
- (1) signal to noise ratio
 - (2) noise figure.

OR

- (b) Discuss the need for modulation. Explain amplitude modulation with the help of necessary example. Also define modulation index of AM and describe its power spectra and required bandwidth. (6)

- Q.4 (a) Mention various methods used for SSB generation and explain any one of them in detail with necessary circuit diagram and equations. (6)
- (b) How AM is produced? Discuss the plate modulated class C amplifier's operation to generate AM waves. (6)

OR

- (b) Taking suitable method for FM generation, explain its working with the help of necessary circuit diagram. (6)

- Q.5 (a) What is meant by frequency shift keying? Where is it used? Discuss the process of modulation involved in frequency shift keying. (6)
- (b) "The pulse code modulation is a digital modulation process". Justify this statement. Explain the process of quantization of modulating signal and its conversion in to digital pulses. (6)

OR

- (b) Differentiate between the geostationary satellite and orbital satellite. Why the geostationary satellites are preferred over the orbital satellites in electronic communication? With the help of a block diagram, explain the operation of satellite transponder in satellite communication. (6)

- Q.6 (a) Explain the significance of IMEI number. What is Luhn check digit? How many bits it has? Taking necessary example, discuss the IMEI number and process of verifying the Luhn check digit. (6)
- (b) What are GSM and CDMA? Compare various features of GSM and CDMA in detail. (6)

OR

- (b) Compare various multiple access systems viz. FDMA, TDMA and CDMA used in mobile communication and data communication systems. (6)

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