

## DEPARTMENT OF ELECTRONICS & COMMUNICATION

"T3 Examination, May 2019"



Semester: IV

Subject: Wireless Communication

Branch: CSE

Course Type: CORE

Time: 3 Hrs.

Max. Marks: 100

Date of Exam: 23/05/2019

Subject Code: ECH-251 -T

Session: II

Course Nature: HARD

Program: B.Tech.

Signature: HOD/Associate HOD:



Note: All questions are compulsory

### PART - A

Q1. (a) Consider the message signal  $m(t) = \cos(20\pi t)$ . Let the carrier frequency  $f_c = 1 \text{ KHZ}$  and carrier amplitude  $A_c = 20$ . With 25% modulation, calculate the efficiency of AM signal. (5)  
 (b) Illustrate block diagram of Digital communication system in brief. (5)

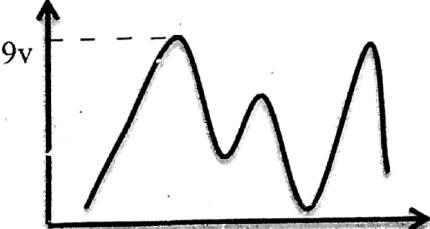
### PART - B

Q2. (a) In a dense environment, path loss exponent = 4.5 and required signal to interference ratio is 13 dB. Evaluate the permissible reuse factor for first tier six interfering cells. If the cell size is reduced to increase the capacity, how it would impact practical wireless design system. (4)  
 (b) Describe the following.  
 (i) Intersystem Handoff  
 (ii) Near-Far effect  
 (iii) Erlang-C system and GOS (6)

### PART - C

Q3. (a) A TDMA system uses 42 Kbps data rate to support 3 users per frame. Each user occupies two of the six time slots per frame. Calculate:  
 (i) Raw data rate provided for each user  
 (ii) If frame efficiency is 80% and frame duration is 6.67 ms, determine the number of information bits for each user per frame. (10)  
 (b) Determine the maximum throughput that can be achieved using ALOHA and Slotted ALOHA protocols. (10)

Q4. (a) For the information signal given:



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$$\frac{S}{I} = 13 \text{ dB}$$

$$10 \log \frac{S}{I} = 13$$

$$10 \log \frac{94.667}{1000} = 13$$

$$94.667 \times 10^{-3} = 10^{13/10}$$

$$94.667 \times 10^{-3} = 3.162 \times 10^{-1}$$

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Model a DSSS system and show all the intermediate steps at both transmitter and receiver sides in detail with help of blocks and waveforms. 12

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(b) In Advanced phone mobile services, 400 channels are allocated to a cellular operator. The channel Bandwidth is 25 KHZ with guard band of 8KHZ. Calculate the spectrum allocated. 4

4

(c) Estimate the number of analog channels per cell for the case of  $n=3$ , where minimum acceptable carrier to interference ratio  $\frac{C}{I} = 14$  dB. What is the approximate cluster size for the system? Assume channel bandwidth is 30 KHZ and total spectrum allocation is 20 MHZ. 4

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PART-D

$$n = \frac{B_{ch}}{B_{ch} + \sqrt{\frac{2}{3} \left( \frac{C}{I} \right)_{min}}}$$

Q5. (a) Explain the concept of MIMO in detail and compare Transmit, receive and frequency diversities techniques. 10

10

(b) With help of labeled diagram discuss the transmission of OFDM signal in detail. 10

10

Q6. Discuss briefly the following:

(d) LTE signal flow

(e) Polarization diversity

(f) SCFDMA

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