### KENYA METHODIST UNIVERSITY – NYERI CAMPUS

**2nd Trimester 2017**

### Wireless Communication Technologies

**PAPER 2**

SECTION A : Compulsory question

Q1. Define the following terms

1. Bluetooth ( 3 marks)
2. RFID (3marks)

(b) Define and explain how the VoIP protocol works . (4 marks)

(c) Distinguish between flat and frequency selective fading. (4 marks)

(d) Name and explain at least two indoor and outdoor propagation models known to you.

( 8Marks)

(e) Differentiate spatial diversity and spatial multiplexing. ( 4 marks)

 (f) What is the need for power control in CDMA based cellular systems ( 4 marks)

**SECTION B: Answer any two Questions**

Q2. A new cellular service provider decided to employ a cluster of 19 cells as the basic module for frequency reuse. Let us define the reuse distance as D and the cell radius as R.

1. Identify one such cluster structure? Mark this structure (just the full set of cells, without numbering them) by filling the appropriate cells (4 marks)
2. Get an alternate cluster structure for part a.(4markd)
3. What is the reuse distance D for the system of part a., as a function of R? ( 4 marks)
4. Find the worst-case co-channel interference in such a system, considering only first-tier co-channel interferers with equal transmitter power Pt? ( 8 marks)

Q3. Explain the various capacity expansion techniques in cellular systems ( 8 marks)

(ii)An Urban area has a population of two million residents. Three competing trunked mobile networks (Systems A, B, and C) provide cellular service in this area. System A has 394 cells with 19 channels each, system B has 98 cells with 57 channel each, and system C has 49 cells, each with 100 channels. Find the number of users that can be supported at 2% blocking if each user averages two calls per hour at an average call duration of 3 minutes. Assuming that all trunked systems are operated at maximum capacity, compute the percentage market penetration of each cellular provider. Given from Erlang B chart for GOS= 2% ( 12 marks)



Q4. With suitable diagrams, explain the implementation of the MAC protocol in wireless networks. (6 marks)

(ii) A mobile host travels to foreign networks while retaining its home IP address. To support this, mobile hosts advertise their home IP address to foreign routers, who propagate this information to other routers during routing updates. Name two advantages and disadvantages of this scheme compared to Mobile IP. ( 8 marks)

 (iii)Illustrate the implementation of a web dispatcher on an https implementation ( 4 marks)