JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
TEST -2 EXAMINATION- Oct 2018
B.Tech VII Semester (ECE)

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COURSE CODE: 10B1WEC731

MAX. MARKS: 25

COURSE NAME: Mobile Communication
COURSE CREDITS: 3

MAX. TIME: 1 Hr 30 min

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.

Q1) Draw the GSM reference architecture model and explain the following GSM subsystem entities **(a)** Radio Sub System (RSS) **(b)** Network Sub System (NSS) **(c)** Operation Sub System (OSS)   **(5)**

Q2) What is the difference Between a physical channel and a logical channel? Describe the important functions of various types of GSM logical channels.   **(5)**

Q3)

   (a) Compute the worst case C/I value for the mobile receiver located at the boundary of its serving Cell if it is under the influence of interfering signals from two nearest co-channel interfering cells in a cellular system. The system is designed with 3 – sector directional antenna cellular system with a reuse pattern of 4. Assume the path loss exponent as 4 in a mobile radio environment.

   (b) Does this system yield an adequate value of C/I for a practical system which requires 6 dB higher than the theoretical value of $C/I = 18dB$?   **(5)**

Q4) A cellular service provider decides to use a digital TDMA scheme which can tolerate a Carrier-to-interference ratio of 15dB in the worst case and a path loss component of $\gamma = 4$. Find the optimal value of K for
   a) Omni-directional Antennas
   b) 120^0 sectoring
   c) 60^0 sectoring
   Should sectoring be used? if so, which case (60^0 or 120^0) should be used?   **(5)**

Q5) Consider a seven- cell reuse cellular system having a total of 395 traffic channels. In this system, an average call lasts for three minutes and the probability of blocking is no more than 1%. Let every mobile subscriber make one call per hour, on average. Assume that blocked calls are cleared so that the call blocking is described by the Erlang B distribution.   **(5)**
   Determine the following:

   a) The average number of calls made by a mobile subscriber per hour if the system is configured as an omni-directional system.
   b) The average number of calls made by a mobile subscriber per hour if the system is configured as a 3-sectored antenna configuration. Show that the decrease in trunking efficiency from that of an omni-directional antenna is 24%.
   c) The average number of calls made by a mobile subscriber per hour if the system is configured as a 6- sectored antenna configuration. Show that the decrease in trunking efficiency from that of an omni-directional antenna is 44%.