3E9501

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M. Tech. (Sem. III) (Main & Back) Examination, April - 2011
Digital Communication
3MDC1 Mobile Communication

Time : 3 Hours] [Total Marks : 100
[Min. Passing Marks : 33

Attempt any five questions.
Marks of questions are indicated against each question.
Draw neat and comprehensive sketches wherever necessary to clearly illustrate your answer.
Assume missing data suitably if any and specify the same.

Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)

1. Nil 2. Nil

1 (a) Explain Cellular frequency reuse concept and find the expression for total number of duplex channel that can be assigned to a cell. 8

(b) Prove that for a hexagonal geometry the co-channel reuse ratio is given by
$Q = \sqrt{3N}$, where $N = i^2 + ij + j^2$. 8

(c) What is the difference between traffic intensity and the mean rate of cells in a system. 4

2 Consider a 7-cell system covering an area of 3100 km². The traffic in the seven cells is as follows :

Cell No.	1	2	3	4	5	6	7
Traffic	30.8	66.7	48.6	33.2	38.2	37.8	32.6

Each user generates an average of 0.03 erlangs of traffic per hour with a mean holding time of 120 sec. The system consists of a total of 395 channels and is designed for a grade of service of 0.02. Determine the following :

(i) No. of subscribers in each cell
(ii) No. of calls per hour per subscriber
(iii) No. of calls per hour in each cell
(iv) No. of channels required in each cell
(v) Total no. of subscribers
(vi) Subscriber density / km²
(vii) The average no. of subscriber per channel
(viii) The total traffic
(ix) Erlangs/km²
(x) Radius of cell. 20

3 (a) Discuss the Okumara and Hata Outdoor propagation models as applied for calculation of path loss in urban/suburban area. 10

(b) What are the difference hand-off strategies ? What is the difference between hard and soft hand-off. 10

4 (a) What is the fresnel zone concept ? Explain its significance in planning a N/W 8

(b) What are the different pulse shaping technique for improving Intersymbol Interference. Explain 'Raised Cosine roll off filter'. 8

(c) Suppose the distance b/w two fx is 10 Km and carrier frequency is 2.4 GHZ, calculate radius of first fresnel zone at mid-point b/w 2 fx. 4

5 (a) What are the 2-fading mechanism that characterize small-scale fading. Explain the fourier transform and duality relationship among the time and frequency descriptions of these mechanism. 10

(b) Discuss the spread spectrum concept. Explain the advantages and disadvantages of spread spectrum technique in cellular system. 10

(a) Draw a block diagram of overall GSM architecture and explain the key functional elements in the GSM system. 10

(b) With the help of a block diagram, explain the reverse CDMA channel modulation process. 10

(a) Discuss the three major multiple access techniques used to share the available BW in a wireless communication system. — unit 6 RP Yadav 10

(b) What are the different protocols and modules include in WAP specification. Give their relationship. 9.2 RP Yadav 10

Write short notes on any two of the following :

(a) Multi-Carrier CDMA

(b) Pure and slotted ALOHA

(c) Rake Receiver

(d) GSM speech codec. — 7.5.6 RP Yadav 10+2