

- N.B. :** (1) Question No. 1 is compulsory.  
 (2) Solve any **four** questions from Q. No. 2 to Q. No. 7.  
 (3) Draw **neat** sketches/diagrams, wherever **necessary**.  
 (4) Assume **suitable** data, wherever **necessary** and **justify** it.  
 (5) **Figures** to the right indicate **full** marks.
1. (a) A total of 20 equal power mobiles share a frequency band through a CDMA system. Each mobile transmits data at 16 kbps with DSSS BPSK-modulated signal. Calculate the minimum chip rate of the PN-sequence needed to maintain a bit error probability of  $10^{-6}$ . Assume the interference factor due to other cells,  $f = 0.6$ ; power control accuracy factor = 0.8, and gain due to three-sector antenna = 2.55 and ( $U_f = 0.5$ ). 5
  - (b) Calculate the search window size in PN chips of the active, neighbour, and remaining set. The maximum delay spread is  $4 \mu\text{s}$  and spreading rate is 3.84 Mcps. The maximum distance between (i) the mobile and cell transmitting active set pilot, and (ii) the mobile and cell transmitting neighbour (remaining) set pilot is 4 miles. 5
  - (c) List the different features incorporated in TAG-3 Personal Access Communication System. 5
  - (d) Describe the various Blue tooth usage models. 5
  2. (a) Explain briefly the different Forward Link Physical channels used in CDMA 2000 system. 10
  - (b) Explain the TR-45.1 architectural reference model for WLL system. 10
  3. (a) Describe the three search windows used by the mobile to track the received pilot signals, in CDMA system. 10
  - (b) Draw a labelled sketch of Blue tooth Protocol Stack. Hence, explain the Middleware Protocol Group. 10
  4. Calculate the link safety margin parameters for the Forward Link Channel of a CDMA system using following data :- 20
    - (a) Pilot Channel ERP ( $P_{\text{pilot}}$ ) = 33.8 dBm
    - (b) Synch Channel ERP ( $P_{\text{sync}}$ ) = 23.8 dBm
    - (c) Paging Channel ERP ( $P_{\text{paging}}$ ) = 29.5 dBm
    - (d) Traffic Channel ERP ( $P_{\text{traffic}}$ ) = 41 dBm
    - (e) Number of users per sector on the reverse link = 13
    - (f) Channel overhead due to soft handoff = 0.85
    - (g) Path loss between cell site and mobile ( $L_p$ ) = -130.2 dB
    - (h) Penetration loss ( $L_{\text{penet}}$ ) = -15 dB
    - (i) Body/Orientation loss ( $L_{\text{Body}}$ ) = -2 dB
    - (j) Fade Margin ( $M_{\text{fade}}$ ) = -10.3 dB
    - (k) Mobile antenna gain ( $G_m$ ) = 2 dB
    - (l) Cell site antenna gain ( $G_b$ ) = 13 dB
    - (m) Cable losses ( $L_{\text{cable}}$ ) = -1.5 dB
    - (n) Channel activity factor ( $\alpha_{\text{ch}}$ ) = 0.42
    - (o) Bandwidth = 1.2288 MHz
    - (p) Traffic Channel rate = 9600 bps
    - (q) Sync Channel rate = 1200 bps
    - (r) Paging Channel rate = 4800 bps
    - (s) Cell reuse factor ( $f_r$ ) = 0.65
    - (t) Noise figure of mobile ( $N_f$ ) = 8.
  5. (a) Explain the different forms of registration supported by IS-95. 10
  - (b) Describe the different handoff parameters used in the IS-95A system. 5
  - (c) List the different Reverse Physical Channels used in CDMA 2000 systems. 5
  6. (a) Explain the Authentication procedure used in IS-95 CDMA system. 5
  - (b) Describe the PLDCF specific protocols, as defined in CDMA 2000 system. 5
  - (c) Explain the WAP Architecture. 10
  7. Write short notes on (any four) :- 20
    - (a) Blue tooth security.
    - (b) Evaluation of CDMA IS-95 to CDMA 2000.
    - (c) Pilot set Maintenance.
    - (d) Reuse Parameters and Intercell Interference in CDMA system.
    - (e) PLICF data services.