

N.B (1) Question No. 1 is compulsory

(2) Attempt any **four** out of the remaining **six** questions.

(3) Assume **suitable** data if **required**.

(4) **Figures** to the right indicate **full marks**.

1. (a) Explain Umbrella cell approach. 20
 (b) What is a mobile assisted Hand off? Explain strategy.
 (c) Distinguish between FDD and TDD.
 (d) Distinguish between Erlang B and Erlang C system.

2. (a) Prove that for a hexagonal geometry, the co-channel reuse ratio is given by $Q = \sqrt{3N}$, where $N = i^2 + ij + j^2$ 05
 (b) Distinguish between Fixed channel assignment and Dynamic channel assignment strategies. Compare merits and demerits. 05
 (c) A cellular system using a cluster size of 7 is operated with 660 channels, 30 of which are set-up (control) channels. The cell radius is 470.1m and there is a user density of 9000 users/km² in the system. Each user makes an average of one call per hour and each call lasts on an average up to one minute. Determine the probability that a user will experience a delay greater than 20 seconds if all calls are queued. 10

Erlang C chart for number of channels = 90

Traffic intensity (Erlangs)	P (delay >0)
80.12	0.2
82.21	0.3
83.83	0.4
86.12	0.5

3. (a) Explain the functions of the following signaling techniques in AMPS: 08
 (i) Supervisory Audio Tone (SAT)
 (ii) Signaling Tone (ST)
 (iii) Wideband Blank and Burst signaling
 (b) With the help of block diagram, explain the GSM architecture and explain radio interface. 12
4. (a) Define and explain types of small scale fading based on multipath time delay & Doppler spread. 10
 (b) Differentiate between fast fading and slow fading. 04
 (c) A base station transmitter operates at 1850 MHz. For a vehicle moving at 60 mph, compute the received carrier frequency if the mobile is moving (1 mile = 1.6 Km): 06
 (i) Directly towards the transmitter
 (ii) Directly away from the transmitter
 (iii) In a direction perpendicular to the direction of arrival of the transmitted signal

5. (a) Explain Data Services in DECT and PACS: 10
 (b) Explain with architecture.
 (i) High speed Circuit Switched Data (HSCSD) in GSM. 05
 (ii) General Packet Radio Services (GPRS). 05

6. (a) In respect of CDMA system, explain the following: 08
 (i) Power control sub-channel
 (ii) Orthogonal Covering
 (b) Explain the forward CDMA channel modulation process with the help of neat block diagram. 12

7. (a) Explain the common control channels and dedicated control channels used in GSM system. 08
 (b) Explain cell splitting. 06
 (c) Explain the Authentication, Cipher key generation and encryption process in GSM. 06