

- (ix) What is the minimum spectrum allocation required by W-CDMA?
(a) 5 MHz (b) 20 MHz (c) 1.25 MHz (d) 200 kHz.
- (x) Which network is smooth across heterogeneous networks?
(a) CDMA2000 (b) GSM (c) GPRS (d) UMTS.

Group - B

2. (a) In a cluster, there is an increased subscriber density at a particular cell. Recommend a technique to adopt this enhanced traffic density. Also estimate the probable practical limitations in your proposal. [[CO1,CO2](Evaluate/HOCQ)]
- (b) Plan the channel allocation strategy of a cellular system to overcome problems which arise from adjacent cell interference? [[CO1,CO2](Evaluate/HOCQ)]
(4 + 2) + 6 = 12
3. (a) Assess the influence of co-channel interference on system capacity of a cellular system. [[CO1,CO2](Analyse/IOCQ)]
- (b) Develop a technique to enhance the capacity of the cellular system by reducing co-channel interference without modifying the basic cell structure. [[CO1,CO2](Apply/IOCQ)]
6 + 6 = 12

Group - C

4. (a) How modification in the Radio Access Network improves the performance of a 2.5G system? [[CO3](Analyse/IOCQ)]
- (b) Compare the operation of UE and Node B with the analogous component in the 2G system. [[CO3,CO6](Analyse/IOCQ)]
- (c) Mention the improvements in the performance achieved in HSDPA compared to 3G Network. [[CO3,CO6](Understand/LOCQ)]
4 + 4 + 4 = 12
5. (a) What are the key differences between IS95 AND CDMA2000? [[CO2,CO3](Remember/LOCQ)]
- (b) Explain UMTS network operation with suitable figure. [[CO3](Understand/LOCQ)]
- (c) Cdma2000-1xEV is an evolutionary advancement for high-data-rate applications. Justify this statement. [[CO3](Analyse/IOCQ)]
3 + 5 + 4 = 12

Group - D

6. (a) Define Long Term Evolution. How OFDM improves the performance of 4G LTE System? [[CO4,CO5](Analyse/IOCQ)]
- (b) What is VoLTE? How does VoLTE work? [[CO4](Understand/LOCQ)]
6 + 6 = 12

7. (a) Explain MIMO techniques. Explain the working principal of 2×2 DL Single-User MIMO Spatial Multiplexing (SU-MIMO) scheme. [[CO4](Apply/IOCQ)]
(b) How Heterogeneous Networks in LTE can be deployed? Explain briefly. [[CO4,CO5](Evaluate/HOCQ)]
7 + 5 = 12

Group - E

8. (a) What are the significance of coordinated multipoint transmission and reception? How it is going to enhance network performance? [[CO5](Analyze/IOCQ)]
(b) Explain the important features of 5G communication system. What are the key constraints to deploy 5G system under the existing infrastructure? [[CO5,CO6](Evaluate/HOCQ)]
6 + 6 = 12
9. (a) NOMA scheme exploits the channel gain difference between users to achieve high spectral efficiency. Justify the statement. [[CO5](Analyse/LOCQ)]
(b) How the carrier aggregation leads towards bandwidth enhancement in the LTE-Advanced system? [[CO5](Apply/IOCQ)]
4 + 8 = 12
-

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	22.92	53.13	23.96

Course Outcome (CO):

After the completion of the course students will be able to

1. Recapitulate cellular communication systems, architecture, functioning, and various standards.
2. Learn evolution of mobile communication generations 2G, 2.5G
3. Learn 3G with their characteristics and limitations.
4. Understand emerging technologies required for fourth generation mobile systems such as SDR, MIMO etc.
5. Understand the concept of LTE-advanced, 4G features and challenges, 5G vision.
6. Analyse and compare architecture, functioning, protocols, capabilities and application of various mobile communication networks.

*LOCQ: Lower Order Cognitive Question; IOCQ: Intermediate Order Cognitive Question; HOCQ: Higher Order Cognitive Question.

