

Total No. of Questions : 8]

SEAT No. :

PD4300

[Total No. of Pages : 4

[6403]-98

T.E. (E. & TC)

CELLULAR NETWORK

(2019 Pattern) (Semester - VI) (304192)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer questions from Q1 or Q2, Q3 or Q4, Q5 or Q6 and Q7 or Q8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.
- 5) Assume suitable data, if necessary.

Q1) a) Compare 1G to 5G on following parameters only? [5]

- i) Data Bandwidth
 - ii) Technology used
 - iii) Multiplexing Technique used
 - iv) Switching technique used
 - v) Core network used
- b) Draw GSM system architecture along with different interfaces used and function of each interface? [6]
- c) Draw and explain following terms - [6]
- i) Co-channel Interference
 - ii) Adjacent channel Interference

OR

Q2) a) Write following characteristics parameters of GSM standard : [6]

- i) Uplink frequency band
- ii) Down link frequency band
- iii) Bandwidth per channel
- iv) Number of possible simultaneous calls
- v) Modulation used
- vi) Access method used

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- b) In the context of optimizing cellular network performance, consider a scenario where a network consists of 20 clusters, each containing 5 cells, each cell equipped with 15 channels for communication. Determine number of channels per cluster and calculate the total channel capacity for entire network. [5]
- c) Consider frequency reuse factor $N = 7$, for a system that requires S/I ratio of 18 dB, calculate worst case of signal to Noise ratio, Also justify whether $N = 7$ is an acceptable limit for cochannel interference? [6]

- Q3)** a) Write a short note on Teletraffic system model. [5]
- b) In a wireless signal propagation with cell radius $d = 10$ km, height of Transmission antenna of 40 m, height of receiving antenna = 2 m Temperature $T = 293^\circ\text{K}$, Noise figure of 5 dB, Bandwidth = 30 kHz, gain of receiving antenna = 10 dB, cable losses are 3 dB, gain of transmitting antenna is 10 dB, Margin = 10 dB and $\text{SNR}_{\text{req}} = 30$ dB. Calculate the transmit power required through link budget analysis with consideration of level of interference equal to noise power. Assume carrier frequency of 6 GHz and $a(\text{hr}) = 1.04$ dB for large city. [8]
- c) Describe state transition diagram for the system with N channels. [5]

OR

- Q4)** a) Calculate load offered to network by 20 subscribers with total duration of calls are 3600 seconds, If observation period of 20 minutes. [5]
- b) Write a short note on - [8]
- Blocking probability
 - Loss call system assumptions

c) Define the following - [5]

- i) Traffic Intensity
- ii) Peak Busy Hour
- iii) Grade of Service
- iv) Erlang
- v) Relation between Erlang - CCS-CS-CM

Q5) a) Draw and explain : General Packet Radio Service used in 2.5G Technology. [6]

b) Draw and explain Architecture of LTE System? [6]

c) Compare LTE and LTE-A on following parameters : [6]

- i) Peak data rate
- ii) Modulation used
- iii) Peak spectrum efficiency
- iv) Network architecture
- v) Access Technology
- vi) Channel Bandwidth

OR

Q6) a) Draw & explain 3G-UMTS Architecture? [6]

b) Draw and explain LTE-A Radio Protocol Architecture. [6]

c) Draw and explain open wireless architecture of 5G network. [6]

Q7) a) Define QoS? Explain in brief following parameters : [9]

i) Throughput

ii) Latency

iii) Jitter

iv) Packet loss

v) Reliability

vi) Availability

b) Write short note on - [8]

i) Application layer

ii) Network Layer

iii) MAC Layer

iv) Physical Layer

OR

Q8) a) Draw and explain how to do performance evaluation of the system. [5]

b) Define QoE? Explain in brief following parameters. [9]

i) Peak signal to Noise ratio

ii) Structural similarity

iii) Video quality metric

iv) Mean opinion score

c) Short note on Layered Analysis. [3]

