M.Sc. Examination 2018
Semester-II
Computer Science
Course : MCSC-25
(Wireless Network)

Time : 3 Hours **Full Marks : 40**

Questions are of value as indicated in the margin

Answer **any four** questions

1. a) An operator has 5 MHz paired spectrum in the 900 MHz band to deploy 2G ells in a specific region. The operator chooses hexagonal cell neighbourhood plan. Slot 0 for each frame is reserved for control-channel operations. If each cell is provisioned to support 40 simultaneous full-rate voice calls (1 slot each frame), then show a possible frequency reuse pattern.
   b) Suggest a possible reuse pattern using which each cell can be split into 4 smaller cells retaining the hexagonal neighbourhood plan, and the total capacity of the large cell region improves to around 80 simultaneous full-rate voice calls. [5+5=10]
2. a) Briefly illustrate the CS-domain network architecture of 3G systems and mention the functions of each network node.
   b) Illustrate the successful CS-registrtion scenario when the MS power-off in its HPLMN and powers-on in a VPLMN. Explain why the MS identifies itself with the old TMSI in the request message. [5+5=10]
3. a) Briefly explain the GPRS $Q \circ S$ classes and parameters over 3G networks.
   b) Briefly describe how the dynamic IP address and $Q \circ S$ parameters are obtained by MS before start of a browsing session in GPRS. [5+5=10]
4. a) Briefly explain the need and operation of LLC sublayer between the MS and 2G SGSN.
   b) Explain how the need of LLC sublayer is removed in 3G networks. [5+5=10]
5. a) A 3G MS is capable of :
   - reading TMSI, IMSI, user preferred, and operator preferred PLMN lists in 200 ms,
   - Scanning for cells on a carrier frequency in 20 ms,
   - Synchronize and acquisition of PLMN id of a cell in 80 ms,
   - listening to broadcast of a cell and camping on a cell in 640 ms.

   Registration procedure (Success/failure) takes on an average of 1 second.

   Carrier sharing across operators is not allowed.

   There are 300 possible carrier frequency values in the supported frequency band of the MS denoted by f_0 to f_{299} which are scanned in order by MS.

   Neither the last registered PLMN(rpl) nor Home PLMN(hpl) are available in the area. The priority list stored in the SIM is $\{up_1, up_2, op_1\}$. The following PLMNs are available in the area:

   -up_1 on carriers f_{10}, f_{20}, and f_{50} does not allow roaming in that location area,

   -px_1 on carriers f_{70} and f_{80}, has no roaming agreement with hpl subscribers,

P.T.O.

-px_2 on carriers f_{100} and f_{200}, allows roaming for hpl subscribers.
Find the time between the MS being switched on till the network name is displayed on the screen.

b) Briefly describe the uplink and downlink channel structure of 3G network.
[6+4=10]

6. a) Briefly describe the OVSF code tree used to generate channelization codes in 3G networks.

b) At a particular time, a 3G cell needs to allocate 2 channels with SF = 4, 4 channels of SF = 8, and 8 channels of SF = 16 in DL in addition to 4 common channels of SF = 256, which use primary scrambling code and the first four channelization codes of length 256, respectively. Find a possible allocation of channelization and scrambling codes for the allocated channels. [4+6=10]

_____