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10TE82

Eighth Semester B.E. Degree Examination, June/July 2016
GSM

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. Calculate the number of physical channels available in GSM 900 MHz, 1800 MHz and 1900 MHz frequency bands. **(03 Marks)**

b. What are the GSM PLMN services and objectives? **(07 Marks)**

c. With a neat diagram, explain the mapping of GSM onto OSI layers. **(07 Marks)**

d. Write a short note on MS subsystem. **(03 Marks)**

2 a. Describe dynamic power control method. **(04 Marks)**

b. With a neat flow-chart, describe the hopping algorithm used in GSM. **(06 Marks)**

c. Consider a GSM system with the following data:
Coverage area = 9,75,000 mile^2
One-way system bandwidth = 12.5 MHz
Channel spacing = 200 kHz
Frequency reuse factor = 4
MS output power (W) = 600 mW
BS antenna gain (G_{bs}) = 20 dBi
Receive cable/connector loss (L_c) = 3 dB
MS antenna gain (G_m) = 0 dB
Required S/I ratio = 12 dB
Information rate = 271 kbps
Receiver noise figure = 5 dB
Propagation path loss intercept (I_o) = 60 dBm
Log normal fading margin = 8 dB
KT = -174 dBm/Hz
Calculate:
i) Minimum received power
ii) Maximum allowable pathloss
iii) Cell radius in miles
iv) Number of cells required to cover the service area for different number of antenna elements (i.e. for 1, 2, 4 and 6)
v) Infer the result. **(10 Marks)**

3 a. Describe the various GSM logical channels used in GSM. **(08 Marks)**

b. With neat diagram, explain the various bursts used in GSM. **(08 Marks)**

c. With the flow diagram, describe the mobile identification process. **(04 Marks)**

4 a. Explain the attributes of speech coder. **(06 Marks)**

b. Describe LPAS. **(06 Marks)**

c. With neat diagram, explain GSM full-rate LPC-RPE vocoders. **(08 Marks)**

PART – B

5 a. Explain inter-MSC handover using a flow diagram. (08 Marks)

b. With neat block diagram, explain GSM-GPRS network architecture along with protocol stack. (08 Marks)

c. Explain the message flow diagram for call release-mobile initiated. (04 Marks)

6 a. List out the mechanisms used in GSM system to provide privacy and security. (04 Marks)

b. Describe the file structure of SIM card. (04 Marks)

c. Explain the security algorithms used in GSM. (06 Marks)

d. Explain the call flow for token based registration. (06 Marks)

7 a. Consider the GSM system with the following data:

Subscriber usage per month = 180 minutes
Days per month = 28
Busy hours per day = 6
Allocated spectrum = 5 MHz
Frequency reuse plan = 4/12
RF channel width = 200 kHz, full rate
Capacity of a BTS = 32 Erlangs
Subscribers in the zone = 75000
Area of the zone = 550 km^2
Traffic capacity of a sector at 2% GOS = 9.82 Erlangs

Calculate:

i) Average busy-hour traffic per subscriber.
ii) Traffic capacity per cell.
iii) Required number of BSS per zone and the hexagonal cell radius for the zone. (08 Marks)

b. List out the methods which are used to improve spectral efficiency of a wireless system, and define spectral efficiency of a mobile communication system for voice and non-voice transmission services. (04 Marks)

c. Design a TDMA frame for a cellular system to support variable bit rates from 8 kbps to 128 kbps. A user can be assigned multiple carriers (not more than 2). Assume GMSK modulation, a coding rate of R_c = one-half, frame efficiency of 75%, and the symbol rate of the SACCH-a_1 = 0.1 R_s. The cell radius is limited to 5 km and maximum processing delay to 90 ms. (08 Marks)

8 a. Explain the management requirements for wireless networks. (04 Marks)

b. Explain SNMP and OSI systems management. (08 Marks)

c. Explain with neat diagram, NM architecture and interfaces. (08 Marks)

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