ROLL NO. _____

Code: DE66/DE116 Subject: WIRELESS & MOBILE COMMUNICATIONS

DipIETE – ET (Current & New Scheme)

Time: 3 Hours **December 2016** **Max. Marks: 100**

PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVIDED ON EACH PAGE IMMEDIATELY AFTER RECEIVING THE QUESTION PAPER.

NOTE: There are 9 Questions in all.

- **Question 1 is compulsory and carries 20 marks. Answer to Q.1 must be written in the space provided for it in the answer book supplied and nowhere else.**
- **The answer sheet for the Q.1 will be collected by the invigilator after 45 minutes of the commencement of the examination.**
- **Out of the remaining EIGHT Questions answer any FIVE Questions. Each question carries 16 marks.**
- **Any required data not explicitly given, may be suitably assumed and stated.**

Q.1 Choose the correct or the best alternative in the following: (2×10)

a. The separation between adjacent carrier frequencies in GSM is _____.
(A) 100 kHz **(B)** 200 kHz
(C) 225 kHz **(D)** 250 kHz

b. The cluster size of the frequency reuse pattern of a hexagonal cellular system can only take on particular values. Namely
(A) 1, 3,5,7,9... **(B)** 1, 4, 9, 16, 25…
(C) 1, 3, 4, 7, 9, 11... **(D)** 1, 3, 4, 6, 7, 9, 10…

c. The maximum throughput for pure ALOHA is _____ per cent.
(A) 12.2 **(B)** 18.4
(C) 36.8 **(D)** None of these

d. The radio wave propagation effect/effects is/are
(A) Reflection **(B)** Scattering
(C) Distortion **(D)** Both **(A)** and **(B)**

e. Which of the following is a reactive routing protocol for MANETs?
(A) DSDV **(B)** Dynamic source routing (DSR)
(C) Link state routing protocol **(D)** CSMA/CA

f. Which of these are Digital Cellular Technologies?
(A) IS: 54 / IS-136 **(B)** GSM
(C) IS-95 **(D)** All of these

g. Current wireless MACs are based on
(A) CSMA/CD
(B) CSMA/CA
(C) Hybrid technique depending on traffic
(D) Hybrid technique with fixed time partitions

h. A helical antenna is used for satellite tracking because of
(A) Circular polarization **(B)** Maneuverability
(C) Beam width **(D)** Gain

i. Synchronous Time-Division Multiplexing (TDM) is not efficient because of
(A) Higher data rate **(B)** Infinity frames
(C) Empty slots **(D)** n slots

j. The most appropriate wireless networking standard for creating PANs is
(A) Bluetooth **(B)** IEEE 802.11b
(C) Wi-Fi **(D)** I-mode

Answer any FIVE Questions out of EIGHT Questions.
Each question carries 16 marks.

Q.2 a. Define cell. What is the actual shape of a cell? Which shape is approximated as cell shape for practical purpose? Why? **(6)**

b. Why multiplexing is required in wireless communication? Explain any two basic multiplexing techniques in detail with neat diagrams. **(10)**

Q.3 a. Under a free-space propagation model, if the transmission power is 30W
(i) What is the transmission power in unit of dBm?
(ii) The receiver is in a distance of 1000 m; what is the received power, assuming that the carrier frequency fc = 900 MHz and Gt = Gr = 1 dB?
$C = 3 \times 10^8$ m/s
(iii) Express the free space path loss in dB **(8)**

b. Explain the concept of a interleaving with an example. **(8)**

Q.4 a. What is handoff? What are the factors affecting it? Explain with an example. **(6)**

b. Explain co-channel interference and adjacent cell interference. How can we minimize them? **(6)**

c. How does slotted ALOHA improve throughput as compared to pure ALOHA? **(4)**

Q.5 a. What is Near-far problem in CDMA? How can it be solved? **(8)**

b. Explain Reuse Partitioning-Based channel Allocation and overlapped Cells-Based channel allocation. **(8)**

Q.6 a. What is GPS? Explain the concept called the triangulation technique used in GPS to calculate the position and travel time of a GPS receiver on earth. **(8)**

b. Give the step by step process of Registration of an MS outside the subscription area in mobile communication systems. **(4)**

c. What is multicasting? Explain Bidirectional Tunneling approach. **(4)**

Q.7 a. List all the logical channels in GSM and explain control channels. **(8)**

b. Draw and explain universal mobile telecommunication system (UMTS) architecture. **(8)**

Q.8 a. Discuss the factors involved in a routing of MANET and also the routing goals. **(8)**

b. Explain Fixed Wireless sensor networks. **(8)**

Q.9 Write short notes on:

a. Wireless Local Area Networks (WLANs) **(6)**

b. HiperLAN/2 **(4)**

c. Smart Antenna and the concept of beamforming **(6)**