NTK/KW/15/7535

Faculty of Engineering & Technology
Seventh Semester B.E.(Electronics Engg.)
(C.B.S.) Examination
ELECTIVE–I : MOBILE COMMUNICATION

Time—Three Hours] [Maximum Marks—80

INSTRUCTIONS TO CANDIDATES

(1) All questions carry marks as indicated.

(2) Solve Question No. **1 OR** Questions No. **2**.

(3) Solve Question No. **3 OR** Questions No. **4**.

(4) Solve Question No. **5 OR** Questions No. **6**.

(5) Solve Question No. **7 OR** Questions No. **8**.

(6) Solve Question No. **9 OR** Questions No. **10**.

(7) Solve Question No. **11 OR** Questions No. **12**.

(8) Due credit will be given to neatness and adequate dimensions.

(9) Assume suitable data wherever necessary.

(10) Diagrams and Chemical equations should be given wherever necessary.

(11) Illustrate your answers wherever necessary with the help of neat sketches.

(12) Use of design data book is permitted.

4. (a) Given that Rayleigh faded mobile radio signal has a level crossing rate of $Nr = \sqrt{2\pi}\, fm\, \rho e^{-\rho^2}$, find the value of ρ for which Nr is maximum. 8

(b) Explain he difference between short term fading and long term fading. 6

5. (a) Explain the constellation diagram of QAM and mention its salient features. 6

(b) Explain $\frac{\pi}{4}$ QPSK transmission and detection techniques. 7

OR

6. (a) Explain the block diagram of GMSK transmitter and receiver. 6

(b) Mention in detail how QPSK, $\frac{\pi}{4}$ QPSK and Offset QPSK are different ? 7

7. (a) Draw the block diagram of a specified communication system using an equalizer at the receiver and derive the expression showing equalizer is actually an inverse filter of channel. 7

(b) Explain various space diversity techniques with their merits and demerits. 6

OR

8. (a) Write a short note on fundamentals of equalization. 6

(b) What do you mean by frequency and time diversity techniques. Explain in detail polarization diversity. 7

9. (a) Explain in detail :

(i) Frequency hop multiple access

(ii) Code division multiple access. 8

(b) Differentiate between FDMA and TDMA. 6

OR

10. (a) Explain near-far problem in CDMA. 6

(b) Write a short note on space division multiple access and explain in detail the necessity of multiple access techniques. 8

11. (a) Explain speech signal processing in GSM from transmitter to receiver using suitable block diagram. 7

(b) What are the different data bursts used in GSM ? Give bit format of each. 6

OR

1. (a) Explain frequency reuse concept in cellular telephone system. 6

(b) With timing diagram illustrate how a call to a mobile user initiated by a landline subscriber is established ? 7

OR

2. (a) Explain the following terms in detail :

(i) PSTN

(ii) MSC

(iii) BSC. 6

(b) Explain the following terms :

(i) Umbrella cell approach

(ii) Cell dragging

(iii) Soft handoff

(iv) Hard handoff. 7

3. (a) Give the significance of the following :

(i) Level crossing rate and average duration of fade.

(ii) Delay spread

(iii) Coherence bandwidth

(iv) Intersymbol interference. 8

(b) Find the average fade duration for threshold levels $\dot{\rho} = 0.01$, $\dot{\rho} = 0.1$ and $\dot{\rho} = 1$, when Doppler frequency is 200 Hz. 6

OR

12. (a) Explain in detail GSM system architecture. 7

(b) If GSM uses a frame structure where each frame consists of 8 time slots and each time slot contains 156.25 bits and data is transmitted at 270.833 kbps in the channel.

find :

(i) Time duration of a bit

(ii) Time duration of a slot

(iii) Time duration of a frame

(iv) How long must a user occupying a single time slot wait between two successive transmissions ? 6