Name : ....

Roll No. : ....

Invigilator's Signature : ....

CS/B.Tech(ECE)/SEPARATE SUPPLE/SEM-8/EC-802/2011

2011

ADVANCED COMMUNICATION SYSTEM

Time Allotted : 3 Hours   *Full Marks* : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

(Multiple Choice Type Questions)

1.   Choose the correct alternatives for any *ten* of the following :

$10 \times 1 = 10$

    i)   The material for making an efficient LED should be

        a)   a metal

        b)   an indirect band gap semiconductor

        c)   a direct band gap semiconductor

        d)   an insulator.

    ii)   The cut off wavelength of GaAs material with optical energy gap of 1·4 ev at 300 k is

        a)   885 nm   b)   886 nm

        c)   805 nm   d)   785 nm.

iii) Optical bandwidth is always

    a) greater than the electrical bandwidth

    b) less than the electrical bandwidth

    c) equal to electrical bandwidth

    d) square of the electrical bandwidth.

iv) The terms 'single mode' and 'multimode' are best desired as

    a) the number of fibre placed into fibre optic cable

    b) the number of voice channels each fibre can support

    c) the number of wavelengths each fibre can support

    d) the index number.

v) Normalized frequency V for single mode fibre is

    a) $V \leq 2\cdot4$

    b) $2\cdot4 \leq V \leq 3\cdot8$

    c) $V \geq 2\cdot4$

    d) $0 \leq 2V \leq 3\cdot8$.

vi) Pulse broadening in multimode fibre is due to

    a) Intermodal dispersion

    b) Intramodal

    c) Both (a) & (b)

    d) None of these.

vii) Earth station figure of merit is definad by

   a) $10 \log \left(\dfrac{G}{T} \right)$

   b) $10 \, ln \left(\dfrac{G}{T} \right)$

   c) $10 \log (\, GT \,)$

   d) $20 \log \left(\dfrac{G}{T} \right)$.

viii) The interface between BTS & BSC is called

   a) A interface

   b) *A* bis interface

   c) *B* interface

   d) Radio Air Interface.

ix) Soft hand off is used by

   a) GSM   b) AMPS

   c) USDC   d) CDMA.

x) In SMS, maximum number of characters that can be sent is

   a) 140   b) 160

   c) 180   d) 220.

xi) The orbital period of a geo-stationary satellite is

a)   8 hours

b)   12 hours

c)   23 hours 56 minutes 4·1 sec

d)   24 hours 32 minutes 9 sec.

xii) Co-channel interference in GSM system can be reduced by

a)   microcells

b)   dynamic channel allocation

c)   sectoring

d)   guard band.

xiii) Rake receiver is used by

a)   FDMA   b)   CDMA

c)   TDMA   d)   SDMA.

xiv) Which type of modulation technique is used in GSM ?

a)   PSK   b)   ASK

c)   MSK   d)   GMSK.

xv) Near-far problem occurs in

a)   TDMA   b)   FDMA

c)   CDMA   d)   CSMA.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. What do you mean by spread spectrum modulation ?

3. Draw and explain ground reflection (Two-Ray) model for mobile communication.

4. Derive satellite link design equation and explain different types of loss.

5. Explain Time Division Duplexing (TDD) and frequency Division Duplexing (FDD).

6. If a total of 36 MHz of bandwidth is allocated to a particular frequency division duplex cellular telephone system, which uses two 25 KHz sampling channels to provide full duplex voice and control channels, compute the number of channels available per cell if a system uses 7 cell reuse pattern.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. a) Prove that for a hexagonal geometry the co-channel reuse ratio is given by $Q = \sqrt{3N}$, where $N = i^2 + ij + j^2$.

   b) Also derive that $N = i^2 + ij + j^2$ where N is the number of cells in a cluster.

8. a) Derive the two body equation of motion of a satellite orbiting the earth. 5

   b) What is system noise temperature of satellite receiver ? Explain blockwise. 3

   c) Prove that for a satellite link $\frac{C}{N}$ $\alpha \frac{G}{T}$ ratio. 7

9. a) Explain why the performance of multimode grade index fibre is improved over multimode step index fibre ? 5

   b) Calculate the cut-off number and the number of modes supported by the SI fibre with n_1 = 1·53, n_2 = 1·15 and with a core radius of 50μn operating at 1500 nm. 5

   c) What is optical power budgeting ? Why is system margin provided ? 5

10. a) Make a comparative study of GSM and CDMA. Evaluate the better choice. 4

   b) What is statistical model of radiowave propagation ? Explain Okumura & Hata model for different regions. 6

   c) What is "near and far" problem in CDMA band system ? Draw the GSM frame structure. 2 + 3

11. Write short notes on any *three* of the following :   3 × 5
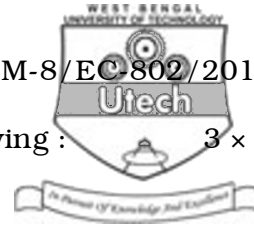
   a) Software Defined Radio

   b) Friss Transmission equation

   c) Sectoring and splitting

   d) GPRS

   e) Temperature stalilization of laser diode.

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