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Paper Code : IT-705E

ADVANCE DATA COMMUNICATION AND CODING

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 multiplexing technique used in SONET is

a) WDM b) TDM

c) FDM d) TWDM.

ii) The normal shape of a GSM cell is

a) Circular b) Triangular

c) Octagonal d) Hexagonal.

iii) In ..... Frequency Spectrum is divided into smaller spectra and is allocated to each user.

a) TDMA b) CDMA

c) FDMA d) FGMA.

iv) State whether True of False.

(I) The cells of subdivisions of a geographical area are always hexagonal

(II) A land to mobile call originates through the Telephone exchange.

a) True, False b) False, True

c) False, False d) True, True.

v) ..... are typically characterized by very small cells, especially in densely populated areas.

a) 2G system b) 3G system

c) 2·5 G system d) 3·5 G system.

vi) An antenna which attempts to direct all its energy in a particular direction is called as a

a) Directional Antenna

b) One to One Antenna

c) Propagation Antenna

d) Single Direction Antenna.

vii) Which mode is used for installing networks in wireless communication device characteristics ?

a) Fixed and wired

b) Mobile and wired

c) Fixed and wired

d) Mobile and wireless.

viii) What is the first passive satellite transponder ?

a) Sun b) Early Bird

c) Score d) Moon.

ix) Repeaters inside communication satellites are known as

a) Transceivers b) Transponders

c) Transducers d) TWT.

x) ..... is a satellite that rotates around the earth in a low-altitude elliptical or circular pattern.

a) Geosynchronous satellite

b) Non-synchronous satellite

c) Prograde satellite

d) Retrograde satellite.

xi) What is the frequency range of C-band ?

a) 8·5 to 12·5 GHz b) 3·4 to 6·425 GHz

c) 12·95 to 14·95 GHz d) 27·5 to 31 GHz.

xii) A satellite signal transmitted from a satellite transponder to earth's station is

a) Uplink b) Downlink

c) Terrestrial d) Earth-bound.

xiii) The earth area covered by a satellite radio beam is

a) Beam width b) Band width

c) Footprint d) Zone.

xiv) The term "hand off" is associated with

a) digital communication

b) analog communication

c) cellular communication

d) satellite communication.

xv) As the height of a satellite orbit gets lower, the speed of the satellite

a) increases b) decreases

c) remains the same d) none of these.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. State and prove Nyquist theorem.

3. a) What is adaptive delta modulator ?

   b) How does it overcome the problems of delta modulation ? 3 + 2

4. What is the effect of solar eclipse on a satellite ?

5. Write a short note on Regenerative repeater.

6. Derive the expression for C/N ratio in satellite communication.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. a) Draw and explain the architecture of GSM.

   b) Discuss GPRS location management procedure.

   c) Explain the main function of HLR VLR and AUC in GSM system/ 5 + 5 + 5

8. a) Explain the forward and reverse link in CDMA based IS 95 system.

   b) Draw and explain GPRS network architecture. What are GPRS radio interfaces ?

   c) What is near and far problem in CDMA based system ? 7 + 6 + 2

9. a) Write Kepler's law related to orbital period of satellite.

   b) Why is the uplink frequency greater than downlink frequency ? What are apogee and perigee of a satellite ?

   c) What is sub-satellite point ? What is the difference between geo-synchronous ad geo-stationary orbits ? 5 + 6 + 4

10. a) Draw and explain PCM technique.

    b) Draw and explain the block diagram for generation and detection of BPSK signal.

    c) Given the data stream

    1100010110.

    Sketch the transmitted sequence of rectangular pulses for each of the following line codes :

    (i) Unipolar NRZ

    (ii) Unipolar RZ

    (iii) Manchester

    (iv) Polar NRZ. 5 + 6 + 4

11. Write short notes on any *three* of the following : 3 × 5

a) SONET

b) Transponder and polarization hopping

c) QPSK

d) Inter-Symbol Interference (ISI)

e) Delta modulation.