[3HRS]   MAXIMUM MARKS   80

1. Question no.,1 is compulsory.
2. Write any three questions from remaining five questions.
3. Assume suitable data where ever necessary.
4. Draw diagrams wherever required.

1. a] Define and explain following terms
   i) Coherence Bandwidth ii) Coherence time iii) Doppler spread   05

b] Why 120degree sectorization is preferred over 60degree sectorization in cellular
technology.discuss in detail with reference to S/I calculations and handoffs   05

C] What is OVSF in WCDMA what is its advantage over fixed spreading
IS95   05

d] What is timing advance in GSM explain in detail   05

2 a Discuss the various types of Handoffs from 2G to 4G with reference to
technologies.   10
  B   How is the cell search and synchronization achieved in 3G?
10

3. a] Draw and explain 3G reference architecture   10

   b] For a Rayleigh fading signal, compute the positive going level crossing rate for
      $\rho=1$. The maximum Doppler frequency (fm) is 20 Hz. What is
      the   maximum   velocity of the mobile for this Doppler frequency if
      the carrier frequency is 900 MHz?   10

4.a] Draw and explain protocol architecture of
GPRS   10

   b] Compare OFDMA and MC-CDMA
techniques.   10

   5. a] Explain RPE- LTP speech coder in
GSM   10
   b] What is the software-defined radio
system?   10

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6. Write short note on (any two)   20
    a] Cognitive Transceiver Architecture
    b] Spreading codes used in CDMA
    c] Adaptive multi antenna Techniques

(3 Hours)　　　　　　　　　　　**TOTAL MARKS: 80**

N.B:　(1) Question No.1 is COMPULSORY

　　　(2) Attempt any three questions from remaining questions

　　　(3) Figures to the right indicate full marks

1.　(a) Define Spontaneous Emission , Stimulated Emission and Quantum Efficiency　　5

　　(b) Define Cross talk and Solitons　　5

　　(c) What is OTDR. Draw its response graph with details.　　5

　　(d) Explain three operating windows in optical communication　　5

2.　(a) What are the desirable requirements of a good fiber optic connector? What are the lensing schemes for coupling improvements?　　10

　　(b) List different types of fiber fabrication techniques and explain any one of them.　　10

3.　(a) Explain different types of Front End Amplifier in Optical Receiver.　　7

　　(b) Differentiate PIN and APD. Derive an expression for Responsivity of PIN diode.　　8

　　(c) Explain Link Budget Analysis in Optical Communication　　5

4.　(a) Differentiate Intermodal and Intramodal Dispersion. Derive an expression for Pulse Spreading in Intermodal Dispersion.　　10

　　(b) Consider a Graded Index Multimode Fiber for which the index profile $\alpha=2.0$, the core index $n_1=1.480$, the core cladding index difference $\Delta=0.01$ and core radius a=25μm. If the radius of curvature of the fiber is R=1cm, What percentage of the modes remain in the fiber at a 1300nm wavelength?　　10

5.　(a) What is Four Wave Mixing? Explain in brief WDM in optical communication　　10

　　(b) Explain in detail structure of SONET/SDH network.　　10

6.　Write a short note on any two　　20

　　(a) OTDM

　　(b) Optical Access Network

　　(c) Fault Management

　　(d) Wavelength Stabilization

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(3 Hours)   Max Marks: 80

N:B : 1. Question no. 1 is compulsory.
2. Out of remaining questions, attempt any three questions.
3. Assume suitable additional data if required.
4. Figures on the right hand side indicate full marks.

Q.1 (a) Explain Doppler shift and its role in pulsed and CW radar.   [5]
(b). How does a slow–wave structure operate?   [5]
(c) What are the advantages of more than two cavities in a Klystron?   [5]
(d) Name four categories of transmission lines. What restricts the use of two-wire   [5]
line in the microwave region?

Q.2 (a) What are the relationships of the signal, pump and idler frequencies for a   [10]
parametric amplifier with an idler circuit operated as a degenerate amplifier?
(b) Derive equation for phase velocity, cutoff frequency, cutoff wavelength and   [10]
field equations for rectangular waveguide.

Q.3 (a) Explain the working of TWT. A helix travelling wave tube operates at 4GHz   [10]
under a beam voltage 10KV and beam current of 500 mA. If the helix
impedance is 25 ohms and the interaction length is 20 cm. Find the output
power gain in decibels.
(b) With the help of suitable diagram explain mechanism of operation of   [10]
Magnetron. What is mode jumping in Magnetron? How are various modes
separated?

Q.4 (a) Explain how avalanche devices operate. Name three devices that use the   [10]
avalanche mode for their operation.
(b) Antenna with impedance 40+j30 ohms is to be matched to 100 ohms lossless   [10]
line with a shorted stub. Determine: i) Required stub admittance
ii) Distance between stub and antenna
iii) Stub length
iv) Standing wave ratio between stub and load, stub and source, along the stub.
(use smith chart).

Q.5 (a) Derive the Radar range equation as governed by minimum detectable signal to   [10]
noise ratio.
(b) With a suitable block diagram explain the working of a conical scan tracking   [10]
radar

Q.6   Write short note on:
i)   Modes in Gunn diode   [07]
ii)   High electron mobility transistors   [07]
iii)   Instrument landing system   [06]

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