BE | EXTC | VIII CREDIT 24/5/2012
Wireless Network

AGJ 1st half (j)-Con-Cod 25
Con. 3964-12.

(REVISED COURSE)

GN–7634

(3 Hours)

[Total Marks : 100

N.B. : (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** questions from remaining Q. Nos. **2** to **7**.
(3) Draw **neat** sketches wherever **necessary**.
(4) Assume **suitable** data if **required**.

1. (a) Explain RAKE receiver in CDMA. (20)
(b) Explain various states in Bluetooth system.
(c) Explain the concept of hidden and exposed terminals in WLAN
(d) What is frequency reused concept in GSM?

2. (a) Explain in detail IS-95 forward and reverse channels in detail. 10
(b) Explain GSM architecture with a neat block diagram, highlighting all the interfaces. 10

3. (a) Draw and explain the architecture of WAP. 10
(b) Compare: 10
1. WCDMA and CDMA2000
2. IS-95 and CDMA2000

4. (a) "CDMA is an interference limited system". Give proper justification to support this statement. Also explain in short methods used for power control in CDMA environment. 10
(b) Explain in detail Bluetooth security features and security levels with proper diagrams. 10

5. (a) Explain Wireless Sensor Network Protocol Stack in detail. 10
(b) Explain the frame format in Bluetooth technology. 10

6. (a) Explain the following: 10
1) WiMAX
2) HSPDA .
(b) explain link budget analysis and requirements of wireless networks. 10

7. Write short notes on:– 20
a) UMTS
b) ZigBee Technology .

BE | EXTC | VIII (Rev) 19/5/12
Optical fiber Communication

55-p3-d-upq-FH KL12 B

Con. 3705-12. **(REVISED COURSE)** **GN–7643**

(3 Hours) **[Total Marks : 100**

N.B. : (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** from remaining **six**.
(3) **All** questions carry **equal** marks.

1. (a) Explain with a neat sketch the two categories of front-end amplifiers used in optical fiber communication systems. **5**
   (b) State the spectral band designations used in optical fiber communications. **5**
   (c) Discuss in brief single mode step index fiber and multimode step index fiber. **5**
   (d) Name the key parameters for describing the signal transmission in single mode fiber and multimode fibre. **5**

2. (a) Define the terms numerical aperture, critical angle, propogating modes and microbands in the context of an optical fiber. **10**
   (b) Calculate the required Δ if a fiber with a 8 μm core and a 125 μm cladding is to be single mode at 1300 mm. Assume that the core index is 1·46. **5**
   (c) A 45° – 45° – 90° prism is immersed in alcohol (n = 1·45). What is the minimum refractive index the prism must have if a ray incident normally on one of the short faces is to be totally reflected at the long face of an prism ? **5**

3. (a) What do you understand by degenerating modes in step index fiber ? **5**
   (b) With a neat sketch explain fiber optic cable. **5**
   (c) Name five connectors used in optical fibre communications **5**
   (d) What does the coupling efficiency equation ? $\eta = (pf / ps) = (NA)^2$ signify where pf is the power coupled to the source ps source power. **5**

4. (a) What do you understand by double heterostructure? State its limitations. **5**
   (b) State the difference between LED and LASER. **5**
   (c) A light source generating an optical power output equal to 1 μw is coupled into an optical fiber with a cross sectional area larger than the active area of the light source. **5**
   Determine the power coupled into the fiber. θ^0 equal to 15^0.
   (d) Draw the current optical power output curve for Fabry - Perot Laser and explain to relationships. **5**

5. (a) List all the parameters that contribute to photo current gain of APD. **5**
   (b) Derive an expression for the responsibility "R" of the photo detector. **5**
   (c) Briefly discuss the possible sources of noise in optical fiber receiver. Describe in detail what is meant by quantum noise. Consider this phenomenon with regard to **10**
      (i) Digital signalling
      (ii) Analog transmission.

6. (a) In a point-to-point communication link it is given that launched power is —10 dBm, receiver sensitivity is —40 dBm and the length of the link is 10km. If the total losses in the link add upto 27dB. Find the safety margin. If the fiber bandwidth is 1000 MHz. km what is the maximum permissible data rate. If the risk time due to the source and the detector is neglegible. **10**
   (b) Draw and explain the test-set up for measuring the chromatic dispersion. **10**

7. Write short notes on any **two** :—

(a) Linearly polarized modes

(b) Numerical aperture in GIF

(c) Scattering losses in optical fiber

(d) Distributed feed back laser.

BE / EXTC / VIII (REV) 29/5/2012
Satellite Communication B. E. (Extc)

Con. 4454-12.(REVISED COURSE) **GN–8276**
(3 Hours) **[Total Marks : 100**

N.B. :(1) Question No. **1** is **compulsory**.
(2) Attempt in all **five** questions.
(3) Assume **suitable** data if **necessary**.

1. Answer the following (any **four**) :– **20**
   (a) What are the advantages of satellite communication over terrestrial communication ?
   (b) Why uplink frequency is different form downlink frequency ? Explain.
   (c) Explain Kepler's laws.
   (d) Explain reliability and space qualification.
   (e) Compare FDMA and CDMA.

2. (a) Explain the following terms with reference to satellite communication :– **10**
      (i) Apogee, Perigee
      (ii) Ascending node, descending node
      (iii) Argument of perigee
      (iv) Right ascension of ascending node
      (v) Mean anomaly, Eccentiric anomaly.
   (b) A satellite orbit has an eccentricity of 0·15 and a semi major axix of 9000 Km. **10**
   Find the :–
      (i) Periodic time
      (ii) Latus rectum
      (iii) Minor axis
      (iv) Apogee height
      (v) Perigee height
      [Assume $\mu = 3.986 \times 10^{14}$ m^3/sec^2, r_e = 6378Km].

3. (a) Explain the various stages in launching of a geostationary satellite into Final circular orbit with zero inclination by ELV. **12**
   (b) With the help of a block diagram explain TT&C system. **8**

4. (a) A communication satellite is located in a geostationary orbit at a longitude of 30° west. Determine the slant range, Azimuth and elevation angles of the satellite as seen from a ground station at a longitude of 74°W and latitude of 41°N. **10**
      [Assume r_e = 6378 Km].
   (b) What is satellite stabilization ? Explain three axis stabilization method. **10**

5. (a) Explain SPADE system of FDMA. **10**
   (b) A receiver for geostationary satellite transmission at 2.2GHz has an equivalent noise temperature of 160 K and a bandwidth of 1MHz. The receiver antenna has a gain of 30db and the antenna noise temperature is 190db. What is the minimum required satellite transmitter power to achieve a 20db CNR at the output of the receiver. **10**

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B.E. (Extc)

6. (a) What is polarization of satellite signals ? Explain. 10
   (b) Explain the following :– 10
      (i) Sun transit outage
      (ii) Minimum inclination at launch of a satellite
      (iii) Combined C/N of a satellite.

7. Write note on any **three** :– 20
   (a) Orbital perturbation
   (b) Double conversion Transponder
   (c) TDMA frame structure
   (d) Earth eclipse of satellite.

BE \ EXTC \ VIII CREDIT 15/5/2012
Advance microwave Engg.

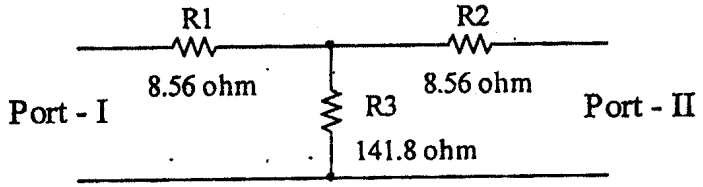
Con. 3633–12. (REVISED COURSE) GN–7445

(3 Hours) [Total Marks : 100

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

1. (A) Explain the properties of *S*-parameters. (05)
(B) Explain Stability circles and its importance in amplifier design. (05)
(C) Explain how noise parameters at microwave frequencies can be determined. (05)
(D) Explain 1 dB compression. (05)

2. (A) Find *S* parameters of 3 dB attenuator shown in Fig. 2(A). (10)



(B) Derive the transducer power gain as (10)

$$G_T = \frac{P_L}{P_{avs}} = \frac{|S_{21}|^2\left(1-|\Gamma_S|^2\right)\left(1-|\Gamma_L|^2\right)}{|1-\Gamma_S\Gamma_{in}|^2|1-S_{22}\Gamma_L|^2}.$$

3. (A) Define the Figure of Merit in unilateral microwave amplifiers. If unilateral gain of the microwave amplifier is $U = \frac{|S_{11}S_{12}S_{21}S_{22}|}{\left|1-|S_{11}|^2\right|\left|1-|S_{22}|^2\right|}$, show that $\frac{1}{(1+U)^2} < \frac{G_T}{G_{TU}} < \frac{1}{(1-U)^2}$, where G_T is the transducer gain and G_{TU} is the transducer gain in unilateral case. (10)

(B) A BJT has the following *S*-parameters as a function of four frequencies. Determine in which of these cases, device is unconditionally stable, and of these, which has the greatest stability. (10)

Frequency (MHz)	S_{11}	S_{12}	S_{21}	S_{22}
500	$0.70\angle -57^\circ$	$0.04\angle 47^\circ$	$10.5\angle 136^\circ$	$0.79\angle -33^\circ$
750	$0.56\angle -78^\circ$	$0.05\angle 33^\circ$	$8.6\angle 122^\circ$	$0.66\angle -42^\circ$
1000	$0.46\angle -97^\circ$	$0.06\angle 22^\circ$	$7.1\angle 112^\circ$	$0.57\angle -48^\circ$

4. Design a transistor oscillator at 4 GHz using FET in a common gate configuration. An inductor of value 5 nH is placed in series with the gate to increase the instability. Choose a terminating network to match a 50 Ω load, and an appropriate tuning network. The *S* parameters of the transistor in a common gate configuration are: (20)
$S_{11} = 2.18\angle -35^\circ$, $S_{12} = 1.26\angle 18^\circ$, $S_{21} = 2.75\angle 96^\circ$, and $S_{22} = 0.52\angle 155^\circ$.

5. (A) For two port oscillator at steady state oscillation, prove that if: $\Gamma_L \Gamma_{in} = 1$ then $\Gamma_T \Gamma_{out} = 1$. (10)

(B) Discuss microwave amplifiers versus microwave oscillators. (10)

6. A GaAs FET has the following scattering and noise parameters at 4 GHz, measured with a 50 Ω systems: (20)
$S_{11} = 0.6\angle -60^\circ$, $S_{22} = 0.5\angle -60^\circ$, $S_{12} = 0.05\angle 26^\circ$, $S_{21} = 1.9\angle 81^\circ$, $F_{min} = 1.6$ dB, $R_N = 20\ \Omega$, and $\Gamma_{opt} = 0.62\angle 100^\circ$.
Assuming the FET to be unilateral, design an amplifier using open-circuited shunt stubs and transmission line lengths for a maximum possible gain and a noise figure no more than 2.0 dB. Estimate the error introduced in G_T due to this assumption.

7. Write a short note on any two of the following: (20)

(A) Balanced FET mixers.

(B) Power distributed amplifiers.

(C) Microwave resonators.
