B.E (Extc) VIII Elective, 24/5/13
Satellite Comm.

92 : 1st half.13-shilpa(i)

Con. 9099-13. **(REVISED COURSE)** **GS-3874**

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

N.B. : (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** questions out of **six** questions.
(3) Assumptions if done, should be **justify**.

1. (a) What is spot beam ? Explain its use in satellite communication. **5**
(b) Explain the following :– **5**
(i) Argument of perigee
(ii) Right Ascension of Ascending node
(c) Compare ELV and STS methods to launch a satellite in GEO orbit. **5**
(d) Write a note on rain attenuation. **5**

2. (a) What are look angles ? Explain its significance in relation to satellite position. Hence solve an earth station is located at a latitude of 12° South and longitude of 52° W. Calculate the antenna look angles for a satellite at 70° W. **10**
(b) Describe various reasons for perturbation of satellite orbit. Calculate maximum daily eclipse duration for GEO orbit. **10**

3. (a) What is intermodulation noise ? Dose it affect overall C/N ratio. Derive the expression for the same. **10**
(b) Which are the types of antennas used in satellite communication. Write is detail. **10**

4. (a) What is TT and C subsystem ? Explain what kind of antenna's are used for tracking and command signal transmission during transfer orbit. **10**
(b) Draw and explain block diagram of FDM/FM/FDMA earth station. **10**

5. (a) Explain satellite structural design. Also explain how mass and power is estimated for space craft. **10**
(b) Compare advantages of TDMA, FDMA and DS-SS CDMA satellite signal. **10**

6. (a) What is eclipse ? Is there any ways of avoiding eclipse during lanuching of satellite. Explain in detail. **10**
(b) Explain point of compression to 1dB, AM/PM conversion and input and output back-off ratio with respect to satellite communication. **10**

7. Write short notes on :– **20**
(a) TDMA synchronization
(b) Side real day
(c) Lifetime of satellite
(d) Orbital parameters.

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BE ISEM VIII 7 EXTC (Rev) May 2015.
W.N.
2015|13

Con. 8551–13. GS–3673

(REVISED COURSE)

(3 Hours) [Total Marks : 100

N.B. (1) Question No. 1 is **compulsory**.
(2) Attempt any **four** questions out of the remaining **six** questions.
(3) Support your answer with **sketches/diagrams** wherever **necessary**.
(4) Assume suitable **data** if **required**.

1. (a) Explain forward link features of CDMA 2000. **4**
   (b) Explain concept of HSDPA with respect to WCDMA. **4**
   (c) What is adaptive multirate coding ? **4**
   (d) Give different WLAN topologies. **4**
   (e) Explain the concept of OFDM. **4**

2. (a) Explain in detail components of sensor node. **10**
   (b) Explain in detail various IEEE 802.11 standard used in wireless Network. **10**

3. (a) Differentiate between WCDMA and CDMA 2000. **10**
   (b) Calculate the downlink cell load factor and number of voice users per cell for a WCDMA system using the following data. **10**
   - Information Rate (Ri) = 12.2 kbps
   - Chip Rate (Rc) = 3.84 Mcps
   - Required Eb/Nt = 4 dB
   - Average interference factor due to other cells = 0.5
   - Orthogonality factor = 0.6
   - Interference margin = 3db

4. (a) Give UMTS Air-Interface specifications, also explain 3 types of channels defined in UMTS. **10**
   (b) Explain blue tooth protocol stack. **10**

5. (a) Describe forward link and reverse link physical channels for CDMA 2000. **10**
   (b) Explain WLAN technologies in detail. **10**

[TURN OVER

6. (a) Discuss in detail WAP programming model. **8**

(b) Using the following data for GSM 1800, Develop downlink and uplink budget and determine cell radium. **12**

- Base station transmit power = (P_b) = 36 dBM = 4W
- Mobile station transmit power = P_m = 24 db_m
- Base station noise figure = 5 dBs
- Mobile station (hand held unit) noise figure = 8 dBs
- Base station transmit and receive antenna gain = G_A = 18 dBi
- Mobile antenna gain = 0 dBi
- Required signal to noise ratio (SNR) = 12 dB
- Transmit antenna Cable, connector Loss = L_c = 5 dB
- BS receiver antenna cable, connector loss (L_c = 2 dB)
- Orientation / body loss of mobile = 3 dB
- Shadow fading = 10.2 dB
- Thermal noise density = –174 dBm/Hz
- Antenna diversity gain at B_s = 5 dB

7. Write short notes on :– **20**

(a) Wimax

(b) Zigbee Protocol.

B.E (EXTC) VIII Rev 8/05/13

Advanced Microwave Engg.

P3-upq-Feb.-13KL-12 A4 E

Con. 7485–13. **(REVISED COURSE)** **GS–3013**

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

N.B. :(1) Question No. **1** is **compulsory**.
(2) Attempt any **four** questions from remaining **six** questions.
(3) Use Smith chart if **necessary**.
(4) **Figures** to the **right** indicate **full** marks.

1. (a) Explain Large signal characterization with reference to load pull countors, how it is measured ? **5**
   (b) What are the causes of low frequency noise and high frequency noise ossociated with the mixer ? **5**
   (c) Define and explain with neat diagram noise correlation matrix for general noisy two port network. **5**
   (d) What is an unilateral figure of merit of an amplifier ? **5**

2. (a) If the transistor has following S-parameters at 5GHz with 50 Ω impedance. **10**

$S_{11} = 0{\cdot}6 \angle -175°$; $S_{12} = 0{\cdot}02 \angle 20°$

$S_{21} = 2{\cdot}2 \angle 35°$; $S_{22} = 0{\cdot}6 \angle -95°$

Determine the stability criteria and plot the stability circles.

   (b) Derive following parameters of an amplifier— **10**
   (i) power gain (G)
   (ii) Available gain (GA)
   (iii) Transducer gain (GT).

3. (a) Explain using suitable diagrams two methods of designing broad band amplifier. **10**
   (b) A BJT with $I_c = 30$ mA and $V_{CE} = 10$ V is operated at a frequency of 1·0 GHZ in a 50 Ω system. Its S–parameters are— **10**

$S_{11} = 0{\cdot}73 \angle 175°$; $S_{22} = 0{\cdot}21 \angle -80°$

$S_{12} = 0{\cdot}0$; $S_{21} = 4{\cdot}45 \angle 65°$

Determine whether the transistor is unconditionally stable. If yes, calculate the optimum terminations, $G_{S,max}$, $G_{L,max}$, $G_{TU,max}$.

4. (a) A certain GaAs MESFET has following noise figure parameters measured at **15**

$V_{ds} = 50$, $I_{ds} = 20$ mA with 50 Ω resist once for frequency of 9 GHz,

$F_{min} = 4$dB, $\Gamma_{opt} = 0{\cdot}55 \angle 175°$, $R_0 = 4\ \Omega$

Plot noise figure circles for given values of f_1 at 2, 2·5, 3·5, 4·5 dB.

   (b) Define stability. List the various criteria for stability. **5**

[TURN OVER

5. (a) If a one port microwave diode has $\Gamma_{in} = 1{\cdot}5 \angle 60°$ with respect to $Z_0 = 50\ \Omega$. Design an oscillator for desired frequency of 10 GHZ. **12**

   (b) For two port oscillator at steady-state oscillation prove that if :— **8**

$$\Gamma_L \ \Gamma_{in} = 1 \quad \text{then} \ \Gamma_{in} \ \ \Gamma_{out} = 1$$

6. A certain MESFET is baised for large signal class A operation with the following small signal S-parameters at 5 GHZ :— **20**

$$S_{11} = 0{\cdot}55 \angle -150° \ ; \ S_{12} = 0{\cdot}04 \angle 20° \ \ S_{21} = 3{\cdot}5 \ \angle 170° \ \ S_{22} = 0{\cdot}45 \angle -30° \ ;$$

The large signal forward transmission coefficient S_{21} is measured to be $S_{21} = 2{\cdot}8 \angle 180°$. Design a Large – Signal Class A amplifier with maximum transducer gain in a 50 Ω system. Assume $\pm$ 0·5dB error in gain. What is the high-power amplifier gain ?

7. (a) Write a note on optimal loading used in 1 + PA design. **10**

   (b) A wideband amplifier (2 – 4 GHZ) has gain of 10dB, an O/P power of 10 dBm and a noise figure of 4 dB at room temperature. Find the output noise power in dBm. **10**

BE/EXTC/VIII (REV.) 13/5/2013.
Optical Fibre communication.

VT-F.H.Exam. April(1)-13-174

Con. 8209–13. **GS–3268**

(REVISED COURSE)

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

N.B. : (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** questions out of the remaining **six** questions.
(3) Assume **suitable** data wherever **necessary**.

1. (a) Discuss the basic block diagram of optical communication system. **5**
(b) Draw the refractive index profile for the step index and graded index fiber. For each type give typical core and cladding diameters. **5**
(c) Differentiate between spontaneous and stimulated emissions. **5**
(d) Derive expression for the responsivity of an intrinsic photodetector in terms of quantum efficiency and wavelength. **5**

2. (a) Draw refractive index profile of a graded index fiber and show with neat diagram transmission of light through this fiber. Explain how GRIN fiber has transmission bit rate much higher than multimode step index fiber. **10**
(b) Find the core radius necessary for single mode operation at 820 nm of step index fiber with $n_1 = 1{\cdot}482$ and $n_2 = 1{\cdot}474$. What is the numerical aperture and maximum acceptance angle of this fiber ? Calculate the corresponding solid angle. **10**

3. (a) List the important factors responsible for power loss in optical fiber. Explain each factor briefly. **10**
(b) Explain interamodal and intermodal dispersion. How does despersion affect the transmission bandwidth of optical fibers. **10**

4. (a) What is the basic principle on which optical sources work ? With the help of a LED structure explain its working. **10**
(b) Draw the structure of Avalanche Photo Diode (APD) along with the electric field profile that exist in the various regions of APD structure. Explain the working. **10**

5. (a) Explain modified chemical vapour deposition (MCVD) method of fiber fabrication in detail. **10**
(b) Discuss a popular non-destructive technique for attenuation measurement. **10**

6. (a) Describe two methods of splicing individual fibers together. What are the advantages and disadvantages of each method. **10**
(b) What are the desirable requirements of a good fiber optic connector ? What are the lensing schemes for coupling improvements ? **10**

7. Write short notes on any **two** :– **20**
(a) OTDR
(b) Link Power Budget
(c) Coherent and Concoherent optical transmission.

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24/5/13

B.E (Extc) Elective VIII

Image Processing

Con. 9068–13. GS–3901

(REVISED COURSE)

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

N.B. (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** questions out of the remaining **six** questions.
(3) Assume suitable **data** wherever **necessary**.

1. (a) Is there any advantage of frequency domain filters over special filters ? Why ? **5**
(b) Compare Canny edge detector with Laplacian of Gaussian Gaussian edge detector. **5**
(c) Why is zig-zag scanning preferred in JPEG standard. **5**
(d) Distinguish between lossy and lossless compression. **5**

2. (a) Explain image sampling and quantisation. A medical image has a size of 8 × 8 inches. The sampling resolution is 5 cycles/mm. How many pixels are required ? Will and image of size 256 × 256 be enough. **10**
(b) Let V = {0, 1}. Compute De, D4, D8 and Dm distances between two pixels p and q. Let the pixel coordinates of p and q be (3, 0) and (2, 3) respectively for the image shown. Find distance measures. **10**

	0	1	2	3
0	0	1	1	1
1	1	0	0	1
2	1	1	1	1(q)
3	1	1	1	1
	(p)			

3. (a) Compute 2-D DFT of 4 × 4 gray scale image given below and then compute inverse 2-D DFT of transform coefficient. **10**

f(x, y) =

1	1	1	1
1	1	1	1
1	1	1	1
1	1	1	1

(b) Explain with example how Slant transform and DCT transform of (4 × 4) image can be used for image compression. **10**

[TURN OVER

4. (a) For a given image find - **10**
   (i) Digital negative of an image.
   (ii) Contrast stretching $\Upsilon_2 = 5$, $\Upsilon_1 = 3$, $s_2 = 6$, $s_1 = 2$
   (iii) Bit plane slicing.

4	3	2	1
3	1	2	4
5	1	6	2
2	3	5	6

   (b) Explain image enhancement in frequency domain. **10**

5. (a) Perform histogram equalization for 8 × 8 image shown in table. **10**

Image gray level distribution

Grey Level	0	1	2	3	4	5	6	7
Number of Pixel	8	10	10	2	12	16	4	2

   (b) Explain segmentation based on discontinuity and segmentation based on similarities. **10**

6. (a) Calculate entropy and coding redundancy for the symbols given in table using Huffman codes. **10**

Symbol	1	2	3	4	5	6
Probability	0.4	0.2	0.2	0.1	0.05	0.05

   (b) What is difference between image enhancement and image restoration ? **5**
   (c) Explain modeling the degradation function in image restoration. **5**

7. Write notes on any **two** :–
   (a) Wiener Filtering **10**
   (b) Hotelling Transform **10**
   (c) Homomorphic filter. **10**
