20/12/2011 ME EXTC Sem-I (REV)
FOC

21 2nd Half-Exam.-11 mina (a)

Con. 5942-11. **BB-2947**

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

N.B.: (1) Question No.1 is compulsory.
(2) Answer any four questions out of remaining six questions.

1. (a) Derive equations for numerical aperture and total number of modes in optical fiber.
(b) Draw and explain the block diagram of optical fiber communication system.
(c) Explain propagation of light gate through the Planar and Circular waveguides.
(d) State the difference between coherent and non-coherent sources? **20**

2.(a) Calculate Transmission loss factor(transmissivity) and Rayleigh scattering coefficient for a fiber from following data.
Fictive Temperature Tf=1550 K, Isothermal compressibility Bc = 92x 10^{-12} m^2/N,
Average Photoelastic coefficient p=0.29,Refractive Index n =1.46, Length of fiber L= 1km,
Boltzman constant k = 1.38 x 10^{-23} J/K. Wavelength 1 = 630 nm,
Repeat for Wavelength 2 = 1.33 um. **10**

b) Explain the various losses in optical fiber. **10**

3. (a) Explain any two fabrication process of optical fiber with a neat diagram. **10**
(b) Define modal birefringence in optical fiber. Explain the various factors responsible for the same with its dependence on polarization of light. **10**

4.(a) What is direct and indirect materials ,explain why direct bandgap materials are used in case of LEDs. Draw and explain surface emitter double heterodyne LED structure. **10**
(b) With suitable example explain the process of rise time budget. **10**

5. a)Explain the basic principle of LASER generation. Discuss any two types of solid state LASERs. **10**
b) Draw and explain block diagram of optical receiver with various noise sources and the relevant equations. **10**

6. (a) Explain various modulation techniques along with WDM and TDM. **10**
(b) Explain the polarization of mode in SIF. **10**

7. Write short notes on any four :- **20**
(a) Link Power Budget.
(b) Optical amplifier.
(c) APD and RAPD.
(d) Electrical Band width versus Optical Bandwidth.
(e) Waveguide equation for SIF.

15/12/2011 ME EXTC Sem-I (R)
Error Correction Codes

Con. 6170-11. **(REVISED COURSE)** **BB-2944**

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

N. B. : (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** questions out of the remaining **six** questions.

1. Write short notes on any four
   a). Primitive polynomials b). Hamming Codes. c). Goppa codes d). Catastrophic codes e). Golay codes (20)

2. a). Compute the following using GF (8)
   i). $\alpha^6+\alpha^3+1$ ii). $(\alpha^5+\alpha^4)(\alpha^5+\alpha^3)$ (05)
   b). Find out the primitive elements of GF (11) (05)
   c). Compute the conjugacy classes and minimal polynomials of elements in GF (2^4). (10)

3. a). Derive the parity matrix for a double error correcting BCH codes (06)
   b). for a triple error correcting BCH code with length 31, the received vector with single error is given by $r(x)=x^{10}$. Find out the correct code word. (14)

4. Consider a (7, 4) cyclic code generated by $g(x)=1+x+x^3$.
   a). Design an encoder using shift registers and using this encoder, find out the code word for the message (1 0 1 1). (06)
   b). Suppose the received vector is r = (1001111), find the syndrome using syndrome circuit. (06)
   c). Explain shortened cyclic codes (08)

5. For a (7,3) two bit error correcting RS code, Find the correct code word using Berlekamp Massey algorithm if the received vector is given by
   $$r(x)=1+\alpha^2x+\alpha^4x^2+x^3+\alpha^6x^4+\alpha^3x^5+\alpha^5x^6$$ (20)

6. a). What are Reed Muller (RM) codes? (08)
   b). Let the received RM code word be r = 00111100. Decode the information using $\Re(1,3)$. (12)

7. a). Explain stack algorithm for the decoding of convolution codes. (06)
   b). Consider (3,1,2) convolution code with $g^{(1)}=(1\ 10)$, $g^{(2)}=(1\ 01)$, $g^{(3)}=(111)$. The received binary code vector over a BSC channel with transition probability p = 0.10 is given by r = 010 010 001 110 100 101 011. Find out the transmitted binary massage using stack algorithm. (14)

10/12/11 ME EXTC Sem-I (Rev) Microwave Integrated circuits

79. 2nd Half-Exam.-11 mina (a).

Con. 5812-11. **BB-2941**

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

N. B. : (1) Attempt **five** questions.
(2) Question No. **1** is **compulsory**.
(3) Out of the remaining **six** questions, attempt any **four**.
(4) Assume any **suitable** data wherever **necessary**.
(5) Make use of **Graphs** wherever **necessary**.
(6) Numbers to the **right** indicate **Max. Marks** for the question.

1. Write a short note on the following:
   A). Transition of a Slot line to Coaxial Line 05
   B). Conventional ICs Vs. MICs 05
   C). Applications of Coplanar Wave Guides 05
   D). Prove that Microstrip Line observes Non TEM propagation 05

2. Describe key processing techniques used in making HMICs . 20

3. A). Describe in detail the Ion Beam Implantation Technique used in making MMICs. 14
   B). Write down all the steps needed to fabricate a MESFET. 06

4. A). Using the Spectral Domain Impedance Analysis, derive the relation for Characteristic impedance for a Covered Microstrip Line. 15
   B). Calculate the change in length in the microstrip line due to the open end discontinuity. The line has ε_{qsa} as 5.73, W/h as 0.405 & h as 0.635 . 05

5. A). What are Coupled Microstrip Lines, derive their wave equations. 12
   B). Describe a Slot Line. Explain the Waveguide model of analyzing it. 08

6 A). Describe CPW. Give in detail the QSA approach of analyzing it by assuming the CPW to be having an infinitely thick substrate. 10
   B). Describe the Galerkin's method of analyzing a Slot Line. 10

7 Describe in detail the basic Principal, Construction & Applications of,
   A). Dielectric Resonators 10
   B). BJT 10

5|12|11 ME EXTC Sem - I Communication Network

VT-Sept -11- 114

Con. 5876–11. **BB–2938**

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

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

1. (a) Explain the flow control at transport layer. **5**
   (b) Explain the role of RARP, BOOTP and DHCP in address allocation. **5**
   (c) Explain ATM net-twork interfaces. **5**
   (d) Explain the importance of flow specification in deciding Quality of Service in Internet Model. **5**

2. (a) What is the function of subnet addressing in case of IP version 4 addressing ? **4**
   (b) What are the functions of the transport layer in OSI model for network communication ? Explain TCP multiplexing and error recovery. **8**
   (c) Explain the function of ATM layer with ATM cell header format. **8**

3. (a) Explain IP with reference to IP addressing and IP fragmentation and reassembly. **10**
   (b) Explain the various phases involved in a connection oriented TCP connection. **10**

4. (a) Compare and contrast IP version 4 with IP version 6. **10**
   (b) Explain in detail the Broadband ISDM reference model. **10**

5. (a) Explain the Little's theorem with an example. **10**
   (b) List different queuing models. Explain one in detail. **10**

6. (a) Explain the Integrated services model in the Internet. **10**
   (b) Explain RSA algorithm with an example. **10**

7. Write short notes on any **two** of the following :– **20**
   (a) RTP Protocol
   (b) RSVP
   (c) Routing Information Protocol.

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AGJ 2nd half (q) 19 30/11/11 ME EXTC : Sem - I STC

Con. 5806-11. **BB–2935**

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

N.B. : (1) Question No. **1** is **compulsory**. Attempt any **four** of remaining **six**.
(2) **All** questions carry **equal** marks.
(3) Assume **suitable** data if **necessary** and state them **clearly**.

Q.1 (a) Write short notes, explaining the basic concepts of 12
(1) Classical Brownian motion
(2) Ergodic Random Signal in strict and wide sense
(3) Gaussian White Noise.
(4) Markovian Queues.
(b) State and prove Tschebycheff inequality for the probability distribution of a random variables 8

Q. 2 (a) Three dice are rolled. Find the probability that the sum of their faces is 12. Assume equal probability for all elementary events. 8
(b) If in the above problem, dice are indistinguishable, what is the total number of elementary events of this experiment? What is the probability of their sum to be 12? 12

Q.3 (a) Define the term "second order random variables" and "characteristic function". The probabilty density of the random variable x is given by 10

$$p(x) = \frac{1}{\pi}\frac{1}{1+x^2}$$

Is x a second order random variable? Give reasons. Baye's Theorem
(b) Prove Schwartz inequality for two complex random variables 10

Q. 4 (a) What ~~are (i)~~ Poisson Process (ii) Poisson points and (iii) Shot Noise. Define the random signal $X(t)$ for all three cases. Find the probabilty for the Poisson Process signal $X(t) = n$ and find its corrella-tion function. 10
(b) Show that the sum of n Poisson variables is also a Poisson variable. 10

Q. 5. (a) Synchronised binary square pulse signal is given by 10

$$X(t) = \sum_n A_n \theta(\frac{t - nT}{2T})$$

where T is the width of the square pulse, amplitudes A_n take the values $\pm a$ with equal probability and $\theta(x) = 1$ if $|x| \leq 1$ and zero otherwise. Show that the signal is NOT wide sense stationary.

(b) Find the powers spectrum $S_Y(\omega)$, of the signal $Y(t)$ 10
which is the solution of the differential equation

$$\sum_{k=0}^{\infty} a_k \frac{d^k Y}{dt^k} = X(t)$$

where the signal $X(t)$ is known to be white and the coefficients a_k are constants.

Q. 6 (a) On an average a working communication equipment fails 10
twice in a month. Average repair time is 5 days. There is 50that the equipment was working at time $t = 0$, find the probability of its working at a later time t, assuming constant failure and repair probabilities in a time dt.

(b) A particle is undergoing one dimensional random walk, 10
taking a step$+a$ with probability p and $-a$ with probability $q = 1 - p$. Find the probability for (i) return to origin after $2N$ steps (ii) first return to origin after $2N$ steps.

Q. 7 (a) State and prove the Orthogonality principle for 10
obtaining the LMMSEE of a random Signal $Y(t)$ on the basis of another measured Signal $X(t)$.

(b) Use the above principle to find the optimum Wiener filter for 10
removing zero mean, additive noise from a Wide Sense Stationary signal $Z(t)$.