M.E. Extc sem (I) (old). 3/6/15

FOC

QP Code : 1214

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

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

1. (a) Explain normalized frequency of fiber on the basis of single mode and multimode fiber. **5**
   (b) Obtain an expression for material dispersion. **5**
   (c) What are the different types of nonlinearities in optics. **5**
   (d) Explain the methode to mitigate the effect of FWM in optical fiber communication. **5**

2. (a) Derive the waveguide equation for optical fiber. **10**
   (b) Explain the different losses in the optical fiber communication compare linear scattering and non-linear scattering. **10**

3. (a) Explain any one fiber fabrication process with a neat sketch. **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 band gap materials. Explain the working of LED and LASER. **10**
   (b) What are the types of optical amplifiers? Explain functioning of Erbium Doped Fiber amplifier. **10**

5. (a) Explain rise time budget with suitable examples and explain how it is relevant with bandwidth and speed of communicaiton. **10**
   (b) A GIF has a parabolic refractive index profile (α=2) and a core diameter of 50μm. Estimate the insertion loss due to 3μm laterial misalignment at a fiber joint when there is an index matching and assuming that there is uniform illumination of all guided modes. **10**

6. (a) Draw and explain the structure of Avalanche Photo Diode (APD) along with electrical field profile that exists in the various regions of APD structure. Explain why it is also called reach through APD (RAPD). **10**

[TURN OVER

(b) Draw and explain block diagram of optical receiver and discuss various noise sources in optical receiver. 10

7. Write short notes on any **four** :– 20

(a) Optical modulators
(b) OTDR
(c) Optical networks
(d) Power coupling in optical fiber
(e) Mach-zehder Interferometer

M.E (EXC)
Sem I old
Error Corrrcting Code 28/05/12

Q.P. Code : 1212

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

N.B. : (1) Questions No.1 is **Compulsory.**
(2) Attempt any **four** from remaining questions.
(3) Assume suitable data wherever necessary.

1. Write short notes on any **four** **20**
   (a) Binary symmetric channel
   (b) Groups, fields and rings
   (c) Golay codes
   (d) Catastrophic codes
   (e) Hamming distance and Bound.

2. (a) Consider 4-ary code 'ç' defined by following parity check matrix. 'α' is premitive element in GF(4) and $H=\begin{bmatrix} \alpha & \alpha^2 & 1 & 1 \\ \alpha^2 & \alpha & 1 & 0 \end{bmatrix}$ **10**
   (i) Find all code vectors
   (ii) Does this code achive single tone bound.
   (b) Find out the minimal polynomials of the elements in GF(16) with respect to GF(4) **8**
   (c) Check for premitive poly nomial given $x^6+x^5+x^4+x^3+x^2+x+1$ **2**

3. 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) **8**
   (b) Suppose the received vector is r=(1001111), find the syndrome circuit. **8**
   (c) Explain shortened cyclic codes. **4**

4. (a) Explain the encoding process for Reed muller codes. **10**
   (b) Compute the following using GF(8) **5**
   (i) $\alpha^6+\alpha^3+1$ (ii) $(\alpha^5+\alpha^4)(\alpha^5+\alpha^3)$
   (c) Find out the primitive elements of GF(11) **5**

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 **20**
   $r(x)=1+\alpha^2x+\alpha^4x^2+x^3+\alpha^6x^4+\alpha^3x^5+\alpha^5x^6$

[TURN OVER

6. For a ½ rate canvolution encoder. $g^{(1)}$=(1011) and $g^{(2)}$=(1101). Draw the state diagram. If the received code word is (11111101110010). Find out the correct codeword if the codeword is transmitted across BSC with p=0.125 ussing FANO algorithm **20**

7. (a) Explain the procedure to find out the codeword for systematic cyclic codes **10**
   (b) Explain peter son's Algorithm for t error correctong codes. **10**

M.E EXTC Sem I (Old). 18/5/15.

CN

QP Code : 1206

(3 hours) (100 marks

(1) Question No. **1** is compulsory.
(2) Out of remaining questions attempt any **four** questions.
(3) In all **five** questions to be attempted.
(4) Figures to the right indicate full marks.

1. a	Discuss role of **IGMP** and **ARP** protocol in **TCP/IP**	**[5]**
1. b	Can IP addresses be used in ATM? Explain why or why not?	**[5]**
1. c	Discuss various delay components in the communication network	**[5]**
1. d	Discuss role of **RARP, BOOTP** and **DHCP** in address allocation	**[5]**
2. a	Explain in detail M/M/1 queuing system. Compare the M/G/1 system with M/M/1 system	**[10]**
2. b	Explain RSA algorithm with an example	**[10]**
3. a	Compare and Contrast IPv4 with IPv6	**[10]**
3. b	Explain the **TCP** segment with header format and how connection are established and closed in **TCP**	**[10]**
4. a	Explain the lossless data compression techniques used in communication networks	**[10]**
4. b	Explain in detail the architecture of **BISDN** network	**[10]**
5. a	Explain Little's theorem and explain its application in communication network	**[10]**
5. b	List different queuing models and explain any one model in detail	**[10]**
6. a	Explain in detail **RSVP** protocol.	**[10]**
6. b	Which aspects of the ATM network architecture depends on the fixed-length nature of ATM cells? What happens if ATM cells are allowed to be variable in length?	**[10]**
7.	Write short notes on any **two** of the following: i. DHCP ii. ICMP iii. RTP protocol iv. OSI reference model	**[2x10]**

M.E EXTC Sem I (old).

STC

12/5/15.

Q.P. Code : 1203

(3 Hours) [Total Marks : 100

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

1. Explain following terms clearly giving suitable examples or applications wherever possible. 20
   (a) Power spectrum
   (b) Characteristic functions
   (c) Memory less distribution
   (d) Random signal

2. (a) Define the terms : 12
   (i) Joint probability density of two real random variables.
   (ii) Marginal distribution function
   (iii) Conditional denstiy functions. The joint density function of two random variables x and y is.
   $p(x, y) = A \exp(-|x| - |y|) \quad -\infty < x, y < \infty$
   Where A is a constant . Find the constant A.

   (b) State and prove Schwartz inequality for two random variables. 8

3. (a) Define probability measures. Prove that 10
   $P(A \cup B) = P(A) + P(B) - P(A \cap B)$.
   Also find the expression for $P(A \cup B \cup C)$

   (b) Four dices are rolled together. Find the probability for the sum of their faces to be 14 . What are the basic events and sample space in this case. 10

4. (a) Prove that the limiting form of a random walk is the Wiener process. Find the covariance function of Wiener process. 10

   (b) Show that the optimum Wiener filter transfer function is given by 10

$$|H(\omega)|^2 = \frac{\phi_{xx}(\omega)}{\phi_{xx}(\omega)+\phi_{nn}(\omega)}$$

Where $\phi_{xx}(\omega)$ and $\phi_{nn}(\omega)$ are the power density spectrums of input x (t) and additive noise n (t) respectively.

[TURN OVER

5. (a) Patients arrive at the doctor's clinic according to poisson process with rate $\lambda = \frac{1}{2}$ minute. The doctor will not see a patient untill at least 3 patients are in the waiting room. Find the expected waiting time until the first patient is admitted to see the doctor . What is the probalilty that no body is admitted to see the doctor in the first hour. **10**

   (b) Let $x_1, x_2, \ldots\ldots x_n$ be jointly random variables. Let $Z = a_1 x_1 + a_2 x_2 + \ldots\ldots a_n x_n$ Show that Z is always a Gaussian random variable if $x_1, x_2, \ldots\ldots x_n$ are Gaussian random varriables. **10**

6. (a) A signal is given by $x(t) = A \cos(\omega t + \theta)$ where A and ω are constant and θ is uniformly distributed over $(0, \pi)$. Show that the signal is not W.S.S. If A were not to be a random variable, What should be the conditions on A that the signal is W.S.S. **10**

   (b) State and prove central limit theorem. **10**

7. Write short note on **20**
   (a) Markov Process.
   (b) Ergodic Process.
   (c) Queue Discipline.
   (d) Moment generating functions.
