ME | EXTC | I OLD 1|12|2014
CN

QP Code : **17064**

(3 Hours) [Total Marks :100

N.B. : (1) Question Number 1i s **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) How does the transport layer differ in connection oriented versus connectionless approach in design of computer network? **5**
1. (b) Explain the role of a ATM adaptation layer in ATM network **5**
1. (c) Discuss various delay components in the communication network **5**
1. (d) Discuss ATM traffic management in brief **5**

2. (a) List different queuing models. Explain one in detail **10**
2. (b) Explain RSA algorithm with an example **10**

3. (a) Explain the subnet addressing with suitable example **10**
3. (b) Explain performance issues in ARQ **10**

4. (a) Explain the losless 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) Explain the QoS requirement for ATM network and how they are achieved. **10**

6. (a) Explain MPLS protocol in detail. **10**
6. (b) Compare and contrast IPv4 with IPv6 **10**

7. (a) Explain the TCP segment with header format and how connection are established and closed in TCP **10**
7. (b) Explain in detail RSVP protocol. **10**

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FOC

QP Code :17070

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

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

1. (a) Explain what is V-number of a fiber and how it is related to the numerical aperture of the fiber and number of modes propagating through the fiber. **5**
   (b) Explain curvilinear propagation of an optical ray through a graded index fiber, with a neat sketch. what are the advantages offered by graded index fiber over step index fiber? **5**
   (c) What is dispersion? What are different types of dispersion? Explain cause of each. **5**
   (d) Draw neat sketch of electric field distribution across an R-APD. Explain working of R-APD briefly. **5**

2. (a) Draw neat sketch of ray propagation in an ideal step index optical fiber. Show conditions on the refractive index of each medium. What is critical angle and acceptance cone? Give expression for numerical aperture. **10**
   (b) Derive wave equation in cylindrical waveguides in terms of E_z and H_z only. Show how the solutions are characterised in the core and the cladding. **10**

3. (a) Give expression for group delay per unit laugh (τ_g/L) in an optical fiber and derive expression for dispersion D. **10**
   (b) A double heterojuction InGaAsP LED emitting at a peak wavelength of 1310 nm has radiative and non-radiative recombination times of 30 and 100 ns respectively. The drive current is 40 mA. Find the bulk recombination lifetime, internal efficiency and internal power level. **10**

4. (a) Give expressions for the following for a photo diode: **10**
   (i) Upper wavelength cut off.
   (ii) Efficiency.
   (iii) Responsivity.
   (b) Draw schematic of coherent optical communication system. Explain concept of coherent detection with expressions. **10**

5. (a) Explain link power budget and rise-time budget. **10**
   (b) Explain fuctionality of 2x2 fiber coupler. **10**

6. (a) Explain the amplification mechanism in EDFA. **10**
   (b) Draw the schematic of a typical WDM network and explain its working. **10**

7. Write short notes on any **two** :— **20**
   (a) Fiber Bragg grating.
   (b) Non linear effects in optical fiber.
   (c) Solitons.

M.E. ExTC - Sem I (old).

STC

25/11/14.

QP Code : 17062

[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** if **necessary** but justify the same.

1. Explain the following terms with suitable examples in communication engineering:— **20**
   (a) Random signal.
   (b) Ergodic process.
   (c) Power spectrum.
   (d) Markov signal.

2. (a) Xand Y are the random variables each having gaussian distribution with mean m_X and m_Y and variances σ_x^2 and σ_y^2 respectively. What is the distribution of Z=X+Y. Derive mean and variance of Z. **10**
   (b) State and prove schwartz inequnality for two real random variables. **10**

3. (a) State and prove Bay's theorem of conditional probability of an event A that can occur through n mutually exclusive channels X1, X2, X3....Xn. **10**
   (b) In a class of 40 students. 23 failed in mathematics. A Football team of II players is selected from the class. find the probability distribution of failed students in the team and average number of failed students in the team. **10**

4. (a) Define the joint probability density of two random variables and conditional density function. The joint probability density function of two random variable X and Y is given by $P(X, Y) = A \exp [|X| - |Y|]$, $-\infty < X, Y < \infty$ Where A is a constant. Find the value of A. **10**
   (b) If y(t) is the output of linear time invariant system with impulse response h(t). When wide sense stationary random process x(t) is applied as input, then show that $Sxy(\omega) = H(\omega)\ \ Sxx(\omega)$. **10**

5. (a) What is moment generating functions for the probability distribution functions, show all the moments can be generated from the moment generating functions. **10**

(b) if $|H(\omega)|^2 = \frac{\omega^2 + 9}{(\omega^2 + 4)(\omega^2 + 16)}$ **10**

find the realizable transfer function and evaluate impulse response h(t).

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 signal is not WSS. if A were not be a random variable what should be the condition on A such that the signal is WSS. **10**

(b) A particle is under going one dimensional random walk taking a step +a and -a with probability p and q with probability q=1-p. Find the probability of the particle to return to origin after 2N steps. **10**

7. Write short notes on:— **20**

(a) Classical Brownian motion.

(b) Memory less distribution.

(c) Poison process.

ME (EXTC) Sem I 11/12/14 Error Correction Codes

QP Code : **17067**

(3 Hours) [Total Marks :100

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

1\. (a) Write short note on :— **20**
(a) Binary symmetric channel.
(b) Perfect code.
(c) Check for primitive polynomial given $x^6 + x^5 + x^4 + x^3 + x^2 + x + 1$.
(d) Explain MDS codes.
(e) State different decoding techniques for convolution code. Write the steps for any one Technique.

2\. For (15,11) cyclic hamming code generated by $g(x) = 1 + x + x^4$. Determine. **20**
(i) Generator polynomical of its dual code.
(ii) Construct G and H matrics in symmetric form.
(iii) Draw encoder-decoder diagram.
(iv) Find code word if received code word is m = 10101100001.

3\. (a) Find out the generator polynomial for triple error correcting BC Hcode. **8**
(b) For a rate ½ convolution encoder $g^{(0)}$ = (1011) and g(1) = (1001). Draw the state diagram. If the received codeword is (11111101110010), find out the correct codeword if the code word is transmitted across BSC with p =0.15 using FANO Algorithm. **12**

4\. (a) Consider (6,3) linear code whose generator matrix **10**

$$G = \begin{bmatrix} 1 & 0 & 0 & 1 & 0 & 1 \\ 0 & 1 & 0 & 1 & 1 & 0 \\ 0 & 0 & 1 & 0 & 1 & 1 \end{bmatrix}$$

Find (i) All code vector.
(ii) Hamming weight and distance.
(ii) Encoder diagram.

(b) If g(x) a polynomial of degree (n-k) and is a factor of $(x^n + 1)$ then prove that g(x) generates and (n,k) cyclic code. **10**

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5. (a) Consider the second order RM code of M = 3 determine 10
   (i) Parmetors of this RM code.
   (ii) Basic Vectors of 'G' for this code.
   (ii) encoder for this RM code.
   (b) Explain the procedure to findout the codeword for systematic cyclic code. 10

6. (a) Explain the encoding procedure in RS codes. 10
   (b) Encode the 3 symbol message (010110111) using (7,3) RS code. 10

7. (a) Explain stack algorithm 20
   (b) Explain Berlekamp-Massey algorithm
   (c) Use of state and Treediagram in coding Technique
   (d) Explain Binary Golay code.
