

CBCS SCHEME

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18EC61

Sixth Semester B.E. Degree Examination, Jan./Feb. 2023

Digital Communication

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Explain Hilbert transform and its properties. (10 Marks)
 b. Derive the expression for the complex low pass representation of band pass system. (10 Marks)

OR

- 2 a. Describe the canonical representation of Band-pass signal. (10 Marks)
 b. Find out the hibert transform of
 i) $g(t) = \cos 2\pi Ft + \sin 2\pi Ft$
 ii) $g(t) = e^{-j2\pi Ft}$ (04 Marks)
 c. Sketch the line code for the binary sequence 10110011 i) Unipolar NRZ ii) Unipolar RZ
 iii) Manchester coding. (06 Marks)

Module-2

- 3 a. Describe the geometric representation of signals. Also show that energy of the signal is equal to squared length of the vector representing it. (10 Marks)
 b. Find out the expression of mean, variance and covariance of correlator outputs. (10 Marks)

OR

- 4 a. Explain the correlation receiver and matched filter receiver with relevant diagrams. (10 Marks)
 b. Apply Gram-Schmidt procedure to obtain an orthonormal basis for the signals $s_1(t)$, $s_2(t)$ and $s_3(t)$ as shown in Fig.Q.4(b). Write $s_1(t)$, $s_2(t)$ and $s_3(t)$ interms of orthonormal basis function.

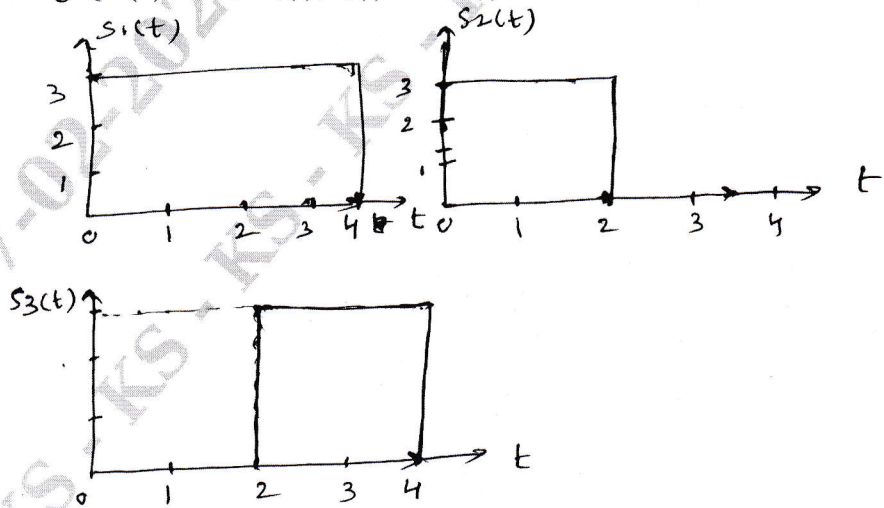


Fig.Q.4(b)

(10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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Module-3

- 5 a. Describe with neat diagram the generation and detection of BPSK. Also derive the probability of error for coherent detection. (10 Marks)
- b. Using block diagram, explain the generation and detection of QPSK signal. (10 Marks)

OR

- 6 a. Derive the expression for average probability of error for FSK using coherent detection. Explain transmitter and coherent receiver of FSK. (10 Marks)
- b. Explain with block diagram the non-coherent detection of FSK signals. (06 Marks)
- c. Encode the binary sequence using DPSK 11011011. Assume reference bit as '1'. (04 Marks)

Module-4

- 7 a. Explain the digital PAM transmission system. Also derive the expression for Inter Symbol Interference (ISI). (10 Marks)
- b. Illustrate the due-binary and modified duo-binary signals in time-domain and frequency domain. (10 Marks)

OR

- 8 a. Describe the Nyquist criterion for distortion less base band binary transmission and find out the ideal solution for zero-ISI. (10 Marks)
- b. The input to the preorder is a binary sequence 1 0 0 1 0 1 1 0 0. Obtain the preceded sequence, transmitted amplitude levels, the received signal levels and the decoded sequence for due-binary system. (06 Marks)
- c. Write short note on-eye diagram. (04 Marks)

Module-5

- 9 a. Illustrate the working of Direct-sequence spread spectrum transmitter and receiver with block diagram, waveforms and expression. (10 Marks)
- b. Explain frequency hop spread spectrum system with neat block diagram. (10 Marks)

OR

- 10 a. Illustrate the CDMA system forward link base on IS-95. (10 Marks)
- b. Write note on application of spread spectrum in wireless LAN's. (04 Marks)
- c. Obtain the PN sequence from the given PN sequence generator, assume 100 is a initial state. (06 Marks)

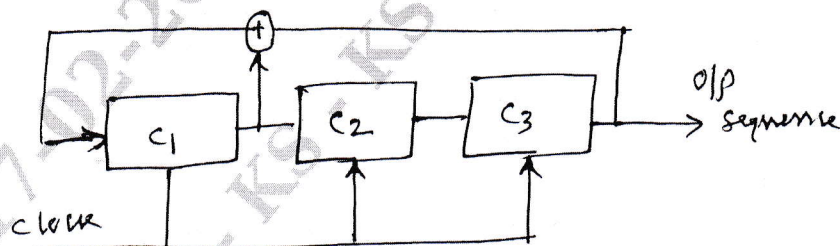


Fig.Q.10(c)

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18EC62

Sixth Semester B.E. Degree Examination, Jan./Feb. 2023 Embedded Systems

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. With a neat diagram, explain the architecture of ARM cortex M₃ processor. (10 Marks)
b. Explain two stack model and reset sequence of ARM cortex M₃. (10 Marks)

OR

- 2 a. With the help of neat diagram, explain operation modes and privilege levels of cortex M₃. (10 Marks)
b. With the help of register bit format, explain XPSR register in detail. (06 Marks)
c. Explain the function of special registers PRIMASK, BASEPRI, CONTROL, FAULTMASK. (04 Marks)

Module-2

- 3 a. Explain the operation of following instructions with syntax and an example for each:
i) ADD.W ii) LDMIA iii) BEQ iv) LSR v) IF-THEN. (10 Marks)
b. Explain different rotate and reverse instructions of cortex M₃ with example for each. (10 Marks)

OR

- 4 a. Explain SSAT and USAT saturation instructions with an example. (05 Marks)
b. Write an assembly language program to multiply two numbers. (05 Marks)
c. With a neat diagram, explain the CMSIS organization, operation, benefits and disadvantages. (10 Marks)

Module-3

- 5 a. Define embedded system. Classify an embedded system based on i) Generation ii) Complexity iii) Triggering. (10 Marks)
b. Explain the purpose of an embedded system. (06 Marks)
c. Mention the application of an embedded system in different domains. (04 Marks)

OR

- 6 a. Differentiate between RISC and CISC. (06 Marks)
b. With a neat interface diagram, explain the onboard I²C communication bus. (08 Marks)
c. Explain the following:
i) Optocoupler ii) Zig-bee iii) Wi-fi, (06 Marks)

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Module-4

- 7 a. Define and explain operational and non operational quality attributes of an embedded system. (10 Marks)
- b. With a block diagram, explain the role of different components of washing machine. (07 Marks)
- c. Explain super loop based approach for embedded firmware design. (03 Marks)

OR

- 8 a. With a neat flow diagram, explain high-level language source file to machine language conversion. (06 Marks)
- b. Compare DFG and CDFG models with an example. (06 Marks)
- c. With the help of FSM model, explain the design and operation of automatic seat belt warning system. (08 Marks)

Module-5

- 9 a. Define the term operating system, with a neat diagram, explain the operating system architecture. (07 Marks)
- b. Define process, explain in detail the structure, memory organization and state transitions of the process/task. (07 Marks)
- c. Three processes with process IDs P_1 , P_2 , P_3 with estimated completion time 10, 5, 7 milliseconds respectively enters the ready queue together. A new process P_4 with estimated completion time 2ms enters the ready queue after 2ms. Calculate the waiting time for all the processes and the turn around time for all the processes. Also, calculate the average waiting time and turn around time. Algorithm used is SJF (Shortest Job First) based preemptive scheduling. Assume all the process contain only CPU operation and no I/O operation are involved. (06 Marks)

OR

- 10 a. Explain the concept of 'deadlock' with a neat diagram. Mention the different conditions which favors a deadlock situation. (08 Marks)
- b. Write a block schematic of IDE environment for embedded system design and explain their functions in brief. (08 Marks)
- c. Write a note on IAP [In Application Programming] and in system programming. (04 Marks)

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18EC63

Sixth Semester B.E. Degree Examination, Jan./Feb. 2023 Microwave and Antennas

Time: 3 hrs.

Max. Marks: 100

- Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Use of Smith chart is permitted.

Module-1

- 1 a. Describe the mechanism of oscillation of Reflex Klystron. (07 Marks)
b. Explain different mode curve in the case of Reflex Klystron. (06 Marks)
c. A reflex Klystron is to be operated at frequency of 10GHz, with DC beam voltage 300V, repeller space 0.1cm for $1\frac{3}{4}$ mode. Calculate $P_{RF\ max}$ and corresponding repeller voltage for a beam current 20mA. (07 Marks)

OR

- 2 a. Explain with neat diagram of microwave system. (06 Marks)
b. Derive transmission line equation in voltage and current forms. (07 Marks)
c. Explain salient features of Smith chart. (07 Marks)

Module-2

- 3 a. What is reciprocal network? For a reciprocal microwave N – port network prove that the Z and Y matrices are symmetrical. (07 Marks)
b. Explain S – matrix representation of multiport network. (07 Marks)
c. State and prove the following properties of S – parameters.
i) Symmetry property for reciprocal network
ii) Unitary property for a lossless junction. (06 Marks)

OR

- 4 a. Explain with a neat sketch a precision type variable attenuator. (07 Marks)
b. Explain with diagram a phase shifter. (06 Marks)
c. Explain magic tee and derive the S-matrix and mention its applications. (07 Marks)

Module-3

- 5 a. Derive the characteristic impedance of micro-strip line. (07 Marks)
b. Derive the characteristic impedance of shielded strip line. (07 Marks)
c. A certain micro strip line has the following parameters :
 $\epsilon_r = 5.23$; $h = 7$ mils ; $t = 2.8$ mils and $w = 10$ mils.
Calculate the characteristic impedance Z_0 of the line. (06 Marks)

OR

- 6 a. Explain the basic Antenna parameters. (07 Marks)
b. Explain briefly :
i) Radiation intensity
ii) Beam efficiency
iii) Directivity and Gain. (07 Marks)
c. Explain the radio communication link and derive Frii's transmission formula. (06 Marks)

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Module-4

- 7 a. Explain and derive the arrays of two isotropic point sources of same amplitude and phase. (10 Marks)
b. Explain with neat diagram linear arrays of 'n' isotropic point sources of equal amplitude and spacing. (10 Marks)

OR

- 8 a. Explain the electric and magnetic fields of short dipole. (07 Marks)
b. Explain the radiation resistance of short electric dipole. (07 Marks)
c. Explain the linear antenna. Also write supporting equations for E and H field. (06 Marks)

Module-5

- 9 a. Explain with relevant equations the small loop antenna. (06 Marks)
b. Explain the directivity of circular loop antenna with uniform current. (07 Marks)
c. With supporting equations explain rectangular Horn Antenna. (07 Marks)

OR

- 10 a. Explain with neat diagram of Helix Geometry and Helix modes. (07 Marks)
b. Explain practical design consideration for the mono-filar axial mode Helical antenna. (07 Marks)
c. Explain briefly :
i) Yagi – Uda array
ii) Parabolic reflector. (06 Marks)

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Sixth Semester B.E. Degree Examination, Jan./Feb. 2023

Python Application Programming

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Identify three types of errors encountered in Python and also explain the basic building blocks of Python program. (07 Marks)
- b. Predict the output and justify your answer (i) $-13\%9$ (ii) $6.6//16$ (iii) $1+2**3/4*5$
(iv) not "False" (v) $5*1**3$ (05 Marks)
- c. Develop python programs to, (i) Find largest of three numbers (ii) Check whether the given year is leap year or not with functions. (08 Marks)

OR

- 2 a. Make use of necessary examples and flow chart to explain the concept of alternate execution, chained conditional and nested conditional statements. (08 Marks)
- b. Develop a user defined function named 'Solve' that returns the sum and difference of two numbers accepted from the user. Print the sum and difference separately on the console. (05 Marks)
- c. Make use of necessary code examples to explain the following – (i) Short circuit evaluation of an expression (ii) Fruitful functions and void functions. (07 Marks)

Module-2

- 3 a. Build a python program to compute counting summing and average of elements using loops. (06 Marks)
- b. Make use of necessary examples to explain any six methods associated with strings. (06 Marks)
- c. Mention the advantages of break and continue statement. Write a program to compute the sum of only odd numbers within the given natural number using continue statement. (08 Marks)

OR

- 4 a. Make use of necessary syntax to explain fileopen, fileclose, fileread and filewrite concepts in python. (08 Marks)
- b. Develop a python program to accept a file name from the user : (i) Display the first N lines of the file, (ii) Find the frequency of occurrence of the word accepted by the user. (08 Marks)
- c. Use find and string slicing to extract the portion of the string after the colon character and then use the float function to convert the extracted string into a floating point number. Assume the following string :
`str = X-DSPAM-Confidence : 99.94` (04 Marks)

Module-3

- 5 a. Describe any two list operations and list methods. Develop a python program to accept n numbers from user, find sum of all even numbers and product of all odd numbers in entered list. (08 Marks)
- b. Identify pop and remove methods on lists. How to delete more than one element from a list. (06 Marks)
- c. Identify the difference between list and tuples and also demonstrate (i) How a dictionary item can be represented as a list of tuples, (ii) How tuples can be used as keys in dictionaries. (06 Marks)

OR

- 6 a. Develop a program to check the validity of a password read by the users. The following criteria should be used to check the validity. Password should have at least –
- One lower case letter.
 - One digit.
 - One upper case letter.
 - One special character from (\$#!@)
 - Six characters
- (08 Marks)
- b. Build a python program that accepts a sentence and builds a dictionary with LETTERS, DIGITS, UPPERCASE, LOWERCASE as key values and their count in the sentence as values and their count in the sentence as values.
Ex : Sentence = "VTU@123.e-Learning"
d = {"LETTERS" : 12, "DIGITS" : 3, "UPPERCASE" : 4, "LOWERCASE" : 8} (06 Marks)
- c. Develop a python program to count occurrence frequency of words in a file using dictionary. (06 Marks)

Module-4

- 7 a. Create a student class and initialize it with name and roll number. Develop method to,
- (i) SetAge – to assign age to student
 - (ii) SetMarks – to assign marks to student
 - (iii) Display – to display all information of the student
- (08 Marks)
- b. Differentiate between pure function and modifier. Develop a python program to find duration of an event if start and end time is given by defining class TIME. (08 Marks)
- c. Demonstrate the concept of operator overloading with a code snippet. (04 Marks)

OR

- 8 a. Make use of necessary examples to explain single, multiple, multilevel and hierarchial inheritance. (08 Marks)
- b. Develop a python program to express instances as return values to define a class RECTANGLE with members width, height, corner_X, corner_Y and member functions : to find center, area and perimeter of a rectangle. (08 Marks)
- c. Explain __init__ method with an example. (04 Marks)

Module-5

- 9 a. Explain any two socket functions. Explain support for parsing HTML using regular expression with an example program. (08 Marks)
- b. Make use of an example to explain the significance of XML over the web development. (08 Marks)
- c. Compare and contrast the JavaScript object Notation (JSON) and XML. (04 Marks)

OR

- 10 a. Describe creation of database table using database cursor architecture. (08 Marks)
- b. Create a simple spidering program that will go through Twitter accounts and build a database of them. (08 Marks)
- c. What is service oriented architecture? List the advantages of the same. (04 Marks)

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18TE62

Sixth Semester B.E. Degree Examination, Jan./Feb. 2023 Microwave Theory and Antennas

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Describe the mechanism of oscillations in Reflex Klystron along with schematic. (06 Marks)
b. Derive transmission line equations in voltage and current forms. (08 Marks)
c. A reflex klystron is to be operated at frequency of 10 GHz, with dc beam voltage 300 V, repeller space 0.1 cm for $1\frac{3}{4}$ mode. Calculate P_{RFmax} and corresponding repeller voltage for a beam current of 20 mA. (06 Marks)

OR

- 2 a. Define reflection coefficient. Derive the equation for reflection coefficient at load in terms of characteristic impedance and load impedance. (08 Marks)
b. A certain transmission line has a characteristic impedance of $75 + j0.01 \Omega$ and is terminated in a load impedance of $70 + j50 \Omega$. Compute:
(i) The reflection coefficient
(ii) The transmission coefficient (06 Marks)
c. List the characteristics of Smith chart with the help of necessary equations. (06 Marks)

Module-2

- 3 a. State and explain the properties of S-parameters for junction of ports having common characteristic impedance. (08 Marks)
b. With a neat diagram, explain E-plane-Tee and H-plane-Tee. (08 Marks)
c. Explain the working of Directional Couplers. (04 Marks)

OR

- 4 a. Derive S-matrix of a Directional Coupler. (07 Marks)
b. Illustrate the working circulators for 4-port and 3-port with relevant diagrams. (08 Marks)
c. Two transmission lines of characteristic impedance Z_1 and Z_2 are joined at pp' . Express S-parameters in terms of impedance when each line is matched terminated. (05 Marks)

Module-3

- 5 a. Briefly explain ohmic and radiation losses in microstriplines. (08 Marks)
b. Define the following terms with respects to antennas:
(i) Directivity (ii) Beam area
(iii) Beam efficiency (iv) Radiation intensity (08 Marks)
c. Derive Friis transmission formula. (04 Marks)

OR

- 6 a. Find the directivity for the following intensity patterns:
(i) Unidirectional cosine patterns
(ii) Bidirectional sine patterns
(iii) Bidirectional sine squared pattern (06 Marks)

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- b. Derive the expression for Quality Factor (Q) of Micro strip lines. (06 Marks)
 c. Obtain Effective Aperture and Directivity of a short Dipole Antenna. (08 Marks)

Module-4

- 7 a. State and explain power theorem and its application to an Isotropic source. (04 Marks)
 b. Obtain the field pattern for a linear uniform array of isotropic antenna, satisfy the following:
 $n = 4$, $d = \frac{\lambda}{2}$, $\delta = -dr$. Also find BWFN and HPBW. (08 Marks)
 c. Derive an expression for radiation resistance of a short electric dipole. (08 Marks)

OR

- 8 a. Explain principle of pattern multiplication with the help of suitable example. (04 Marks)
 b. An array of 4 isotropic antennas placed along a straight line. Distance between adjacent element is $\frac{\lambda}{2}$. The peak is to be obtained in a direction 60° from the axis of the array. What should be the phase difference between adjacent elements complete the pattern and find BWFN and HPBW. (08 Marks)
 c. Show that the radiation resistance of $\frac{\lambda}{2}$ antenna is 73Ω . (08 Marks)

Module-5

- 9 a. Derive the expression for strength E_ϕ and H_θ in case of small loop. (08 Marks)
 b. Write short notes on: (i) Yagi-Uda array (ii) Parabolic reflector (08 Marks)
 c. Determine the horn parameter :
 (i) Length L (ii) Width a (iii) Flare angle θ (iv) Flare angle ϕ
 if the month height b is 10λ . The horn is fed by a rectangular waveguide with TE_{10} mode. (04 Marks)

OR

- 10 a. Explain the working and design consideration of log-periodic antenna. (08 Marks)
 b. Show that the radiation resistance and small loop is $31171 \left(\frac{A}{\lambda^2}\right)^2$. (08 Marks)
 c. A 16-turn helical beam antenna has a circumference of λ and turn spacing of $\frac{\lambda}{4}$. Find:
 (i) HPBW (ii) Axial Ratio (iii) Directivity (04 Marks)

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CBCS SCHEME

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18TE63

Sixth Semester B.E. Degree Examination, Jan./Feb. 2023 Computer Communication Networks

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- Explain the functions of layers and their protocols TCP/IP protocol suite with neat diagram. (08 Marks)
 - Explain briefly the four physical topologies of a network and list out their advantages and disadvantages. (08 Marks)
 - For the following types of networks with 5 devices, discuss the consequences if connection fails : i) Mesh ii) Star (Excluding hub) iii) Bus iv) Ring. (04 Marks)

OR

- Explain the circuit and packet switching used in data communication with necessary diagrams. (08 Marks)
 - Show the encapsulation and decapsulation presentation in TCP/IP model and explain. (08 Marks)
 - For 'n' devices in a network, what is the number of cable links required for a Mesh, ring, bus and star topologies. (04 Marks)

Module-2

- Explain CSMA/CA protocol with flow diagram. (08 Marks)
 - Explain Bluetooth layer and protocol architecture with a neat diagram. (08 Marks)
 - A bit string, 01111011110111110 is to be transmitted after stuffing. Find the actual string transmitted.
 - W X ESC ESC Y ESC FLAG FLAG Z is the given message. What is the output after destuffing? (04 Marks)

OR

- Explain bit and byte oriented framing with a suitable example for each. (08 Marks)
 - Explain ARP operation and its packet format. (08 Marks)
 - A group of 'X' stations share 10 kbps slotted ALOHA channel. Each station outputs a 100 bits frame on an average of 1000ms even if previous one has not been sent. What is the required value of 'X'? (04 Marks)

Module-3

- Apply Dijkstra's algorithm to find the least cost tree for the given network for node R1.

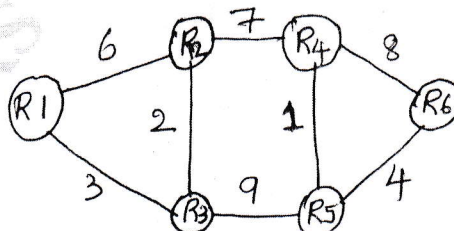


Fig.Q5(a)

- Give a brief overview of IPV4 diagram with a diagram. (08 Marks)
- Explain the occupation of address space in classful addressing. (04 Marks)

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OR

- 6 a. Using distance vector algorithm find the least cost tree for node A.

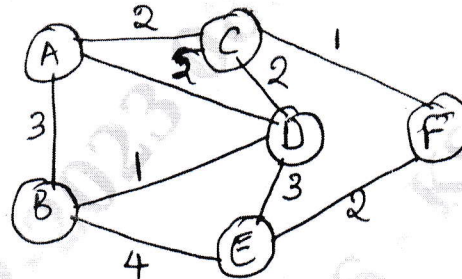


Fig.Q6(a)

- b. Explain the three phases of mobile host and remote host communication. (08 Marks)
- c. Explain the services provided by network layer. (04 Marks)

Module-4

- 7 a. With a neat diagram explain TCP segment format. (08 Marks)
- b. Explain why the size of send and receive window in selective repeat protocol can be at most one half of 2^m . (08 Marks)
- c. Consider a TCP connection having a message of 4000 bytes. The ISN is 1001. Determine the sequence number of each segment if one segment carries 500 bytes. (04 Marks)

OR

- 8 a. Explain Go-Back-N protocol with diagram. (08 Marks)
- b. Explain connection termination using three way handshaking in TCP with a diagram. (08 Marks)
- c. Following is the content of UDP header : CB84000D001C001C. Find : (04 Marks)
- Source port number
 - Destination port number
 - Length of datagram
 - Length of data.

Module-5

- 9 a. Explain the various phases in process of email transfer. (08 Marks)
- b. Explain with a diagram how FIFO queuing technique helps to improve quality of service. (08 Marks)
- c. Explain the concept of NVT in TELNET. (04 Marks)

OR

- 10 a. Explain recursive resolution process used in DNS. (08 Marks)
- b. Explain with a diagram how leaky bucket can be implemented to control traffic. (08 Marks)
- c. Describe how cookies are created and stored in world wide web (WWW). (04 Marks)
