5E3162

Roll No. _____ Total No of Pages: 3

5E3162

B. Tech. V Sem. (Old Back) Exam., Dec. 2014

Computer Science

5CS4 Computer Graphics

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks: 24

Instructions to Candidates:

*Attempt any **five questions,** selecting **one question** from **each unit.** All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.

1. NIL 2. NIL

UNIT – I

Q. 1 (a) Explain various interactive picture construction techniques. [8]

(b) Explain following: [8]

(i) Refreshing

(ii) Working principle of keyboard

OR

(a) A TV screen has 525 scan lines and are aspect ratio of 3:4. If each pixel contains 12 bits words of intensity information, how many bits per second are required to 30 frames each second? [10]

(b) Explain the function of display processor in raster scan vector scan display. [6]

UNIT – II

Q. 2 (a) What is scan conversion? What are the major adverse side effects of scan conversion? [8]

(b) Explain the bresenham circle drawing algorithm. [8]

OR

(a) Modify the simple straight line DDA to draw either solid, dashed or dotted lines. [8]

(b) Consider the line from (1, 1) to (4, 6). Use Bresenham's line drawing algorithm to rasterize the line and give output pixels. [8]

UNIT – III

Q. 3 (a) Explain the different types of Parallel Projection. [8]

(b) Find the transformation matrix that transforms the given square ABCD to half its size with center still remaining at the same position. The co-ordinates of the square are A (1, 1) B(3, 1) C(3, 3) and D(1, 3) and center at (2, 2) [8]

OR

(a) Find the transformation matrix which converts a square with diagonal {(3, 4), (8, 9)} to a unit square at origin. [8]

(b) Show that two successive reflections about either of the co-ordinates axis is equivalent to single rotation about the co-ordinate origin. [8]

UNIT – IV

Q. 4 (a) Explain Cohan-Sutherland line clipping algorithm. [8]

(b) Explain Diffuse reflection and Specular refection. [4]

(c) Explain RGB and CMY colours models. [4]

OR

(a) Explain Z-buffer Algorithm for hidden surface elimination. [8]

(b) Explain Phong Shading and Ray Tracing. [8]

UNIT – V

Q. 5 (a) What is the use of compression technique in computer graphics? Explain JPEG. [8]

(b) Explain RTF file Format. [8]

OR

(a) Explain MIDI with its message format. [8]

(b) Explain TIFF file format. [8]

----------X---------X----------

5E5101

Roll No. _____ Total No of Pages: 3

5E5101

B. Tech. V Sem. (Main / Back) Exam., Dec. 2014

Computer Science & Engineering

5CS1A Computer Architecture

Common with CS IT

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks: 24

Instructions to Candidates:

*Attempt any **five questions,** selecting **one question** from **each unit.** All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.

(Mentioned in form No. 205)

1. NIL 2. NIL

UNIT – I

Q. 1 (a) Explain Flynn classification of computer architecture based on streams. [8]

(b) Write 3 different types of shift micro-operations in Register Transfer Language.[8]

OR

(a) Explain bus transfer micro operation. Write it in Register Transfer Language. [8]

(b) Explain the concept of Von-Neuman Architecture. [8]

UNIT – II

Q. 2 (a) Design a 4 bit ALU. [8]

(b) Draw reservation table for 10 instructions. Also explain the instruction pipeline stages. [8]

OR

(a) Explain speedup, efficiency and throughput in pipelining. [8]

(b) Is there any difference in RISC & CISC architectures? Explain. [8]

UNIT – III

Q. 3 (a) Multiply 10101 & 11011 using Booth multiplier algorithm. Show the steps. [8]

(b) Describe the working of Carry Save Adder. [8]

OR

(a) Divide 0100100001 by 11001 using restoring division algorithms. Show the steps. [8]

(b) How will you subtract 2 floating point numbers? Explain with an example. [8]

UNIT – IV

Q. 4 (a) Design a 16 by 4 RAM. Explain binary cell also. [16]

OR

Write short notes on any two: [8x2=16]

(a) Associative memory

(b) Segmentation

(c) LRU page replacement policy.

UNIT – V

Q. 5 (a) What are the various modes of data transfer to and from the computers system? Explain. [8]

(b) Explain the I/O interface for a pen drive. [8]

OR

Write short notes on any two: [8x2=16]

(a) Input Output Processor

(b) DMA

(c) Priority Intercept.

5E5102

Roll No. _____ Total No of Pages: 3

5E5102

B. Tech. V Sem. (Main / Back) Exam., Dec. 2014

Computer Science & Engineering

5CS2A Digital Logic Design

Time: 3 Hours

Maximum Marks: 80

Min. Passing Marks: 24

Instructions to Candidates:

*Attempt any **five questions,** selecting **one question** from **each unit.** All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.

(Mentioned in form No. 205)

1. NIL

2. NIL

UNIT – I

Q. 1 (a) Explain the concept of Computer Aided Design (CAD) in modern digital system with the help of a flow diagram. [8]

(b) Write VHDC code for 4 bit Serial In Serial Out (SISO) shift register by using structural modeling only. [8]

OR

(a) Write VHDL code for rising edge J-K flip flop by using behavioral modeling. [8]

(b) Describe the following terms in connection with Computer Aided Design (CAD) process -

(i) Design entry

(ii) Simulation of a design

(iii) Synthesis of a design

(iv) Optimization of a design. [8]

UNIT-II

Q. 2 What is simulation and synthesis? Draw timing simulation of VHDL code given below: [16]

```
Entity logic is
Port (x1, x2 ,x3: in bit;
      f: out bit );
      end logic;
architecture logic1 of logic is
begin
      f< = ((not x1 and not x2 and x3) or (x1 and x2 and not x3) or (x1 and not x2 and x3)
         or (x1 and not x2 and x3));
 end logic1;
```

OR

(a) Explain any five VHDL statements using an example for each. [8]

(b) Write two differences (also support with any example for explanation) between package and entity. [8]

UNIT-III

(a) What do you understand by clock skew? How can it be avoided by clock synchronization? [10]

(b) Write the difference between Moore and Mealy machines. [6]

OR

Discuss the concept and working principle of following:

(i) ROM

(ii) FPGA

(iii) PLA

(iv) PLD

[4×4=16]

UNIT-IV

Q. 4 What is meant by race free assignment? Explain the procedure of state reduction of incompletely specified machines with suitable examples. [16]

OR

(a) Differentiate between -

(i) Transition table vs flow table

(ii) Critical vs Non critical races

(iii) Internal state vs total state

(iv) Stable vs unstable

[4×2=8]

(b) What do you understand by dynamic hazards? Explain with example. [8]

UNIT-V

Q. 5 Why do we use FPGA kits? Explain logic elements and programmability. [16]

OR

Write short notes on-

(a) Flash memory

(b) Look up table technology.

[8×2=16]

5E5103

Roll No. _____ Total No of Pages: 4

5E5103

B. Tech. V Sem. (Main / Back) Exam., Dec. 2014

Computer Science & Engineering

5CS3A Telecommunication Fundamentals

Common with CS IT

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks: 24

Instructions to Candidates:

*Attempt any **five questions,** selecting **one question** from **each unit.** All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.

(Mentioned in form No. 205)

1. NIL 2. NIL

UNIT – I

Q. 1 (a) Draw the following reference models used in computer communication-

(i) OSI / ISO Model

(ii) TCP/IP Model

Also give the key difference in both above models. [3+3+2]

(b) Suppose a spectrum of a channel is between 3 MHz and 4 MHz and signal to noise ratio is 24 dB, compute how many signaling levels are required to achieve the reachable data rates. Also calculate the channel capacity. [3]

(c) What are various transmission impairments? Explain in brief. [5]

OR

(a) Explain the working of Stop-and-Wait protocol with the help of suitable diagrams. [8]

(b) Distinguish between Synchronous and Asynchronous communication systems. [5]

(c) Sketch the waveforms for each of the following code for the bit sequence 11001101 [3]

(i) Manchester coding

(ii) Bipolar NRZ

(iii) Unipolar RZ

UNIT – II

Q. 2 (a) Consider a (7, 4) block code generated by [7]

$$G = \left[\begin{array}{cccc:ccc} 1 & 0 & 0 & 0 & 1 & 1 & 1 \\ 0 & 1 & 0 & 0 & 1 & 1 & 0 \\ 0 & 0 & 1 & 0 & 1 & 0 & 1 \\ 0 & 0 & 0 & 1 & 0 & 1 & 1 \end{array}\right]$$

Find out the error vector in data word 0010000.

(b) Explain frame structure of HDLC Protocol and compare with PPP. [7]

(c) Give the functions of Media Access Control Sublayers. [2]

OR

(a) Generate the Hamming codeword for ASCII character 'S' = 1010101. Assume odd parity for the Hamming code. [7]

(b) Explain Pure ALOHA and Slotted ALOHA. Give relationship in terms of their throughput. [7]

(c) Give the applications of CSMA/CD. [2]

UNIT – III

Q. 3 (a) What are the various effects of Hidden node and Exposed node problem in communication? [4]

(b) How can Virtual LANs be more efficient than normal LAN? Explain in detail using suitable diagram. [7]

(c) Explain Transparent and Learning Bridge. [5]

OR

(a) Draw and Explain 802.11 architecture & protocol stack. [8]

(b) Explain Protocol stack for Bluetooth Architecture. [8]

UNIT – IV

Q. 4 (a) Why do we require switching in communication? Explain Signal stage and Multistage switches. [6]

(b) Design a 3 stage 200×200 switch (N = 200) with k = 4 and n = 20. Also compare number of cross points with single stage switch. [4]

(c) Draw and explain TDMA frame structure and burst structure. [6]

OR

(a) Describe ADSL and slip rate in terrestrial network. [8]

(b) If a normal GSM time slot consists of 6 trailing bits, 8.25 guard bits, 26 training bits and 2 traffic bursts of 58 bits of data, find the frame efficiency. [6]

(c) Draw Analog Hierarchy of FDM. [2]

UNIT – V

Q. 5 (a) Find the processing gain of the system when data rate is 7.8 Kbps and the spread rate or chip rate is 9.6 Mbps. (Use BPSK technique for modulation). [4]

(b) Discuss the concept of Spread spectrum used in communication and explain the working of DSSS transmitter and receiver using the suitable block diagram. [6]

(c) Explain Forward and Reverse CDMA in detail. [6]

OR

(a) Write short notes on any three- [3x3=9]

(i) M-sequence

(ii) Hand-Off Process

(iii) Gold Sequence

(iv) IMT-2000

(b) Explain the direct sequence and frequency spread spectrum with their performance measurement. [4]

(c) Explain the generation of PN sequence. [3]

------x------x------

5E5104

Roll No. _____ Total No of Pages: 4

5E5104

B. Tech. V Sem. (Main / Back) Exam., Dec. 2014

Computer Science & Engineering

5CS4A Data Base Management System

Common with CS IT

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks: 24

Instructions to Candidates:

*Attempt any **five questions,** selecting **one question** from **each unit.** All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.

(Mentioned in form No. 205)

1. NIL 2. NIL

UNIT – I

Q. 1 (a) Compare the file system and DBMS on the basis of following:

(i) Integrity

(ii) Difficulty in accessing data

(iii) Concurrentl access anomalies. [2×3=6]

(b) Describe various functions of Database Administrator. [2]

(c) Explain the database design process. [3]

(d) Using neat diagram and examples show that database system hides details of data stored and maintained. [5]

OR

(a) Consider following transaction that transfer $50 from account A to account B

Ti : read (A): reading A from database

A = A – 50:

write (A): updating A in database

read (B):

B = B + 50:

write (B):

using the above example describe the following problems in file system;

(i) Atomicity

(ii) Inconsistency. [4+4= 8]

(b) Why query processor component of database system is important? Briefly discuss about all components of query processor. [2+2=4]

(c) Differential b/w DDL & DML using syntax for them. [4]

UNIT – II

Q. 2 (a) Describe the following terms with examples:

(i) owner entity sets

(ii) identifying relationship

(iii) discriminator

and design E-R diagram to model them. [6]

(b) Design an E-R to show that participation of weak entity set as owner entity set in identifying relationship with another weak entity sets and find primary key of all entity sets. [4]

(c) Differentiate between following-

(i) Candidate keys and super key

(ii) Partial and total participation

(iii) Entity and entity sets. [6]

OR

A university Registrar office maintain data about course, course offering, student, instructor, enrolment and grade. Construct an E-R diagram for office and convert E-R diagram into tables. [8+8=16]

UNIT – III

Q. 3 (a) Explain Relationship algebra joints. [8]

(b) Explain following terms for Domain Relational Calculus -

(i) Formal definitions [4]

(ii) Safety of expressions. [4]

OR

(a) Compare the tuple relational calculus and domain relational calculus on the basis of following: [8]

(i) Formal definition

(ii) Safety of expressions

(iii) Expressive power of languages.

(b) Consider following schemas -

Project (Pid, Pname, dept-no)

Works-on (emp-id, pid, hours)

Employee (emp_id, ename, address, salary)

Department (dept_no, dname)

Write relational algebra syntax for following -

(i) For each employee working on a project with Pname of '231 Project', retrieve the name of the employee and his/her salary.

(ii) Retrieve the name of each employee who works on all project controlled by department number 5.

(iii) for each project on which more than two employee work, retrieve the project number, the project name and the number of employee who work on the project. [2+2+4=8]

UNIT – IV

Q. 4 (a) Consider the schemas of Q. 3 (ii) in unit-III and write the SQL syntax for mention statements a, b, and c. [3+3+4=10]

(b) What is embedded SQL? Why we need to access a database using General Purpose Programming Language? [2+4=6]

OR

(a) What is JDBC? Explain establishing a connection to the database, create statement, execute query and iterate result set in JDBC. [8]

(b) What is Triggers? How do we create triggers on a database? Show some syntax. [2+2+4=8]

UNIT – V

Q. 5 (a) What is Bcd database? Explain with examples insert, update and delete anomalies in database. [8]

(b) Consider the schema R=(A,B,C,D,E) with a set F of functional dependencies {ED→D, A→BC, E→A, E→B, B→C}. Find canonical cover for F. [8]

OR

We are given a schema S={A,B,C,D,E}. The F of functional dependencies is {A→B, BC→E, ED→A}.

(a) is S in BCNF? Why

(b) is S in 3NF? Why?

(c) find canonical cover F_c of F

(d) List all candidate keys for S [3+3+5+5=16]

320

5E5105

Roll No. _____ Total No of Pages: 4

5E5105

B. Tech. V Sem. (Main / Back) Exam., Dec. 2014

Computer Science & Engineering

5CS5A Operating Systems

CS, IT

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks: 24

Instructions to Candidates:

*Attempt any **five questions,** selecting **one question** from **each unit.** All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.

(Mentioned in form No. 205)

1. NIL 2. NIL

UNIT – I

Q. 1 (a) What are the main functions of an operating system? Explain the types of operating systems in brief. [8]

(b) How an operating system works as a resource manager and vertical machine? [8]

OR

(a) What is a process? What is the difference between a program and a process? Explain PCB using a suitable example. [8]

(b) Explain the following: - [2×4=8]

(i) Kernel level thread

(ii) Boot strop loader

(iii) System call

(iv) Multithreading OS

UNIT-II

Q. 2 (a) What is critical section problem? Explain the role of lock variable and TSL instruction in busy waiting. [8]

(b) Consider the following set of processes with arrival time and CPU burst time given in ms.

Process	Arrival time	Burst time
P_1	0	8
P_2	1	4
P_3	2	9
P_4	3	5

What is the average waiting time for these processes with preemptive SJF scheduling? [8]

OR

(a) What is dining- philosophers problem? Explain the solution of this problem by using a suitable example. [8]

(b) What is the difference between preemptive and non-preemptive scheduling? [4]

(c) Explain the turnaround time and response time. [4]

UNIT-III

Q. 3 (a) Consider the following snapshot of the system-

	Allocation			Max			Available		
Process	A	B	C	A	B	C	A	B	C
P_0	0	1	0	7	5	3	3	3	2
P_1	2	0	0	3	2	2			
P_2	3	0	2	9	0	2			
P_3	2	1	1	2	2	2			
P_4	0	0	2	4	3	3			

If a request from process P_1 arrives for (0, 1, 2) can the request be granted immediately? What is the content of need matrix? [8]

(b) What is deadlock? What are the necessary conditions to occur the deadlock? What are the various methods to recover from the deadlock? [8]

OR

(a) Explain free space management using bit map, linked list/ free list. [8]

(b) Explain the difference between logical and physical address space. Explain fragmentation. What are the various solutions for external fragmentation? [8]

UNIT-IV

Q. 4 (a) What is the difference between Pager and Swapper? [4]

(b) What is demand paging? [4]

(c) What is thrashing? [4]

(d) Write short note on TLB. [4]

OR

(a) Consider 3 page frames and the following reference string using FIFO page replacement algorithm to calculate the number of page faults in each reference string:- [10]

7 0 1 2 0 3 0 4 2 3 0 3 2 1 2 0 1 7 0 1

(b) What is virtual memory? Explain the use of virtual memory using a suitable example. [6]

UNIT-V

Q. 5 Suppose a disk drive has 200 cylinders, numbered from 0 to 199. The drive is initially at cylinder 53. The queue with request from 1/0 to blocks in cylinders: [16]

98 183 37 122 14 124 65 67

Count the total head movements of cylinders in -

(i) SCAN Scheduling

(ii) C-SCAN Scheduling.

OR

Q. 5 Write short notes on:- [4×4=16]

(i) Directory structure in Linux

(ii) File Naming

(iii) Acyclic graph

(iv) File organization

5E5106

Roll No. _____ Total No of Pages: 4

5E5106

B. Tech. V Sem. (Main / Back) Exam., Dec. 2014

Computer Science & Engineering

5CS6.1A Advance Data Structure

Common with CS IT

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks: 24

Instructions to Candidates:

*Attempt any **five questions,** selecting **one question** from **each unit.** All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.

(Mentioned in form No. 205)

1. NIL 2. NIL

UNIT – I

Q. 1 (a) Suppose we build the Huffman code tree for the set of letters and frequencies given below:

Character :	A	B	C	D	E	F
Frequency:	1	5	20	30	40	50

What will be the length of the code for the character B? [8]

(b) Explain the concept of 2-3 tree. How can keys be inserted into it? Comment on the efficiency of search operations on a 2-3 tree. [8]

OR

(a) Prove that the insertion of a new node in the red-black tree with n nodes in Q (logn) time in the worst case. [8]

(b) What is a dictionary? Give the applications of dictionary or dictionary with duplicates in which sequential access is desired. [8]

UNIT – II

Q. 2 (a) Explain the various techniques used in amortized analysis. [8]

(b) What is Binomial heap? Explain binomial operations and its applications. [8]

OR

(a) Show that if only the mesageable-heap operations are supported, the maximum degree D (n) in an n-node Fibonacci heap is at most [log n]. [8]

(b) Justify the 0(1) amortized time of FIB-HEAP-DECREASE-KEY as an average cost per operation by using aggregate analysis. [8]

UNIT – III

Q. 3 (a) Construct a graph G with the following properties:

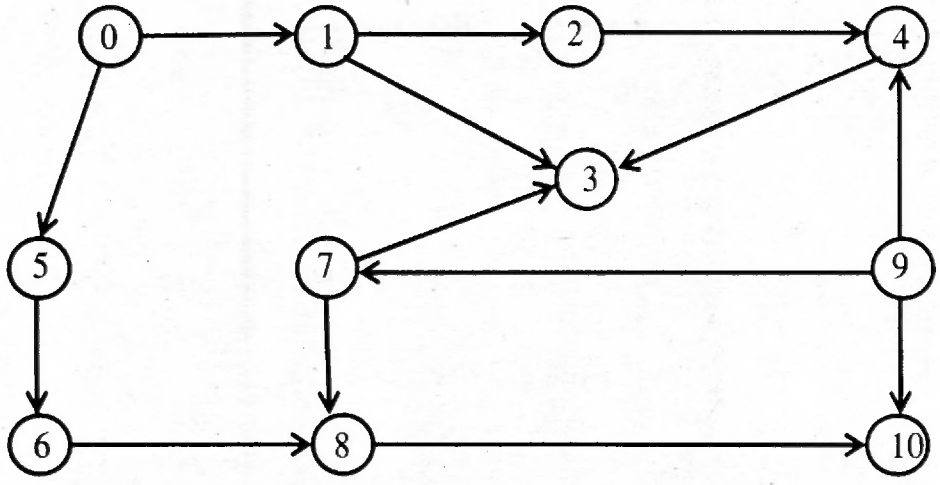
Edge connectivity of G = 4

Vertex connectivity of G = 3 and degree of every vertexes of G > 5. [8]

(b) Prove that let G be 9 non planar graph without Kuratowski graphs of minimal total size $E_G + V_G$, then G is 3-connected. [8]

OR

(a) Find the BFS Topological sorting of the following graph: [8]



(b) State and prove the max-flow min-cut theorem for network flows. Derive Ford-Fulkerson algorithm for finding the maximum flow in a network. [8]

UNIT – IV

Q. 4 (a) Prove that the number of comparators in any sorting network is at least Ω (nlgn). [8]

(b) Describe how an 0(lgn) depth bitonic sorter can be constructed when the number n of inputs is not an exact power of 2. [8]

OR

(a) Although up trees are used to conceptualize a disjoint set, disjoint sets are generally implemented in an Array. Explain how this is possible. [8]

(b) Describe priority and concatenable queues using 2-3 trees with an example. [8]

UNIT – V

Q. 5 (a) What do you mean by modular Arithmetic? Explain. [8]

(b) Which algorithm is used for computing the greatest common divisor of two integers? Prove the supporting recursion theorem. [8]

OR

(a) Satisfy the following congruence in Chinese remainder theorem. Find x?

P1 : x = 2 (mod3), P2 : x = 3 (mod5)), P3 : x = 2 (mod7) [8]

(b) Write short notes on: [4x2=8]

(i) Primarily Testing

(ii) Integer Factorization

5E5107

Roll No. _____ Total No of Pages: 4

5E5107

B. Tech. V Sem. (Main / Back) Exam., Dec. 2014

Computer Science & Engineering

5CS6.2A Digital Signal Processing

Common with CS IT

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks: 24

Instructions to Candidates:

*Attempt any **five questions,** selecting **one question** from **each unit.** All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.

(Mentioned in form No. 205)

1. NIL 2. NIL

UNIT – I

Q. 1 (a) Show that the discrete time system described by the input-output relationship $y[n] = nx[n]$ is linear. [4]

(b) Is a discrete time signal described by the input-output relation $y[n] = r^n x[n]$ time invariant? [4]

(c) What are energy and power signal? What are the operations performed on a signal? [8]

OR

(a) Evaluate the discrete time convolution sums: [4×2=8]

(i) $y(n) = \left(\frac{1}{4}\right)^n u(n) * u(n+2)$

(ii) $y(n) = \cos\left(\frac{\pi}{2} n\right) u(n) * u(n-1)$

(b) Determine the output of the system described by the following differential equations with input and initial conditions specified. [4×2=8]

(i) $\frac{d}{dt} y(t) + 10\, y(t) = 2x(t)$

$y\left(\bar{0}\right) = \perp$

$x(t) = u(t)$

(ii) $\frac{d^2}{dt^2} y(t) + y(t) = \frac{3d}{dt} x(t)$

$y\left(\bar{0}\right) = -1$

$\left.\frac{d}{dt} y(t)\right|_{t = \bar{0}} = \perp$ 1a

$x(t) = 2t\, e^{-t} u(t)$

UNIT – II

Q. 2 (a) Find out the DTFT (Discrete Time Fourier Transform) of - [4×2=8]

(i) Exponential sequence

(ii) Unit step sequence

(b) Explain the initial and final value theorem for Z- transform by taking suitable examples. [8]

OR

(a) Consider the function $f(n) = b^{|n|}$ for $b > 0$. Find Z - transform of f (n). [4]

(b) If Z- transform of $x(n) = a^n u(n)$ is $x(z) = \frac{z}{z-a}$ with ROC $|z| > a$ find the

Z - Transform of x (n-2). [4]

(c) Find the inverse Z-transform of - [8]

$$x(Z) = \frac{1 + Z^{-1} + 2Z^{-2}}{\left(1 - \frac{1}{2} Z^{-1}\right)\left(1 - \frac{1}{3} Z^{-1}\right)\left(1 - \frac{1}{4} Z^{-1}\right)}, \quad Z > \frac{1}{2}$$

using partial fraction method

UNIT – III

Q. 3 Find the Nyquist sampling rate and sampling interval for each of the following -

(a) $5 \cos (1000 \pi t) \cos (4000 \pi t)$

(b) $\sin C (100 \pi t)$

(c) $\sin C (50 \pi t) . \sin C (100 \pi t)$

(d) $\sin C (100 \pi t) + 3 \sin C^2 (60 \pi t)$ [4×4=16]

OR

(a) Consider a signal m (t) = cos $w_o t$ where $W_o = 2\pi f_o$. Illustrate the effect of under sampling of m (t) for a sampling rate of $f_S = \left(\frac{3}{2}\right) f_o$. [8]

(b) Assign $x_1(t)$ is band limited to 2KHz while $x_2(t)$ is band limited to 3KHz, find the sampling Nyquist rate for - [4×2=8]

(i) $x_1 (t) + x_2 (t)$

(ii) $x_1 (t) * x_2 (t)$

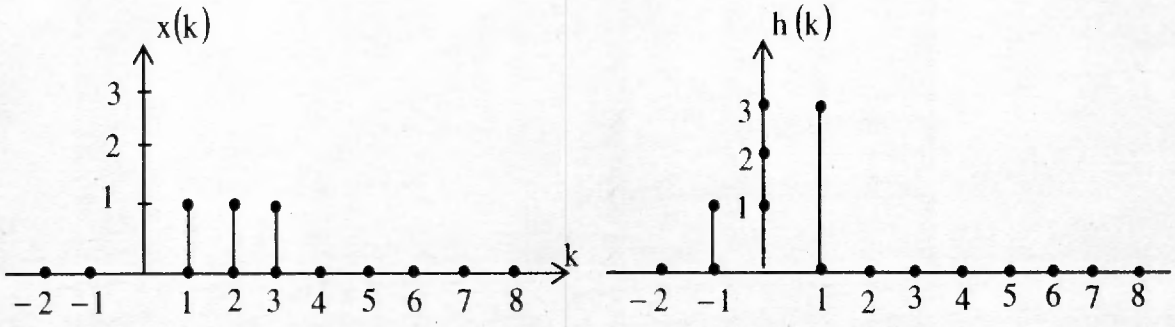
(iii) $x_2 (t - 3)$

(iv) $x_1 (2t)$

UNIT – IV

Q. 4 (a) Explain DIT FFT Algorithm. [8]

(b) Evaluate linear convolution of the sequence shown below- [8]



(a) (b)

Fig – 1

OR

(a) Explain the properties of DFT. [8]

(b) Given $x(n) = 2^n$ and N = 8, find X (k) using DIT FFT algorithm. [8]

UNIT – V

Q. 5 (a) An LTI system is describe by the LCCD equation as follow - [8]

$$y(n) - \frac{5}{6} y(n-1) + \frac{1}{6} y(n-2) = x(n)$$

Determine frequency and impulse response of the system.

(b) Determine H (z) using the impulse invariant technique for the analog system function - [8]

$$H(s) = \frac{1}{(s+0.5)(s^2+0.5s+2)}$$

OR

(a) Design a butterworth filter that satisfies the following constraint using bilinear transformation. Assume T = 1 sec. [8]

$$0.9 \le |H(e^{jw})| \le 1 \quad ; \quad 0 \le w \le \pi/2$$

$$|H(e^{jw})| \le 0.2 \quad ; \quad 3\pi/4 \le w \le \pi$$

(b) Draw the cascade and parallel structure of the following equation - [8]

$$H(Z) = \frac{1 - 3Z^{-1} + 2Z^{-2}}{1 + 0.3Z^{-1} - 0.1Z^{-2}}$$

------x------x------