LAKSHYA INSTITUTE OF TECHNOLOGY

BSC.CS

3RD SEM OLD UNIVERSITY QUESTION

II - S - B.Sc. - (ITM) - Core - 3 -
(Computer Organisation) - (NC)

2022

Full Marks - 60

Time - As in the Programme

The figure in the right hand margin indicate marks.

Answer ALL questions.

1. Answer all the questions : [1 x 8 = 8

(a) What is the full form of IEEE ?

(b) (110000011100001001)2 = ( )16.

(c) What is DMA ?

(d) What are PROM ?

(e) What is the capacity of hard disk, if it consists 20 usable plates having 40 tracks and sector each ?

(f) Which memory holds the information when the power supply is switched off ?

(g) What is TLB ?

(h) What is the use of cache memory ?

2. Answer any EIGHT of the following questions : [1.5 x 8 = 12

(a) Differentiate between SRAM and DRAM.

[P.T.O...

(b) What is control state ?

(c) What is the need of processor clock ?

(d) Define clock rate. How it is calculated ?

(e) Define memory cycle time.

(f) What is TLB ?

(g) What is flash memory ?

(h) Give two example of instruction hazard.

(i) Write the uses of stack and queue in computer organization.

(j) Draw the basic function units of the computer.

3. Write short notes : [2 x 8 = 16

(a) Define multiprocessing. How it is differ from multiprogramming ?

(b) What is register ? How it stores data in computer system ?

(c) Give short note on system software.

(d) Differentiate between synchronous and asynchronous bus.

(e) What is DVD ?

(f) Define virtual memory ? What is its need ?

(g) What is associate memory ?

(h) Define deadlock. How it is overcome ?

(i) What is delayed branching ?

(j) What is data path ?

[Cont...

4. Answer any FOUR of the following questions : [6 x 4 = 24

(a) Explain BUS structure of computer system.

OR

Discuss about different types of addressing modes.

(b) Explain various data transfer modes used in DMA.

OR

Draw and explain typical hardware control unit.

(c) Define interrupts ? What are the reasons of getting such interrupts ? How are they handled ?

OR

Write a short notes on the following :

(i) Magnetic disk drive.

(ii) Optical drive.

(d) Explain different types of hazards that occur in a pipeline.

OR

Explain the basic concepts of pipelining and compare it with sequence processing with neat diagram.

2021

Full marks – 50

Time – As in the Programme

The figure in the right hand margin indicates marks.

Answer ALL questions.

Group – A

1. Answer the following questions :- [1x10=10]
   a. What are the functions of ALU?
   b. Whether $(876)_8$ is a valid octal number or not? Explain.
   c. What do you mean by software? How many types of software are used?
   d. Explain truth table of Logic Gate NAND?
   e. Define primary memory?
   f. Why secondary memory is used?
   g. What is process state?
   h. What is the output of $(A.\bar{A}) + (A + \bar{A})$? Explain.
   i. What is flip-flop?
   j. What is the use of input units? Give example.

Group – B

2. Discuss about various components of a computer system. [8]

OR

Explain the different types of addressing modes with suitable examples.

3. What is flip flop? Explain different types of flip flop used with example. [8]

OR

Short notes on the following:-

a) Decoder
b) PLDs
c) CPLDs
d) FPGA

4. Explain different number systems with example. Convert $(426)_{10}$ decimal number to binary, octal and hexadecimal number system. [8]

OR

(a) Explain different types of Logic gates used with their Truth Table.
(b) Simplify the Boolean function
F(A,B,C,D)=m(1,3,4,7,9,10,11,12,15)

5. Short notes on any two ARM processor :- [8]

a. Branch instruction
b. Register move instruction
c. Logic instruction

OR

a) Explain arithmetic and logical instructions of ARM processor.
b) Explain the basic INPUT / OUTPUT operations.

6. Short Notes on the following : [8]

a. Asynchronous DRAMS
b. Static memories
c. Optical disks
d. Rambus memory

OR

Explain the entire memory structure of a computer system.

(c) What is Flip flop ? Draw and explain the logic circuit of JK flip flop.

OR

Explain types of ROM and their advantages.

(d) Define Interrupt. Discuss its type.

OR

Discuss the need of multiplexer ? Draw the logic diagram of 4 × 1 multiplexer.

I - S - B.Sc. - Comp. Sc. -
P - Core - II - (Computer Organization)

2023

Full Marks - 80

Time - As in the Programme

The figure in the right hand margin indicates marks.

Answer All questions

1. Answer the following Questions. [1 × 12=12

(a) Which memory is a nonvolatile memory ?

(b) Convert $(516)_8$ into decimal.

(c) What is ring counter ?

(d) Convert $(234)_{10}=(\ )_2$

(e) What is the use of Guard bits ?

(f) Which gate is known as coincidence detector ?

(g) Write the use of controlled invertor.

(h) Write the use of register file.

(i) What is transmission gate ?

(j) What do you mean by min-term and max-term ?

(k) Find the 2's complement of 31.

(l) What is floating point number ?

2. Answer any eight of the following Questions. [2 × 8=16

(a) Write the difference between latch and flip-flop.

(b) What is tri-state buffer ?

(c) What is edge-triggered flip-flop ?

(d) What is the use of booth algorithm ?

(e) How truncation generated in floating point numbers ?

(f) Write the differences between mealy and Moore state machine.

(g) Prove the pair of expression for equivalence.
$(x \vee y)' \equiv x'y'$

(h) Write an example of 2-to-1 mux.

(i) Show that the NAND gate is universal.

(j) How to execute a full subtractor from a full adder ?

3. Answer any eight of the following Questions. [3 × 8=24

(a) Define Amdahl's law.

(b) Difference between Computer organization and computer architecture.

(c) What is the use of PAL ?

(d) Define the speed of processor ? How it is measured ?

(e) Difference between SRAM and DRAM.

(f) Define Field Programmable Gate Array.

(g) What are the advantages of ROM ?

(h) What is the need of UP/DOWN counters ?

(i) Find the decimal equivalent of the unsigned binary number $(1101.0101)_2$.

[Cont...

(j) What is the use of bidirectional shift register ?

(k) Find the decimal equivalent of the 2's complement number $(10110101)_2$.

(l) Explain carry save addition with example.

(m) Difference between EPROM and EEPROM.

4. Answer any four of the following Questions. [7 × 4=28

(a) Minimize the following Boolean expression using Boolean law.

(a) $AB + \overline{AC} + \overline{ABC}(AB + C)$

(b) $\overline{x}\,\overline{y}\,\overline{z} + \overline{x}\,y\,\overline{z} + x\,\overline{y}\,\overline{z} + x\,y\,z$

OR

Convert the following into octal and hexadecimal.

(i) $(1030)_{10}$

(ii) $(0101100110110111)_2$

(iii) $(230)_{10}$

(iv) $(1456)_{10}$

(b) Define binary adder. Explain the truth table and circuit diagram of different types of adders.

OR

What is finite state machine (FSM) ? Discuss different types of FSM.

[Cont...

Write short notes (Answer any TWO) :

(i) Direct Memory Access.

(ii) Universal Serial Bus.

(iii) Booth Algorithm.

(iv) Interface Circuit

(d) What is Data Hazard ? Discuss how it is handled in Software. What are its side effects ?

OR

Write short notes (Answer any TWO) :

(i) Pipeline Performance.

(ii) Out of Order Execution.

(iii) Addressing Modes.

(iv) RISC Processor.

II - S - B.Sc. - (ITM) - Code - Core - 3 -
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II - S - B.Sc. - (ITM) - Code - Core - 3 -
(Computer Organisation)

2024

Full Marks - 60

Time - As in the Programme

The figure in the right hand margin indicate marks.
Answer ALL questions.

1. Answer the following questions : [1 x 8 = 8

(a) What is the use of program counter ?

(b) Find the addition result of $(1011)_2 + (1011)_2$.

(c) What is the 2's complement of 10011 ?

(d) How much input and output needed for multiplexer ?

(e) Convert $(516)_8$ into decimal.

(f) Write the use of cache memory ?

(g) Define Amdahl's Law.

(h) Which logic gates are known as universal gates ?

2. Answer any EIGHT of the following questions : [1.5 x 8 = 12

(a) Write the differences between PROM and EPROM.

(b) Define Clock Rate. How it is Calculated ?

(c) What is T flip flop ?

(d) What is floating point number ?

(e) Convert $(7320)_8$ in to binary form.

(f) What is universal Logic gate ?

(g) Find the equivalent of X + XY.

(h) Write the differences between SRAM and DRAM.

(i) Write the use of processor clock.

(j) What is Interrupts ?

3. Answer any EIGHT of the following questions :

[2 x 8 = 16

(a) How do you explain combinational circuit and sequential circuit ?

(b) Write about D flip flop with an example.

(c) What is the need of register ?

(d) What is data path ?

(e) At what situation multiprocessing techniques are used ?

(f) Explain how register stores data in computer system ?

(g) Give short note on system software.

(h) Differentiate between synchronous and asynchronous bus.

(i) Write the use of virtual memory ?

(j) Briefly explain the use of associate memory.

[Cont...

4. Answer any FOUR of the following questions :

[8 x 4 = 32

(a) Discuss the basic structure of computer organization.

OR

Write short notes (Answer any TWO) :

(i) Relative Addressing.

(ii) Instruction Types.

(iii) Byte Addressability.

(iv) Number Representation.

(b) Briefly explain the logic diagram of multiplexer. Give example 4 x 1 multiplexer.

OR

Write short notes (Answer any TWO) :

(i) Micro Instructions.

(ii) Emulations

(iii) K-map

(iv) Branch Addressing.

(c) Discuss the reasons of getting interrupts. How are they handled ?

OR

[Cont...

Write the reasons of getting interrupts. Write the process how to enable and disable the interrupts.

(d) What is superscalar architecture ? Discuss different types of superscalar operation with example.

OR

Explain different types of hazards that occur in a pipeline.

II - S - B.Sc. (ITM) - Core - 3 - (Computer Organisation)

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2023

Full Marks - 60

Time - As in the Programme

The figures in the right hand margin indicate marks.
Answer ALL questions.

1. Answer the following questions : [1 x 8 = 8

(a) What is program counter ?

(b) Write the functional units of computer.

(c) What are the key component of 3rd generation of computer ?

(d) What is cache memory ?

(e) What is use of register ?

(f) Define deadlock.

(g) What is multiprocessing ?

(h) Define data path.

2. Answer any EIGHT of the following questions : [1.5 x 8 = 12

(a) What is clock cycle ?

(b) How to measure CPU performance ?

(c) Define stack and queue.

(d) What is pipelining ?

(e) Define address bus ?

(f) What is guard bit ?

(g) Define underflow in floating point.

(h) What is a bus ? What are the different buses in a CPU ?

(i) Define memory Hierarchy.

(j) Write the use of latency.

3. Answer any EIGHT of the following questions : [2 x 8 = 16

(a) Discuss about 3rd generation of computer.

(b) Explain the functional unit of a computer by the help of suitable diagram.

(c) Brief explain about relative addressing mode.

(d) Write the advantages of USB.

(e) Convert the following expression.

(i) $(1100101001)_2 = (?)_8$

(ii) $(936)_{10} = (?)_{16}$

(iii) $(3AB)_{16} = (?)_2$

(iv) $(564)_8 = (?)_{10}$

(f) Define hit ratio.

(g) What is RAM ? Discuss about its types.

(h) Write the advantages of Booth's algorithm.

[Cont...

(i) Write difference between RISC and CISC.

(j) What is control bus ? Why it is unidirectional ?

4. Answer any FOUR of the following questions : [6 x 4 = 24

(a) Write short notes (answer any TWO) :

(i) Bus Structure

(ii) Relative Addressing

(iii) Byte addressability

OR

Discuss various types of instruction with example.

(b) What is microprogrammed control unit ? Discuss its characteristics.

OR

Write short notes (answer any TWO) :

(i) Execution of instruction

(ii) Wide-branch Addressing

(iii) Emulation

(c) Write short notes (answer any TWO) :

(i) PCI Bus

(ii) Interface Circuit

(iii) Controlling Device Request

OR

[Cont...

Solve the recurrence relation

$a_{n+2} - 5a_{n+1} + 6a_n = (5)4^n$

(b) Prove by mathematical induction that

$\frac{1}{1.2} + \frac{1}{2.3} + \frac{1}{3.4} + ... + \frac{1}{n(n+1)} = \frac{n}{n+1}$ for all $n \geq 1$.

OR

If G is a simple graph with n- vertices and k-components then prove that G can have at most $\frac{(n-k)(n-k+1)}{2}$ edges.

(c) Write the algorithm of both Breadth First Search (BFS) and Dijkstra's Algorithm.

OR

Solve the recurrence relation,

$a_{n+2} - a_{n+1} - 2a_n = n^2$

(c) Solve the recurrence relation,

$a_{n+2} - a_{n+1} - 2a_n = n^2$

OR

Prove that ${}^n c_r = n-1\, c_{r-1} + n-1\, c_r$

2023

Full Marks - 80

Time - As in the Programme

The figure in the right hand margin indicates marks.

Answer All questions

1. Answer any eight of the following questions. [1 × 8 =8

(a) P: All students are intelligent. Write the negation of the statement.

(b) Show that the conditional statement $p \leftrightarrow q$ and $\sim p \leftrightarrow \sim q$ are logically equivalent.

(c) Evaluate (0001110001)^(1001001000).

(d) Define length of bit string with suitable example.

(e) What do you mean by Bipartite graph with suitable example ?

(f) What is injective function with suitable example ?

(g) Define universal quantifier with suitable example.

(h) Define homogeneous recurrence relation with suitable example.

(i) If $|A| = m$ and $|B| = n$ what is the total no. of relation from A to B.

(j) Write definition of an automata with suitable example.

[P.T.O.

2. Answer any eight of the following questions. [1.5 × 8=12

(a) Write two properties of tree.

(b) "Everyone loves everybody". Translate English sentence to quantifiers.

(c) What do you mean by Pigeonhole principle with suitable example ?

(d) What do you mean by partial order relation ? With suitable example.

(e) Write properties of binary relation and explain it.

(f) Define Hamiltonian path and Hamiltonian circuit with suitable example.

(g) Let f and g be the function from the set of integers to the set of integers define by f(x) = 2x+3 and g(x) = 3x+2, then find fog and gof.

(h) What do you mean by regular graph with suitable example ?

(i) Prove by induction method $2^n < n!$, for every integer $n \geq 4$.

(j) Draw a graph G with degree sequences of G = {1,1,3,3,3,4,6,7}.

3. Answer any eight of the following questions. [2 × 8=16

(a) Write three application of Pumping lemma in regular language.

[Cont...

(b) What is different between NFA and DFA ?

(c) What do you mean by regular language ? with suitable example.

(d) Prove that the number of vertices of odd degree in any graph is even.

(e) How many ways four-digit decimal numbers to be constructed without repeating the digits ?

(f) Solve the recurrence relation $a_n - a_{n-1} - 2a_{n-2} = 0$ with $a_0 = 2, a_1 = 7$.

(g) Prove by mathematical induction,

$$1 + r + r^2 + r^3 + \ldots\ldots + r^n = \frac{r^{n+1} - 1}{(r-1)}$$ For all $n \geq 1$.

(h) Explain the following terms: Existential quantifier, Nested Quantifier with suitable examples.

(i) State and prove Handshake theorem.

(j) Define the following terms: Eulerian graph, Hamiltonian graph and Eulerian circuit with suitable examples.

4. Answer any four of the following questions. [6 × 4=24

(a) Construct the truth table of the compound statement

$$((p \to q) \to r) \to s.$$

OR

[Cont...

(b) Prove by induction method

$1 + 3 + 5 + - - - - - + (2n-1) = n^2$

6.

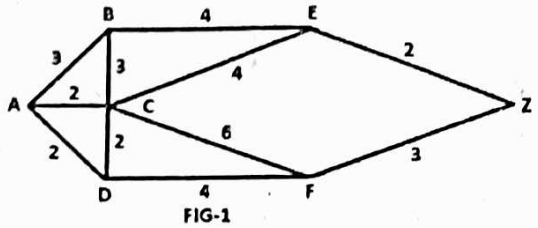

FIG-1

(a) Find the shortest path from A to Z from Fig-1.

OR

(b) From fig-1 make the minimum spanning tree then find the DFS, BFS, Pre Order Traversals, In Order Traversals, Post Order Traversals.

7.(a) Convert NDFA to DFA

STATE	0	1
q_0	q_0 q_1	q_1
q_1	q_1	q_1 q_0

OR

(b) Minimize the finite state machine table.

STATE	INPUT		OUTPUT
	0	1	
A	H	C	0
B	G	B	0
C	A	B	0
D	D	C	0
E	H	B	0
F	D	E	1
G	H	C	1
H	A	E	1

2024

Full Marks - 60

Time - As in the Programme

The figure in the right hand margin indicate marks.

Answer ALL questions.

Group - A

1. Answer all : [8 x 1

(a) Define set and give example.

(b) If A = {1,2,3} & B = {3,4,5} find AXB.

(c) Compute ${}^nP_r$ if n = 8, r = 4 ?

(d) If the graph have (n-1) number of vertices then find the number of edges & vertices of the tree ?

(e) Full form of DFS & BFS.

(f) Define 0 equivalent.

(g) What is the range of the function, $f(x) = |x| / x, x \neq 0$.

(h) Right the Euler formula for graph.

Group - B

2. Answer any EIGHT : [8 x 1.5

(a) $P(n + 1, 4) = 2P(n, 4)$, find n ?

(b) Let $a_n = a_{n-1} - a_{n-2}$ for n = 2, 3, 4 be the recurrence relation. Then find a_2 & a_3. If $a_0 = 3$ $a_1 = 5$.

[Cont...

(c) Find the number of ways of selecting 9 balls from 6 red balls, 5 white balls & 5 blue balls, If each selection consist of 3 balls of each colour.

(d) A tree has 2n vertices of degree 1, 3n vertices of degree 2 & n vertices of degree 3. Find the vertices & edges of that tree.

(e) Differenciate between degree of vertex of graph & degree of vertex of tree.

(f) $f(x) = 3^{2x} + 1$ & $g(x) = \frac{1}{2}.\log_3 (x-1)$. Show that $gof(x) = fog(x)$.

(g) Convert POS to standard POS term. $Y = (A + B)(A + C)(B + C)$

(h) Find the value of n & r, when $P(n, r) = 1680$ & $C(n, r) = 70$.

(i) Define Fibonacci recurrence relation.

(j) Plot the graph of sin x & sec x.

Group - C

3. Answer any EIGHT : [8 x 2

(a) ${}^{2n}C_3 : {}^{n}C_3 = 12 : 1$, then find n ?

(b) Construct truth table of $p \wedge q \rightarrow p \vee q$.

(c) Define branch & chord.

(d) If A = {0,11}, B = {1,10,110}, find AB in modeling of computation.

(e) Make the diagram of FSM table.

[Cont...

STATE	INPUT		OUTPUT	
	0	1	0	1
S_0	S_1	S_0	0	1
S_1	S_0	S_2	0	1
S_2	S_1	S_1	0	0

(f) Define power set & find $P(P(P(Q))) = ?$

(g) Define vertex connectivity & edge connectivity.

(h) Define Null graph & Trivial tree.

(i) $S \rightarrow 1|S$

$S \rightarrow 0$ be the production rule. Find the Grammar ?

(j) Find the Domain & Range of $f(x) = \sqrt{x}$.

Group - D

Answer all : [4 x 6

4.(a) Average score of a class of 60 students was 43. Average score of the students who had passed is 52. Average score of the students who had failed is 16. How many students failed in the exam ?

OR

(b) Check whether truth table are logical equivalence or not.

$p \vee (q \wedge r) = (p \vee q) \wedge (p \vee r)$

5.(a) Find the solution of the recurrence relation by generating function

$a_r - a_{r-1} - 2a_{r-2} = 0$ where $a_0 = 0$, $a_1 = 1$.

OR

[Cont...

2024

Time :As in Programme

Full Marks : 60

The figures in the right-hand margin indicate marks.

*Answer **all** questions.*

PART-I

1. Answer all questions: (1x8=8)

   a) _____ is logically equivalent to $p \wedge q \rightarrow r$?

   b) If Set A = {a,b,c} and Set B = {c,d,e} ,then A$\cup$ B = _____?

   c) _____ ways can 5 different books be arranged on a shelf?

   d) _____ number of words can be created by using 2 letters from the term LOVE?

   e) BFS stands for_____?

   f) _____ is the full form of DFS?

   g) FSM stands for_____?

   h) _____ is the full form of FA?

PART-II

2. Answer any eight of the following within two to three sentences each. (1.5x8=12)

   a) What do you mean by propositional logic?

   b) Define De Morgan's law in set?

(Turn Over)

c) What is a predicate? Give an example?

d) Write down the formula of permutation?

e) Define linear recurrence relation with an example?

f) What is a graph?

g) Define isomorphism?

h) What is cut-set?

i) Define DFA?

j) What is regular language?

PART-III

3. Answer any eight of the following within 75 words each. (2x8=16)

a) What is a quantifier? What is its type?

b) Define modus ponens rule with an example?

c) What is a lattice?

d) Define non-linear recurrence relation with an example?

e) Write down the formula for combination?

f) How many ways are there to select 5 players from 10 players tennis team to make a trip to a match?

g) Define cut-vertex of a graph?

h) What is spanning tree?

i) Define grammar?

j) What is NFA?

PART-IV

Answer all the following within 500 words each. (6x4=24)

4. Prove by induction that :

   $7^n - 3^n$ is divisible by 4 , for all n belongs to natural number.

OR

What is logic? Without using truth table, prove the following equivalence:

$$(\sim p \wedge (\sim q \wedge r)) \vee (q \wedge r) \vee (p \wedge r) \equiv r$$

5. Solve the recurrence relation: ar+2-3ar+1+2ar=0?

OR

Define generating function? Explain it with a suitable example?

6. Define Euler path? Explain it with a suitable example?

OR

Discuss BFS and DFS search with a suitable example?

7. Construct a NFA accepting all strings in (0,1)* with two consecutive o's or two 1's?

OR

Define pumping lemma? Prove that $L = \{a^i b^i \mid i \geq 0\}$ is not regular using pumping lemma?

8

I - S - B.Sc. - (ITM) - P - GE - I -

(Discrete Mathematical Structure)

2021

Full Marks - 60

Time - As in the Programme

The figure in the right-hand margin indicates marks.

Answer ALL the Questions.

1. Answer all the questions. [1×12=12

(a) P : Today is Friday.

Write the negation of above statement.

(b) Show that the conditional statement is a tautology by using table $(p \wedge q) \rightarrow p$

(c) Find bitwise XOR of each of these pairs 1011110, 0100001.

(d) Find length of the bit string 101010011.

(e) Define Tautology.

[Cont....

(f) How many rows appear in compound position ?

$(p \wedge q) \wedge \sim r$

(g) Define universal quantifier with suitable example.

(h) Define Non-linear recurrence relation with suitable example.

(i) If $|A| = n$ and $|B| = m$, what is the total no. of relation from A to B.

(j) Define pseudo graph with suitable example.

(k) Define prefix and suffix of strings.

(l) Define binary tree with suitable example.

2. Answer any EIGHT question from the following that carry 2 marks each. [2×8=16

(a) Express the statements "Some students in this class have visited Delhi and every student in this class has visited Delhi or Bhubaneswar" using predicate and quantifiers.

[Cont....

(b) Prove by induction that $n < 2^n$, for all positive integer.

(c) Draw a simple graph if its degree sequence is 2,3,3,4,2.

(d) Define the following terms : Binary Tree and Completed Binary Tree.

(e) Solve the recurrence relation $a_{n+2} - 5a_{n+1} + 6a_n = 0$

(f) Define Bipartite graph with suitable example.

(g) "All human being are mental"

Translate English sentence to quantifiers.

(h) Write the statement of Pigeon hole principle with suitable example.

(i) What do you mean by Equivalence Relation ?

(j) Write down Inclusion and Exclusion principle.

[Cont...

3. Answer any EIGHT questions from the following that carry 3 marks each. [3×8=24

(a) Show that $(p \leftrightarrow q)$ and $(p \rightarrow) \wedge (q \rightarrow p)$ are logically equivalent.

(b) Show that $[(p \rightarrow q) \wedge (q \rightarrow r)] \rightarrow (p \rightarrow r)$ is a Tautology.

(c) Solve the recurrence relation, $a_{n+2} - 5a_{n+1} + 6a_n = 5.5^n$

(d) Show by mathematical induction,

$$1^2 + 2^2 + 3^2 + \ldots n^2 = \frac{n(n+1)(2n+1)}{6} \text{ for } n>0.$$

(e) Explain the following terms : Recurrence relation, Negation of quantifier statements, Universal quantifiers with suitable examples.

(f) If G is a (V,E) graph, then prove that,

$$\sum_{i=1}^{n} \deg(V_i) = 2|E|$$

[Cont...

(g) Define Regular graph, Eulerian trial, Isomorphism, Eulerian path with suitable examples.

(h) Prove by mathematical induction that, $7^{2n} + 2^{3n-3} \cdot 3^{n-1}$ is divisible by 25 for any natural number $n \geq 1$.

(i) If R and S are equivalence relation in set A, then prove that,

(i) R^{-1} is an equivalence relation.

(ii) $R \wedge S$ is an equivalence relation.

(j) State the applicatin of Pumping lemma in regular language.

4. Answer all the questions. [7×4 =28

(a) Construct the truth table of the compound statement $\left[(p \rightarrow q) \rightarrow r\right] \rightarrow s$

OR

[Cont...

Solve the recurrence relation.

$$a_{k+2} - 5a_{k+1} + 6a_k = (54)2^k$$

(b) Prove by mathematical induction,

$$1^3 + 2^3 + 3^3 + \ldots n^3 = \left[\frac{n(n+1)}{2}\right]^2 \text{ for } n \geq 0$$

OR

Prove by mathematical induction,

$$1^2 + 2^2 + 3^3 + \ldots n^2 = \frac{n(n+1)(2n+1)}{6}$$

for $n \geq 1$

(c) Write the algorithm of both Breadth First Search (BFS) and Dijkstra's Algorithm.

OR

Show that $(p \to q) \to (r \to s)$ and $(p \to r) \to (q \to)$ are not logically equivalent.

[Cont...

(d) Solve the recurrence relation,

$$a_{n+2} - a_{n+1} - 2a_n = n^2$$

OR

Use the grammar G given as G {{S,A,B}, {a,b}, P,S}
Where S → AB, S → bA, A → A, A → aS, A

→ bAA, B → b/ ∈, B → bs, B → aB B

To construct the derivation trees for the strings.

(i) aaabbb (ii) abababba

IV - S - B.Sc. (ITM) - Core - 10 -
(Operating System) - (NC)

2023

Full Marks - 60

Time - As in the Programme

The figures in the right hand margin indicate marks.
Answer ALL questions.

1. Answer all the questions : [1 x 8 = 8

(a) What do you mean by multitasking ?

(b) Define scheduler and dispatcher.

(c) How to differentiate between a process and a program in Operating System ?

(d) What is program counter ?

(e) Define Swapping.

(f) What is Semaphore ?

(g) Define demand paging.

(h) What do you mean by fragmentation ?

2. Answer any EIGHT of the following questions : [1.5 x 8 = 12

(a) What is convoy effect ?

(b) Give the definition of segmentation.

(c) Which attributes are considered while designing the file structure ?

[Cont...

(d) When deadlock occur ?
(e) What is demand paging ?
(f) What is the difference between logical and physical address ?
(g) When does thrashing occur ?
(h) Differentiate between scheduler and dispatcher.
(i) What is virtual memory ?
(j) What is context switching ?

3. Answer any EIGHT of the following questions : [2 x 8 = 16

(a) What is preemptive and non-preemptive scheduling.
(b) Explain RAG.
(c) What is process synchronization ?
(d) Explain producer-consumer problem.
(e) What is critical-section problem ?
(f) Explain the concept of compaction.
(g) What is PCB ?
(h) Define throughput, turnaround time and waiting time.
(i) What do you mean by system call ?
(j) Discuss the concept of first fit, best fit and worst fit.

4. Answer any FOUR of the following questions : [6 x 4 = 24

(a) Briefly explain the services and function of Operating System.

[Cont...

OR

What is Operating System ? Explain different types of Operating Systems.

(b) Find the average waiting time and Turnaround time of the following process p_0, p_1, p_2, p_3, p_4 with arrival time 0, 2, 3, 6, 8 and burst time 3, 6, 4, 5, 2 using SJF.

OR

What do you mean by process ? Explain the process state diagram.

(c) Briefly explain the concept of paging.

OR

Solve the following using LRU with frame size -4. Find the percentage of page hit and page miss.

7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1.

(d) What is File ? Explain the file system concept.

OR

What is the layered structure of file. Briefly explain various operations on file.

2024

Time :As in Programme

Full Marks : 60

The figures in the right-hand margin indicate marks.

*Answer **all** questions.*

PART-I

1. Answer all Questions. 1x8

   a. Operating System is a ____ software.

   b. Which program locates the kernel and loads into the main memory.

   c. ____ is the heart of UNIX operating system.

   d. Virtual Memory uses ____ Memory.

   e. SJF algorithm is stands for ____.

   f. If a process does not get the processor time for a long duration. This condition is ____.

   g. ____ system call is used to create a separate and duplicate process.

   h. ____ acts as a command interpreter in UNIX operating system.

PART-II

2. Answer any eight within two to three sentences 1.5x8

   a. What is operating system ?

   b. What is masking ?

c. What is SPOOLing ?

d. What is Be-Lady's anomaly ?

e. what is deadlock ?

f. Define thrashing.

g. What is locality of reference ?

h. Define safe state.

i. Briefly describe sleeping - barber problem.

j. What is segmentation ?

k. Write the use of process control block.

l. What is fragmentation ?

PART-III

3. Answer any eight of the following (in maximum 75 words.) 2x8

a. State the little formula and explain its usages.

b. What is Semaphore ? Briefly explain its usage.

c. State Bounded-Buffer problem.

d. State the necessary conditions of deadlock.

e. What is paging ? Explain the basic methods of paging implementation.

f. Distinguish between internal and external fragmentation.

g. Why are segmentation and paging sometimes combined into one scheme.

h. What is demand paging ? Explain the role of virtual memory and demand paging.

i. Define shared lock and exclusive lock and explain file-locking mechanism.

j. What is Hash table ? How collision creates problem in directory implementation ?

PART-IV

Answer within 500 words each. 6x4

4. Differentiate between multiprogramming and multi-tasking operating system.

OR

What is System call ? Describe various system calls with suitable example.

5. Define critical section. What are the requirements to solve critical - section problem ?

OR

Differentiate between process and thread. Explain different thread implementation mechanism.

6. Consider the following page reference string 1, 2, 3, 4, 1, 2, 5, 1, 2, 3, 4, 5 for a memory with three frames. How many page fault would occur for following replacement algorithm and find the optimized one.

a. LRU replacement

b. FIFO replacement

OR

Differentiate between physical and logical address. How multilevel paging is useful in logical address space ?

7. What is virtual memory ? How virtual memory is useful in demand paging ?

OR

Explain optimal page replacement algorithm and justify this algorithm is not suffered from Belady's anomaly.

2023

Time :As in Programme

Full Marks : 60

The figures in the right-hand margin indicate marks.

*Answer **all** questions.*

PART-I

1. Fill in the blanks. 1x8
   a. An operating system is a ____.
   b. SPOOL is an acronym for ____.
   c. ____ is a logical extension of multiprogramming.
   d. FORK is ____.
   e. ____ threads are supported directly by the operating system.
   f. A process utilizes a resource in the sequence ____.
   g. The solution of internal fragmentation is ____.
   h. Disk scheduling involves deciding ____.

PART-II

2. Answer any eight within two to three sentences. 1.5x8
   a. Explain real time operating system ?
   b. Write the advantages of batch processing system over serial processing system.
   c. Why a thread is called a light-weight process ?
   d. What is interprocess communication ?
   e. Explain deadlock.
   f. Distinguish between logical and physical addressing.
   g. Write some uses of relocation register.
   h. Explain associative memory ?

(Turn Over)

i. What is DMA ?

j. Explain file attributes.

PART-III

3. Answer any eight of the following (in maximum 75 words.) 2x8

a. Explain distributed operating system ?

b. Write four functions of operating system.

c. Explain Be-Lady's anomaly ?

d. Compare the concurrency and parallelism.

e. What is locality of reference ?

f. Write the basic use of process control block.

g. Define thrashing.

h. Distinguish between paging and segmentation.

i. Explain fragmentation ?

j. Distinguish between blocking and non-blocking I/0.

PART-IV

Answer within 500 words each. 6x4

4. "Operating System can be considered as resource allocator." Explain

OR

Describe multiprogramming and multi-tasking operating system.

5. What is process management ? Explain Inter-process communication.

OR

Explain different deadlock detection techniques.

6. What is virtual memory ? How virtual memory is useful in demand paging.

OR

Explain Memory Management Stratergies like Swapping and Paging.

7. Describe file system concept and file system mounting.

OR

Explain File Sharing and File Protection.

2023

Time :As in Programme

Full Marks : 60

The figures in the right-hand margin indicate marks.

*Answer **all** questions.*

PART-I

1. Answer the following questions. 1x8
   a. Bitmap is a collection of ____ that describes an image.
   b. ____ and ____ are examples of any 2 input devices.
   c. DDA stands for ____.
   d. What is aspect ratio ?
   e. ____ plane is used of 2D transformation.
   f. ____ types of translation are present in computer graphics.
   g. Clipping is used for ____ in computer graphics.
   h. The Cohen Sutherland algorithm divides 2D area into ____ regions.

PART-II

2. Answer any eight within two to three sentences. 1.5x8
   a. What is resolution ?
   b. List any 3 display devices.
   c. Discuss any 3 applications of computer graphics.
   d. Give the matrix representation for 2D rotation.
   e. What is shear transformation ?
   f. Write down any 2 line attributes ?
   g. What is B-spline curve ?

h. Discuss the concept of Vanishing Points.

i. What is view plane ?

j. What is point clipping ?

PART-III

3. Answer any eight of the following (in maximum 75 words.) 2x8

a. Explain random scan system.

b. What is reflection transformation ?

c. List hidden edge surface remoral techniques ?

d. What is aliasing and antialiasing ?

e. What is scan line algorithm ?

f. Discuss boundary fill algorithm ?

g. Discuss some important properties of Bezier curve.

h. What is 3D rotation ?

i. What is 2D viewing transformation ?

j. Differentiate between view port and window ?

PART-IV

Answer within 500 words each. 6x4

4. Describe computer graphics and its applications.

OR

Discuss about raster scan system ?

5. Explain any 2 line drawing algorithms briefly.

OR

Explain any one area filling technique.

6. Explain 2D scaling with an example.

OR

What do you mean by 3D transformation ?

7. Explain about 2D viewing ?

OR

Explain, in brief, about line clipping algorithm.

6. Explain Bankers algorithm with an example.

OR

Calculate hit and miss using page replacement policies LRU and FIFO :

0, 4, 3, 2, 1, 4, 6, 3, 0, 8, 9, 3, 5.

7.(a) What are the typical operations that can be performed on a file. Discuss each one them.

OR

(b) List and briefly explain file allocation method.

IV - S - BCA - CC - 8 - (OPERATING SYSTEMS)

IV - S - BCA - CC - 8 - (OPERATING SYSTEMS)

2022

Full Marks - 60

Time - As in the Programme

The figure in the right hand margin indicate marks.

Answer ALL questions.

Group - A

1. Answer all questions : [8 x 1

(a) DMA stands for _____.

(b) Open() system call is used for _____.

(c) FCFS stands for _____.

(d) IPC stands for _____.

(e) _____ is used for OS to store the information about process.

(f) Paging is a _____ memory allocation method.

(g) File can be organized in _____ & _____.

(h) A stack is a Data structure which works on _____ property.

Group – B

2. Answer any EIGHT : [8 x 1.5

(a) What is the difference between process and program ?

[P.T.O...

(b) Define system software with examples.

(c) State the necessary conditions behind the deadlock.

(d) What is a Thread ?

(e) Discuss advantages of fragmentation.

(f) What is the use of paging in operating system ?

(g) Differentiate between logical address space and physical address space.

(h) What is Kernel ?

(i) Define Semaphore.

(j) What are the merits and demerits of round robin algorithm.

Group – C

3. Answer any EIGHT : [8 x 2

(a) Write the structure of an operating system.

(b) Differentiate between batch processing and multi programming.

(c) Define real time operating system.

(d) Differentiate between long term scheduler and short term scheduler.

(e) What is Thrashing ?

(f) Mention the methods used to handle deadlock.

[Cont...

(g) Explain resource allocation graph with diagram.

(h) What is demand paging ?

(i) Discuss advantages of sequential access method over random access method.

(j) List different types of file ?

Group – D

Answer all questions : [4 x 6

4. Explain in detail the functions of an operating system.

OR

Explain how the process is created when program is an execution.

5.

Process	Burst time	Arrival time
P1	5	0
P2	3	1
P3	7	3
P4	1	4

Implement the SJF (Preemptive) scheduling. Draw the Gantt chart. Also calculate the average waiting time.

OR

What is Process Management ? Explain various states of process with neat diagram.

[Cont...

a. 0,400

b. 1,10

c. 2,100

d. 3,420

e. 4,95

Also calculate the physical address if no trap is produced.

7. Discuss different file protection methods.

OR

Explain the following :

a. File system mounting

b. Direct Access method

2025

Time :As in Programme

Full Marks : 60

The figures in the right-hand margin indicate marks.

*Answer **all** questions.*

PART-I

1. Answer all Questions. 1x8

a. What is a system call in operating system ?

b. What are open-source system ?

c. Define IO bound process.

d. Define Thread.

e. What is IPC? Give examples.

f. Give 2 examples of non-preemptable resource.

g. SJF is a _____ algorithm.

h. _____ graph is used in deadlock detection if all the resources have only single instance.

PART-II

2. Answer any eight within two to three sentences 1.5x8

a. Define monitor in operating System.

b. Give examples of system calls used for different file operation.

c. What is contiguous memory allocation?

d. Define page replacement algorithm.

e. State the different types of schedulers used by a operating system.

f. Define virtual machine.

g. An application program can directly access computer hardware, True or False. Justify your answer.

h. Define MMU.

i. What is a file system. Give example

j. What is segmentation ?

PART-III

3. Answer any eight of the following (in maximum 75 words.) 2x8

a. Differentiate between physical and logical address space.

b. State the contents of a PCB.

c. State the types of queue used in process management?

d. What criteria are used for CPU scheduling?

e. Discuss context switching.

f. Differentiate between program and process.

g. Define Thrashing.

h. Discuss sequential file access methods.

i. What is a file system? Give example.

j. What is swapping ? Which OS program performs swapping ?

PART-IV

Answer within 500 words each. 6x4

4. What are the functionalities of Operating System ?

OR

State and explain the structures of operating system ?

5. Consider the set of 6 processes whose arrival time and burst time are given below -

Process ID	Arrival time	Burst time
P1	0	7
P2	1	5
P3	2	3
P4	3	1
P5	4	2
P6	5	1

If the CPU scheduling policy is SJF, then calculate the average waiting time and average turn around time. Also draw the Gantt Chart.

OR

Define IPC. Give examples of IPC systems.

6. What is paging. Differentiate between paging and segmentation.

OR

Consider the following segment table -

Segment No.	Base	Length
0	1000	700
1	1300	14
2	90	100
3	1303	680
4	2206	90

Which of the following logical address will produce trap addressing error ?