

(3 Hours)

[Total Marks: 80]

N.B. (1) Question No. 1 is **Compulsory**.

(2) Attempt any **three** questions from the remaining **five** questions.

(3) Answers to **sub-questions** should be **grouped** and written **together**.

- Q.1 (a) What is dynamic binding? How it is implemented explain with suitable example. 10
(b) Explain basic concepts of object oriented programming. What advantages OOP offers to the user? 10
- Q.2 (a) Explain different manipulators with suitable examples. 10
(b) What is operator overloading? Write a C++ program to overload > greater than operator. 10
- Q.3 (a) Explain use of try, throw and catch keywords with a suitable program. 10
(b) Explain different types of inheritance with an example. 10
- Q.4 (a) What is constructor? Write a program to implement concept of constructor overloading. 10
(b) Explain the conversion from object to primitive type using suitable example. 10
- Q.5 (a) What type of ambiguity occurs in multipath inheritance? How it can be resolved explain with suitable example. 10
(b) What is inline function? Write a program to implement concept of inline function. 10
- Q.6 Write short notes on any **four** :-- 20
(a) File opening modes
(b) Array of pointers
(c) Default arguments
(d) Dynamic memory allocation
(e) Protected modifier

(3 Hours)

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N.B.

- 1) Question No. 1 is compulsory
- 2) Attempt any **three** from the remaining **five** questions

- Q1. Write Short notes on the following: (Any four)
- a. Special Addresses (5)
 - b. FTP (5)
 - c. POP3 (5)
 - d. 3-Layer switch (5)
 - e. Intranet and Extranet (5)
 - f. SNMP (5)
- Q2. a. Explain the persistent and non-persistent connections of HTTP. What is the difference between persistent HTTP with pipelining and without pipelining? Which of the two is used by HTTP/1.1? (10)
- b. Discuss TCP/IP architecture in detail. Compare and contrast it with OSI model. (10)
- Q3. a. Explain how the DNS works and list the services provided by DNS. (10)
- b. What is intra domain routing? Explain RIP in detail. (10)
- Q4. a. Discuss the 3 way handshake of connection establishment and termination of TCP. (10)
- b. Explain the TCP congestion control algorithms in detail. (10)
- Q5. a. Calculate the CRC for the following bit stream 11101011011 using the divisor 1011. (10)
- b. One of the addresses in a block is 110.23.120.14/20. Find the number of addresses, the first address and the last address in the block. (10)
- Q6. a. Discuss how the quality of service is provided with the help of queue management algorithms and feedback mechanisms at the transport layer. (10)
- b. Discuss PPP in detail. (10)

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Note:

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2. Attempt any three from remaining questions
3. Answers to sub questions should be answered together
4. Illustrate answers with diagram wherever necessary

- 1 **Write short notes on** 20
- a) Swap space management
 - b) Security Problem
 - c) System Call
 - d) Race condition
- 2 a) For the process listed in table, draw a Gantt chart and find their average waiting time and average turnaround time using 10
- i. FCFS
 - ii. Round Robin (quantum=3)
 - iii. SJF (both preemptive and non-preemptive)

| Process | Arrival Time | Processing Time |
|---------|--------------|-----------------|
| P1 | 0 | 5 |
| P2 | 1 | 3 |
| P3 | 1 | 4 |
| P4 | 2 | 2 |

- b) What is process? Draw the five state process model and explain each state transition in it. Also explain the process context switching. 10
- 3 a) What is fragmentation? How does it occur? Discuss the techniques to overcome fragmentations. 10
- b) Consider the head of a moving hard disk with 200 tracks is currently serving a request at track 100 and moving outward. If the queue of request in FIFO order is 55, 58, 39, 18, 19 160, 150, 38, 184. What is the total head movement in the following scheduling algorithms
1)SSTF 2)SCAN 3)FCFS 4)LOOK 10
- 4 a) Given a reference string to the following pages by a program 10
8, 1, 2, 3, 1, 4, 1, 5, 3, 4, 1, 4, 3, 2, 3, 1, 2, 8, 1, 2
How many page faults will occur for the following page replacement algorithm assuming **three** frames?
a) FIFO
b) Optimal Replacement
c) LRU
- b) Explain Threads. Explain the different kinds of threads in details. 10

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- a) FIFO
 - b) Optimal Replacement
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- 5 a) Explain various file allocation techniques. 10
 b) What is a domain? Discuss the access control mechanisms in the context of data files. What are capability lists? How are they used to enhance protection? 10
- 6 a) Define Concurrency control. List out with details of requirements of Mutual exclusion in concurrency control management 10
 b) What is deadlock avoidance? 10
 Consider following snapshot of the system: -

| Process | Allocation | | | Max | | | Available | | |
|---------|------------|---|---|-----|---|---|-----------|---|---|
| | A | B | C | A | B | C | A | B | C |
| P0 | 0 | 2 | 1 | 6 | 4 | 2 | 4 | 2 | 4 |
| P1 | 0 | 0 | 1 | 2 | 2 | 1 | | | |
| P2 | 2 | 1 | 0 | 3 | 2 | 1 | | | |
| P3 | 2 | 0 | 0 | 6 | 0 | 3 | | | |
| P4 | 3 | 1 | 1 | 4 | 2 | 2 | | | |
| P5 | 1 | 1 | 1 | 2 | 2 | 2 | | | |

Using Bankers algorithm answer the following:-

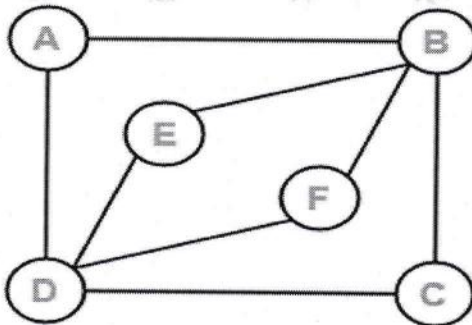
- i) What are the contents of need matrix?
 ii) Find if the system is in safe state

Time: 3 HRS

Max. Marks: 80

- N.B.:** 1) Question No.1 is **compulsory**.
 2) Attempt any **three** from the remaining **five** questions.
 3) Figures to the right indicate full marks

- Q.1** (a) Show by mathematical induction, that 05
 $1+2+3+\dots+n = n(n+1)/2$ for all $n \geq 1$
- (b) Write converse, inverse and contrapositive of the following 05
 statement.
 "If weather will not be good then I will not travel."
 (c) Show that following statements are equivalent using truth 05
 table
 $\sim(P \rightarrow Q) = (P \wedge \sim Q)$
- (d) Define Directed and Undirected graph with example 05
- Q.2** (a) What is the solution of the recurrence relation $a_n = 3a_{n-1} - 2a_{n-2}$, with 10
 initial condition $a_1 = 5, a_2 = 3$
- (b) Find the Euler Path and Euler circuit for the following graph 10



- Q.3** (a) If $A = \{ 1, 2, 3, 4 \}$, $B = \{ a,b,c \}$ and Let $R = \{(1,a), (1,b), (3,b), (2,c), (2,b), (4,a)\}$ and $S = \{(1,b), (3,b), (4,b)\}$ 10
 Compute (I) \bar{R} (II) $R \cap S$ (III) $R \cup S$ (IV) R^{-1}
- (b) State the "Tower of Hanoi" problem and obtain the corresponding 10
 recurrence relation indicating the initial conditions. Solve the recurrence relation.

Q.4

- (a) Let $A = \{1, 2, 3, 6, 12, 18\}$ and relation R be defined on A by xRy if and only if "x divides y". Show that R is a partial order relation

- a. Draw the diagram and Hasse diagram of R
 b. Determine all minimal & all maximal elements.
 c. Find all least and greatest elements.
 d. Give upper bounds and LUB of $A = \{2, 3, 6\}$
 e. Give all lower bounds and the GLB = $\{2, 3, 6\}$
 (b) Find the particular solution of $a_r + 5a_{r-1} + 6a_{r-2} = 3r^2$

Q.5

- (a) Determine whether the relation is equivalent or not on $A = \{1, 2, 3, 4\}$
 $R = \{(1, 1), (1, 2), (2, 1), (2, 2), (3, 4), (4, 3), (3, 3), (4, 4)\}$
 (b) Test the validity of the following arguments.

If milk is black then every cow is white. If every cow is white then it has four legs. So every buffalo is white and brisk. The milk four legs then every buffalo is white and brisk. The milk is black. So every buffalo is white.

Q.6

- (a) (i) Obtain disjunctive normal form of the given formula $P \vee (\sim P \rightarrow (Q \vee (Q \rightarrow \sim R)))$
 (ii) Explain with suitable example: (1) Predicate (2) Proposition

- (b) Let $S = \{1, 2, 3, 4\}$, $R = \{(1, 2), (2, 3), (3, 4), (2, 1)\}$
 Find the transitive Closure of R .