

CENTRAL UNIVERSITY OF HARYANA

Term End Semester Examinations March 2023

Programme: MCA

Session: 2022-23

Semester: FIRST

Max. Time: 3 Hours

Course Title: Operating System and Shell Programming

Max. Marks: 70

Instructions:

1. Question no. 1 has seven parts and students are required to answer any four. Each part carries three and half Marks.
2. Question no. 2 to 5 have three parts and students are required to answer any two parts of each question. Each part carries seven marks.
3. Assume any missing data suitably.

Section A

Marks

- Q1 Answer any four parts among the following.
- | | |
|--|-----|
| a. Define context switching? Write the steps followed by an operating system for performing context switching from process P1 to process P2. | 3.5 |
| b. What is thrashing? Give reasons how thrashing can affect the overall performance of CPU. | 3.5 |
| c. Write a pseudocode to demonstrate the working of Peterson's Solution for achieving process synchronization between two cooperating processes. | 3.5 |
| d. Diagrammatically explain the steps followed by an Operating System to handle a page fault. | 3.5 |
| e. With an example, explain how Bitmap is used for free-space management? | 3.5 |
| f. Give the working and importance of Grep and traceroute commands used in Linux operating systems. | 3.5 |
| g. Differentiate between Multiprogramming and Multiprocessing operating systems? | 3.5 |

Section B

- Q2 Attempt any two parts of the following
- | | |
|--|---|
| a. In a computer the processes P1, P2, P3, P4 with burst times 2, 18, 3, 4 (ms) and arrival times 0, 1, 2, 3 (ms) respectively are submitted for execution. Using FCFS scheduling identify which processes are affected by the Convoy effect? Also, using Round Robin scheduling (with time quantum 2 ms) show how the convoy effect is removed? | 7 |
| b. In a computer the processes P1, P2, P3, P4, P5 with burst times 8, 5, 4, 2, 9 (ms) and arrival times 0, 1, 3, 5, 6 (ms) respectively are given to the CPU for execution. Using Gantt chart deduce among Round Robin (with TQ=2ms) and Shortest Remaining Time First scheduling which will have least average turnaround time? | 7 |
| c. Explain in detail various Multithreading Models available and comment on which among them is most suitable for uniprocessor and multiprocessor systems. | 7 |
- Q3 Attempt any two parts of the following

- a. Suppose a maximum of only 4 main-memory frames are available to any process on a computer with 32 bit logical address space and the pages of a process (numbered from 0 to 7) are loaded in main memory using pure demand paging in the following sequence: 5,0,1,2,0,3,0,4,2,3,0,3,0,6,2,1,2,6,1,7,5,1. Find out the number of page faults that occur when FCFS and Least Recently Used page replacement algorithms are used respectively. 7
- b. Suppose a system has 32 bit logical address space with 2 KB of page size, then calculate the maximum possible size of the page table for a process, if each entry of the page table is of 4 bytes? Also, calculate the Memory effective access time with TLB of 90% hit ratio and memory access time of 10 nanoseconds. 7
- c. Explain in detail the paging mechanism followed using Inverted Page Tables. Also, explain the significance of using inverted page tables. 7

Q4. Attempt any two parts of the following

- a. In a computer, a disk has 0 to 199 cylinders and the current position of the read-write head is at cylinder number 60 and is moving towards cylinder 199. Calculate the total head movements using SCAN and C-SCAN disk scheduling algorithms respectively for the following disk cylinder request queue: 98, 183, 37, 122, 14, 124, 65, 67. 7
- b. Calculate average I/O time to transfer a 4KB block on a 7200 RPM disk with a 5ms average seek time, 1Gb/sec transfer rate and a 0.1ms controller overhead? 7
- c. Explain with an example how semaphores fulfill the characteristics for solving the Critical-Section Problem between multiple cooperating processes? 7

Q5. Attempt any two parts of the following

- a. A computer has 3 resource types A, B, C with 8, 6, 5 instances respectively in total. The maximum resource instances needed to complete each process are given by MAX and allocated resources are represented by ALLOCATION matrix. Using Banker's algorithm, comment on whether the resource instance requests P2(1,1,2) be granted or not? Give reasons for your answer. Assume that each resource instance request is processed separately. 7

Processes	ALLOCATION (Allocated resource instances)			MAX (Max. resources needed)		
	A	B	C	A	B	C
P1	1	0	1	1	1	1
P2	2	1	0	3	2	4
P3	0	1	0	3	1	1
P4	2	0	1	8	5	2
P5	1	1	0	4	4	3

- b. Write shell script which takes a file in the input having multiple lines of text. It generates another file in the output where each line is preceded by the line number and only first 10 characters(first 10 columns) are stored in the output file. 7
- c. Explain with suitable examples, how Deadlock can be prevented in a system 7

CENTRAL UNIVERSITY OF HARYANA

First Semester Term End Examinations March 2023

Programme: Master of Computer Application (MCA)

Session: 2022-23

Semester: 1st

Max. Time: 3 Hours

Course Title: Fundamentals of Computer Science (Bridge Course)

Max. Marks: 70

Course Code: SBS CS 01 01 01 E 3104

Instructions:

1. Question no. 1 has seven parts and students are required to answer any four. Each part carries three and half Marks.
2. Question no. 2 to 5 have three parts and student are required to answer any two parts each question. Each part carries seven marks.

Q 1. (4X3.5=14)

- a) Describe how to convert octal to hexadecimal with example?
- b) Write steps how to convert a number to another type of numbers?
- c) Convert from binary number to decimal number.

$$(11001)_2 = (?)_{10}$$

- d) Draw the block diagram of computer system and explain it.
- e) Explain in the detail any four input devices.
- f) What do you understand by data storage?
- g) What are the types of Personal Computer?

Q 2. (2X7=14)

- a) What are the Characteristics, capabilities and limitation of Computer.
- b) What is Memory? Explain the various types of Memory.
- c) Differentiate between Impact Printer and Non-Impact Printer?

Q3. (2X7=14)

- a) Write the difference between Micro, Mini, and Mainframe Computers.
- b) Explain in the detail Networks and internet. Differentiate between IPv4 and IPv6.
- c) What is software? Explain the types of software.

Q 4.

(2X7=14)

- a) What is difference between number and digit? Explain types of numbers with suitable example.
- b) What are the binary arithmetic operations. Explain with suitable example.
- c) Convert the following numbers to their equivalent:
- i) $(2AB)_{16} = (?)_2$ ii) $(10110101100)_2 = (?)_{16}$ iii) $(545)_6 = (?)_4$

Q 5.

(2X7=14)

- a) What is Mail Merge? Explain the Process of Mail Merge in MS- Word.
- b) What is the difference between Animation and Transition? Explain with example.
- c) Write functions for the operations (a)-(e) based on the spreadsheet given below along with the relevant cell addresses:

	A	B	C	D	E	F	G
1	S.NO.	NAME	Science	Maths	Compter	Total	Average
2	1	Sumit	80	90	77	--	--
3	2	Shivani	90	98	89	--	--
4	3	Neeraj	90	90	98	--	--
5	4	Rohit	60	76	79	--	--
6	5	Asha	50	45	77	--	--
7	Max			--	--		
8	Total		--				

- (i) To calculate the Total Marks as sum of Science, Maths and Computers for each student and display them in column F.
- (ii) To Calculate the average marks for each student and display them in column G.
- (iii) To calculate the highest marks in Computers and display it in cell E7.
- (iv) To calculate the lowest marks in Maths and display it in cell D7.
- (v) To calculate the total number of students appearing for the Science test and display it in cell C8.

CENTRAL UNIVERSITY OF HARYANA

First Semester Term End Examinations March 2023

Programme: Master of Computer Application (MCA)

Session: 2022-23

Semester: 1st

Max. Time: 3 Hours

Course Title: Computer Networks

Max. Marks: 70

Course Code: SBS CS 01 01 02 C 4004

Instructions:

1. Question no. 1 has seven parts and students are required to answer any four. Each part carries three and half Marks.
2. Question no. 2 to 5 have three parts and student are required to answer any two parts of each question. Each part carries seven marks.

Q 1. (4X3.5=14)

- a) What is the need of Error Detection and Correction in Data Link Layer?
- b) What are the four characteristics on which the effectiveness of data communication?
- c) List the Advantages and Disadvantages of Optical Fibre Cable.
- d) How do guided media differ from unguided media?
- e) What is the difference between Hub, Switch, and Router?
- f) Explain in detail about the Flow Control and error Control.
- g) Differentiate between Multipoint connections and Point to Point connections.

Q 2. (2X7=14)

- a) Draw a hybrid topology with a star backbone and three ring networks.
- b) What are the different classes of IP address? Briefly explain the division of address space in an IP address.
- c) Explain in detail about the Services of Transport layer. Also define the transport Protocols.

Q3. (2X7=14)

- a) Explain in detail about the Data Link Layer. What are the goals and issues in DLL.
- b) What are three data transmission modes? Explain with examples.
- c) What are the criteria for the best selection of a router? What are its basic roles?

Q 4.

(2X7=14)

- a) What are the functions of Network layer? In TCP/IP model which protocol works at the network layer level?
- b) What is Network Topology in computer networks? Discuss all types of network topology.
- c) Explain in detail about the Cyclic Redundancy Check (CRC).

Q 5.

(2X7=14)

- a) Explain the Nature of the service provided in Network Layer. Briefly explain the routing.
- b) Assume six devices are arranged in a mesh topology. How many cables are needed? How many ports are needed for each device?
- c) Explain in detail about the Simplex Stop and Wait Protocol.

CENTRAL UNIVERSITY OF HARYANA

First Semester Term End Examination March 2023

Programme: MASTER OF COMPUTER APPLICATION

Session: 2022-23

Semester: First

Max. Time: 3 Hours

Course Title: Discrete Mathematical Structures

Max. Marks: 70

Course Code: SBS CS 01 01 03 C 3104

Instructions:

1. Question no. 1 has seven parts and students are required to answer any four. Each part carries three and half Marks.
2. Question no. 2 to 5 have three parts and student are required to answer any two parts of each question. Each part carries seven marks.

Q 1. (4X3.5=14)

- a) Construct the truth table of $(P \wedge Q) \rightarrow P$.
- b) Define complete bipartite graph with example.
- c) Explain an abelian group with suitable example.
- d) Give an example of a relation which is reflexive and transitive but not symmetric.
- e) Clarify cyclic group with an example.
- f) List different applications of Karnaugh map.
- g) Describe different types of tree traversing.

Q 2. (2X7=14)

- a) Draw the Hasse diagram representing the positive divisors of 36.
- b) Minimize the following boolean function-

$$\text{i). } F(A, B, C, D) = \sum m(0, 2, 8, 10, 14) + \sum d(5, 15)$$

$$\text{ii). } F(A, B, C, D) = \sum m(3, 4, 5, 7, 9, 13, 14, 15)$$

- c) Discuss the following terms. Give one suitable example for each:

- i) Euler circuit
- ii) Hamiltonian graph

Q3. (2X7=14)

- a) Prove that the relation R defined by "a is congruent to b modulo m" on the set of integers is an equivalence relation.
- b) Find Principal Conjunctive Normal Form without Constructing truth table $(P \rightarrow (Q \wedge R)) \rightarrow (\sim P \rightarrow (\sim Q \wedge \sim R))$
- c) Without constructing truth table find Principal Disjunctive Normal Form of $\{(P \rightarrow (Q \wedge R)) \wedge (\sim Q \wedge \sim R)\}$

Q 4. (2X7=14)

- a) Is the "divides" relation a partial ordering on the set of non-zero integers? Explain.
- b) Prove that $G = \{0, 1, 2, 3, 4, 5, 6\}$ is an abelian group of order 7 with respect to addition modulo 7.

c) Prove that intersection of two subgroups of a group $(G, *)$ is a subgroup of a group $(G, *)$

Q 5.

(2X7=14)

a) Check whether the truth values of the following formula is independent of their components:

$$((P \rightarrow Q) \wedge (Q \wedge R)) \rightarrow (P \rightarrow R)$$

b) Define a semi group and Monoid. Give an example of a Monoid which is not group. Justify your answer.

c) State and explain the rules that that can generate a well formed formula.