Max Time: 2½ hrs | **SYCS Semester III** | Max Marks: 75

Principles of Operating Systems 19/10/23

Instructions:

1) **All** questions are **compulsory**.
2) Mixing of sub questions is not allowed.
3) Write in clear, legible, writing.

Q1) Attempt **any four**: (20)

A) Explain the operating system's roles in detail?
B) Explain the concept of thread in detail ?
C) What is the main advantage of the microkernel approach to system design?
D) Explain the type of thread?
E) Explain the shared memory system in detail?
F) Explain the terms scheduling queues?

Q2) Attempt **any four**: (20)

A) Write a short note on the Critical section problem?
B) Define following terms:
   a)cpu utilization
   b)throughput
   c)waiting time
   d)response time
C) Draw Gantt chart for SJF for the following and find average waiting time

Process	CPU burst time	Arrival time
p1	0	7
p2	4	4
p3	6	3
p4	8	4
p5	8	4

D) What is a deadlock ?State necessary and sufficient conditions for the same?
E) What is the concept of main memory ?
F) Depict the gantt chart for FCFS and RR algorithm for the following problem and explain which is better?(for RR time slice is 5 units)

process	p1	p2	p3	p4	p5
Burst time	9	15	3	8	14

Q3) Attempt **any four:** (20)

A) Explain the concept of main memory?
B) Write a note on FCFS scheduling with examples?
C) Explain in brief Memory Management Unit(MMU)?
D) Write a short note on paging ?
E) Explain the concept of disk formatting in detail?
F) Explain the file attributes in detail ?

Q4) Attempt **any five:** (15)

A) Explain the concept of file?
B) Write a short note on the process?
C) Consider following set of processes with length of cpu .Arrival time and burst time given in milliseconds illustrate the execution of these process using SJF scheduling algorithm draw the gantt chart

Consider

process	Arrival time	Burst Time
p1	0	8
p2	1	13
p3	2	5
p4	3	11
p5	4	4

D) Write a note on the process control block?
E) Explain the RR CPU scheduling with an example?
F) Explain the concept of multicore Programming?

Max Time: 2½ hrs | **SYCS Semester III** | Max Marks: 75

LA 20·10·2023

Instructions:

1) **All** questions are **compulsory.**
2) Mixing of sub questions is not allowed.
3) Write in clear, legible, writing.

Q1) Attempt any four: (20)

A) Write the properties for a set V to be Vector space

B) Express $\sqrt{3}+i$ in polar form and find their arguments

C) let u=(1,-2,4), v=(3,5,1), and w=(2,1,-3) find
a) 3u-2v b) 5u+3v-4w c) u.v, u.w, v.w d) ||u||, ||v||

D) Express $\frac{3+2i}{2-3i}$ in standard form of complex number x+iy and then find the complex conjugate.

E) let u=(7-2i, 2-5i) and v=(1+I, -3-6i) find: a)u+v b)2iu c) (3-i)v

F) let u=(2,-5,4,6,-3) and v=(5,-2,1,-7,-4)
a) 4u-3v b) 5u+2v c) u.v d) ||u|| and ||v||

Q2) Attempt any four: (20)

A) Let $v_1=(0,1,0,1)$, $v_2=(0,0,0,1)$, $v_3=(1,0,0,1)$, $v_4=(1,1,1,1)$ are the vectors over GF(2), for each of the following vectors, express it as a linear combination of v=(1,1,0,0)

B) Show that the following set of vectors over R are linearly independent.
{ (1,2,0), (2,4,1), (0,0,-1) }

C) find (a) give basis for row space (b) give basis for column space (c) verify that the row rank and column rank. $A=\begin{bmatrix}1 & 4 & 0 & 0\\ 0 & 2 & 2 & 0\\ 0 & 0 & 1 & 1\end{bmatrix}$

D) express M as the linear combination of A,B and C.

$M=\begin{bmatrix}1 & 2\\ -2 & 5\end{bmatrix}$, $A=\begin{bmatrix}1 & 1\\ 1 & 1\end{bmatrix}$, $B=\begin{bmatrix}0 & 2\\ 1 & -2\end{bmatrix}$, $C=\begin{bmatrix}0 & -1\\ 2 & 3\end{bmatrix}$

E) For each of the following problems, show that the given vectors over GF(2) are linearly independent {(1,1,1,1), (1,0,1,0), (0,1,1,0), (0,1,0,1)}

F) Let $F:\mathbb{R}^2 \to \mathbb{R}^2$ is linear function F(x, y)=(2x+3y, 4x-5y and basis $s=\{u_1, u_2\}=\{(1,2),(2,5)\}$ find the relative matrix of F.

Q3) Attempt any four: (20)

A) Solve the following system using Gaussian elimination method
$v-w=3$, $-2u+4v-w=1$, $-2u+5v-4w=-2$

B) Expand (a)$< 5u_1+8u_2,\ 6v_1-7v_2 >$ (b) <3u+5v , 4u-6v> (c) $||2u-3v||^2$

C) consider the subspace U of $\mathbb{R}^4$ spanned by the vectors.
$v_1=(1,1,1,1)$, $v_2=(1,1,2,4)$, $v_3=(1,2,-4,-3)$ find orthogonal basis of U.
(hint Gram-Schmidt orthogonalization process)

D) Suppose v=(1,3,5,7). Find the projection v on two in other word find w that minimizes ||v-w|| where W is a subspace of $\mathbb{R}^4$ spanned by $u_1=(1,1,1,1)$ *and* $u_2=(1,-3,4,-2)$

E) Find the Eigen value and Eigen vector for the following matrices $A=\begin{bmatrix}2 & -1 & 1\\ 1 & 2 & -1\\ 1 & -1 & 2\end{bmatrix}$

F) find the angle between two vector u, v using the formula $\cos(\theta) = \frac{<u,v>}{||u||.||v||}$

(a) u=(2,3,5), v=(1,-,43) (b) u(t)=3t-5 ,v(t)=t^2 here $< u(t), v(t) >= \int_0^1 u(t).v(t)dt$

Q4) Attempt any five: (15)

A) simplify : (5+3i)(2-7i)

B) Calculate the magnitude of the following vector and find their unit vector.

(a) (1,1,1) (b) (0,11,0)

C) Compute the following matrix-vector products

a) $\begin{bmatrix} 1 & -1 \\ 1 & -1 \end{bmatrix} * [0.5, 0.5]$ b) $\begin{bmatrix} 0 & 0 \\ 0 & 1 \end{bmatrix} * [1.22, 4.44]$

D) Let $v_1 = (0,0,1)$, $v_2 = (2,0,1)$, $v_3 = (4,1,2)$ for each of the following vectors, express it as a linear combination of v=(2,1,4)

E)) find the Eigen values of the following matrices. $A == \begin{bmatrix} 1 & 2 & 3 \\ 0 & 2 & 0 \\ 0 & 0 & 2 \end{bmatrix}$

F) Find k so that u and v are orthogonal to each other where u=(1,2,k,3) and v=(3,k,7,-5)

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Max Time: 2½ hrs | SY B.Sc CS | Max Marks: 75

Data Structures

21/10/23

Instructions:

1) **All** questions are **compulsory**.
2) Mixing of sub questions are not allowed.
3) Write in clear and legible writing.

Q I Attempt any **FOUR** (20)

A) Explain different types of data structures and give their classifications.
B) What is Linked List? Explain different types of ADT of Linked List.
C) What is Stack? Explain Advantages and Disadvantages of Stack.
D) Explain Application of Stack like prefix to postfix notation with the help of an Example.
E) What is Queue? Explain different types of ADT of Queue.
F) What is Circular Queue? Explain Advantages and Disadvantages of Circular Queue.

Q II Attempt any **FOUR** (20)

A) What is Doubly Linked List? Explain Advantages and Disadvantages of Doubly Linked List.
B) Explain Basic Operation carried out in Doubly Linked List
C) What is Tree? Explain different types of ADT of Tree.
D) What is Balanced BST? Explain with the help of an Example
E) Explain Implementation and Traversals of Tree's.
F) Explain Application of Heaps with the help of an Example.

Q III Attempt any **FOUR** (20)

A) What is Graph? Explain Advantages and Disadvantages of Graph.
B) Explain Basic Operation carried out in Graph.
C) Explain Graph Representation using adjacency matrix.
D) Explain Graph operations like deletion of nodes.
E) Explain Concept of Hashing.
F) Explain Collision? Explain Different types of Collision Avoidance techniques.

Q IV Attempt any **FIVE** (15)

A) What is ADT? How does the user Creates user-specific ADT?
B) Explain Application of Linked List like Polynomial Equation with the help of an Example.
C) What is Doubly Linked List? Explain different types of ADT of Doubly Linked List.
D) Explain Insertion and deletion of nodes at various positions in Doubly Linked List.
E) What is Graph? Explain different types of ADT of Graph.
F) Explain Graph Traversals with the help of BFS Algorithm.

Max Time: 2½ hrs | **SYCS Semester III** | Max Marks: 75

Advanced Database Concepts

23|10|23

Instructions:

1) **All** questions are **compulsory**.
2) Mixing of sub questions is not allowed.
3) Write in clear, legible, writing.

Q1) Attempt **any four:** (20)

A) Explain the Architecture of PL/SQL?
B) Explain the date data type in PL/SQL?
C) What are PL/Sql control structures?
D) Write the short note in sequence?
E) What is a function?
F) How to create stored procedures.

Q2) Attempt **any four:** (20)

A) Write a note on dynamic SQL & embedded SQL?
B) What do we mean by exception? Explain types of exceptions with examples?
C) Write a short note on implicit cursor, explicit cursor, for loops?
D) Write syntax for creating USER with suitable examples?
E) Explain type of Exceptions?
F) What are the various collection types?

Q3) Attempt **any four:** (20)

A) What are Triggers? Give an example?
B) What are packages? Give an example?
C) What is database backup? Why is backup needed? Explain types of Database backup?
D) write a short note on commit and rollback ?
E) Explain the types of lock ?
F) Explain the type of Trigger?

Q4) Attempt **any five:** (15)

A) Explain the components of the trigger?
B) Write a short note on
   a) FOR Loops
   b) Case Statements
   c) While loops
C) What is recovery ? Explain the type of recovery?
D) Explain VARRAY in PL/SQL?
E) Explain the various types of cursor with example
F) Explain the features of PL/SQL values.

Max Time: 2½ hrs | **SYBSc CS** | Max Marks: 75

Java | 25/10/23

Instructions:

1) **All** questions are **compulsory**.
2) Mixing of sub questions are not allowed.
3) Write in clear and legible writing.

Q 1 Attempt any **FOUR** (20)

A) Explain the Java slogan 'Write once and run anywhere'.
B) Discuss the keyword 'static' with examples.
C) Explain the keyword 'final' with examples.
D) How is inheritance implemented in Java? Explain with examples.
E) What is an abstract class in Java? Explain with examples.
F) Explain exception handling in Java.

Q 2 Attempt any **FOUR** (20)

A) Write a short note on 'JFC'.
B) Explain the constructors of and five methods of JTextField class.
C) Explain JList component with example.
D) Discuss the various kinds of ResultSet objects.
E) Explain the constructors of and five methods of Vector class..
F) What is an event? Explain how event is implemented using anonymous inner class.

Q 3 Attempt any **FOUR** (20)

A) Diagrammatically explain how the request-response works in context of Java web applications.
B) Explain two methods of each HTTPServletRequest class and HTTPServletResponse class.
C) How is redirection achieved in a servlet? Explain with code snippet.
D) Write a note on Session object.
E) Explain 8 implicit JSP objects.
F) Explain 8 JSP directives with examples.

Q 4 Attempt any **FIVE** (15)

A) Write a program in Java to display the first 10 prime numbers.

B) Write a program in Java to encapsulate a sphere. It should have methods that return the surface area and volume of the sphere.

C) Explain the PreparedStatement class with examples.

D) Explain five methods of Collections class with examples.

E) Explain exception handling/error handling in a JSP page.

F) List the methods in the MouseListener interface.

(SY-CS) 26-10-23
Sem-III

Max Time: 2½ hrs **WT** **Max Marks: 75**

Instructions:

1) **All** questions are **compulsory**.
2) Mixing of sub questions are not allowed.
3) Write in clear and legible writing.

Q.1 Attempt any **FOUR** **(20)**

A) Explain any five text formatting tags with the help of example.
B) What are the types of lists? Explain with the help of example.
C) How to create table in HTML? Explain with its properties.
D) Explain the term Inline, Internal and External CSS in detail.
E) H to link pages in HTML? Give suitable exan e.
F) How to use audio – video files in HTML?

Q.2 Attempt any **FOUR** **(20)**

A) Differentiate between HTML and XML.
B) Discuss the popup boxes available in JavaScript.
C) Write a JavaScript code to print table of given number.
D) What is form validation? Write JavaScript validation code for e-mail validation.
E) Discuss various types of operators available in JavaScript with suitable example.
F) Write JavaScript code to check the number is prime number or not.

Q.3 Attempt any **FOUR** **(20)**

A) Write a short note on XMLHttpRequest object.
B) Explain AJAX web application model in detail.
C) What are the rules to define variable in PHP give example.
D) Write a note on creating and updating cookies.
E) Explain toggle (), hide () events of JQuery.
F) Which are the methods for creating animation effects in JQuery? Give example.

Q.4 Attempt any **FIVE** **(15)**

A) Write on CSS properties for positioning an element with the help of example.
B) What is form? List some of its controls.
C) Explain switch case statement in detail.
D) What is DTD? Discuss the different types of DTD?
E) What is control flow statement in PHP? Explain with the help of example.
F) Write a JavaScript program to generate Fibonacci series till given number.

(SY-CS) 27-10-23
Sem-III

Max Time: 2½ hrs | **SYCS Semester III** | Max Marks: 75

Creative Content Writing

Instructions:

1) **All** questions are **compulsory.**
2) Mixing of sub questions is not allowed.
3) Write in clear, legible, writing.

Q1) Attempt **any four:** **(20)**

A) Explain in brief professional content writing ?
B) Write an ideal length for a blog post ?
C) Explain Le ning Tone in Writing and Its Types ?
D) Explain things marketers write to podcasts ?
E) What are active verbs? Explain its type ?
F) Write a comprehending style in writing and its types ?

Q2) Attempt **any ar:** **(20)**

A) Explain the writing of a hashtag with an example. Give a step for how to tweet ?
B) How to write a page? What are the considerations to keep in mind while writing for the home page ?
C) What is e-mail? Write steps for writing professional mail ?
D) What is writing social media with humor?
E) Explain Eleven Areas of Consideration When Hiring an Infographics designer?
F) What are infographics? Write about three tools available for infographics ?

Q3) Attempt **any four:** **(20)**

A) Explain knowledge-based tools in detail ?
B) What is google authorship? How does it benefit your SEO?
C) What are plagiarism laws in content writing ?
D) Explain ethical and legal aspects of content writing ?
E) Write down the benefits of productivity tools ?
F) Write a short note on IPR laws ?

Q4) Attempt **any five:** **(15)**

A) Write any five tools for content writing ?
B) Write an ideal length for an instagram post ?
C) Write a note on 5 W's and H questions ?
D) Write a note on hashtags ?
E) What is an annual report ? How to start it ?
F) What is knowledge visualization ?