



RAJARSHI JANAK UNIVERSITY
OFFICE OF THE CENTRAL EXAMINATION
End Semester Examination - 2023

Bachelor of Science in Computer Science and Information Technology

Course Title: Introduction to Programming Concept with C

Course Code: SCIT 112

Year/Semester: First/II

Full Marks: 60

Pass Marks: 24

Time: 3 hours

Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks.

[Group A]

Very short answer questions:

[5x2=10]

1. Bit wise operator
2. Difference between break and continue statement
3. Storage classes in C
4. String handling functions
5. Difference between union & Structure.

[Group B]

Short answer questions (Attempt any six):

[6x5=30]

6. Define algorithm and flowchart. Write algorithm and flowchart to verify and display the greatest number among three numbers given.
7. What is formatted input/output function in C-programming? Write the syntax of each function.
8. Define loop and its types. Write a program to display sum of digits of a multi-digit number given by user using function.
9. Define function and its advantages. Write a function which accepts two integers as argument and return sum of them.
10. Define pointer. Write a program to display the smallest of all the elements of an array using pointer.
11. Write a program to read and print data of file.
12. Define graphics function. Write a program to draw a rectangle.

[Group C]

Long answer questions (Attempt any two):

[2x10=20]

13. Define structure of C program with suitable example.
14. Explain array and types. Write a program to check if two matrices are identical or not.
15. WAP to read Id, name and price of 10 books using array of structure. Display information of each book in ascending order based on Id of book.



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Bachelor of Science in Computer Science and Information Technology

Course Title: Operating System

Course Code: SCIT 111

Year/Semester: First/II

Full Marks: 60

Pass Marks: 24

Time: 3 hours

Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks.

[Group A]

Very short answer questions:

[5x2=10]

1. What is preemptive and non-preemptive scheduling?
2. What is critical section problem?
3. Define kernel.
4. What are the four necessary conditions for a deadlock?
5. Explain the term Dual-mode operation.

[Group B]

Short answer questions (Attempt any six):

[6x5=30]

6. What are the attributes of a file?
7. What is demand paging? Describe the process of demand paging in OS.
8. What is segmentation? Explain in detail about implementation of segment table.
9. Describe two level and three level type directory structures in detail.
10. Explain in detail about the methods for deadlock detection.
11. Describe the ways of implementing semaphores.
12. Differentiate between paging and segmentation.

[Group C]

Long answer questions (Attempt any two):

[2x10=20]

13. A. What do you mean by page fault? When does a page fault occur? Describe the action taken by OS when a page fault occurs.
B. Explain the various operations on process with neat diagram.
14. How does an unsafe state differ from a deadlock state? Consider the following initial state and identify whether the requested resource is granted or denied for the given cases.

Process	Has	Max
A	2	6
B	1	5
C	2	3
D	3	8

available = 2

- a. What will happen if process D requests 1 resource?
- b. What will happen if process A requests 1 resource?

15. Consider the following set of process with the length of the CPU burst given in milliseconds:
The process are assumed to have arrived in the order p1, p2, p3, p4, p5 all at time 0.
Calculate the average turnaround time and average waiting time for preemptive scheduling algorithm

Process	Burst time
P1	10
P2	1
P3	2
P4	1
P5	5

- Draw four Gantt charts that illustrate the execution of these process using the following scheduling algorithms: FCFS, SJF and RR(Quantum =1)
- What is the turnaround time of each process for each of the scheduling algorithm in part a?
- What is the waiting time of each process for each of these scheduling algorithms?
- Which of the algorithms results in the minimum average waiting time (overall process)?



RAJARSHI JANAK UNIVERSITY
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Bachelor of Science in Computer Science and Information Technology

Course Title: Technical Communication English

Course Code: SCIT 110

Year/Semester: First/II

Full Marks: 60

Pass Marks: 24

Time: 3 hours

Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks.

[Group A]

Write short Notes on the Following Terms:

[5x2=10]

1. Do's and Don'ts of receiving calls/making calls.
2. Diary Writing
3. The successful factor for an interview.
4. What is verbal and non-verbal communication?
5. References and bibliography

[Group B]

Short answer questions (Attempt any six): Question No.12 is Compulsory.

[6x5=30]

6. Describe technical writing? Elaborate on its characteristics.
7. What should one keep in mind when writing for the web? Discuss.
8. What is the importance of interpersonal and intercultural communication in today's organization?
9. Enumerate etiquette and good manner of public speaking.
10. What are the presentation strategies? Explain the main purposes for making presentation.
11. "Language is a tool of effective communication", justify the statement.
12. Supply the correct words from as indicated in the brackets;
 - a. He hopes to join ___ University soon.(a/an/the/no articles)
 - b. This is Steve. Do you know ___?(correct form of pronoun)
 - c. The police officer is ___ the station. (at/on)
 - d. The Queen's jewellery _____ stolen from the museum. (are/is)
 - e. Copy and write the right sentence from the followings:
 - i. If the cab would have been started on time, she had reached office on time.
 - ii. If the cab had started on time, she would have reached office on time.

[Group C]

Long answer questions (Attempt any two): Question No. 13 is Compulsory.

[2x10=20]

13. Answer the following questions after reading the passage given below:

As the family finally sets off from home after many arguments, there is a moment of lull as the car takes off. "Alright, so where are we going for dinner now?" asks the one at the driving wheel. What follows is chaos as multiple voices make as many suggestions. By the time order is restored and a decision is arrived at, tempers have risen, feelings injured and there is at least one person grumbling. Twenty years ago, you would step out of home, the decision of meal and venue already made with no arguments or opposition and everybody looked forward to the meal with equal enthusiasm. The decision was made by the head of the family and the others fell in line. Today every member of the family has a say in every decision which also promotes a sense of togetherness and bonding. We empower our kids to make their own decisions from a very early age. We ask them the cuisine they prefer, the movie they want to see, the holiday they wish to go on and the subjects they wish to study. It's a closely connected world out there where children consult and guide each other. A parent's well-meaning advice can sound like nothing more than unnecessary preaching. How then do we reach our children through all the conflicting view and make the voice of reason be heard? Child day questions choices and prefer to go with the flow. What then is the best path to take? I would say the most important thing one can do is to listen. Listen to your children and their silences. Ensure that you keep some time aside for them, insist that they share their stories with you. Step into their world. It is not as complicated as it sounds; just a daily half an hour of quality time would do the trick.

Questions:

- a) Write one advantage and one disadvantage of allowing every family member to be a part of the decision-making process.
 - b) In today's world, what are parents asking their kids?
 - c) Which two pieces of advice does the writer give to the parents?
 - d) How the parent is getting conflicting views with their children?
 - e) The passage supports the parents. How far do you agree with the author's views? Support your view with a reason.
- 14. Write a report on the proceedings of two days long seminar workshop on Computer Science and Information Technology (CSIT) conducted by Institute of Science and Technology.**

OR

- 15. There is no canteen in your company. So write a proposal to establish a canteen in your University.**



RAJARSHI JANAK UNIVERSITY
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End Semester Examination - 2023

Bachelor of Science in Computer Science and Information Technology

Course Title: Statistics II

Course Code: SCIT 114

Year/Semester: First/II

Full Marks: 60

Pass Marks: 24

Time: 3 hours

Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks.

[Group A]

Very short answer questions:

[5x2=10]

1. Define Central Limit Theorem.
2. What is p-value?
3. What are the advantages of Non Parametric test?
4. What do you mean by M/M/1 queuing model?
5. If $r_{12} = 0.77$, $r_{13} = 0.72$ and $r_{23} = 0.52$, find $r_{13.2}$

[Group B]

Short answer questions (Attempt any six):

[6x5=30]

6. The following data show employees' satisfaction levels in a small IT company (as a percentage) before and after their company was bought by a larger firm. Did the buyout increase employee satisfaction? Use the 0.05 significance level.

Before	98.4	96.6	82.4	96.3	75.4	82.6	81.6	91.4	90.4	92.4
After	82.4	95.4	94.2	97.3	77.5	82.5	81.6	84.5	89.4	90.6

7. What are the properties of a good estimator? Explain them.
8. Differentiate between correlation and regression.
9. Jobs are sent to mainframe computer at a rate of 4 jobs per minute. Arrivals are modelled by a binomial process.
 - i) Choose a frame size that makes the probability of a new received during each frame equal to 0.1
 - ii) Using the chosen frame compute the probability of more than 4 jobs received during one minute.
 - iii) Compute mean and variance of inter arrival time?
10. Using the number of runs above and below the median, test for randomness the following set of a table of 2-digit numbers:
15, 77, 01, 65, 69, 69, 58, 40, 81, 16, 16, 20, 00, 84, 22,
28, 26, 46, 66, 36, 86, 66, 17, 43, 49, 85, 40, 51, 40, 10.
11. An X-ray technician is taking readings from her machine to ensure that it adheres to federal safety guidelines. She knows that the standard deviation of the amount of radiation emitted by the machine is 150 millirems, but she wants to take readings until the standard error of the sampling distribution is no higher than 25 millirems. How many readings should she take?
12. Suppose we are given following information with $n=7$, multiple regression model is
 $Y = 8.15 + 0.56X_1 + 0.54X_2$
Here, Total sum of square = 1493,
Sum of square due to error = 91
Find i) R^2 and interpret it.
ii) Test the overall significance of model.

[Group C]

Long answer questions (Attempt any two):

[2x10=20]

13. A chemist uses three catalysts for distilling alcohol and lay out were tabulated below:

Catalyst	Alcohol (in cc)				
C1	380	430	410		
C2	290	350	270	250	270
C3	400	380	450		

Are there any significant differences between catalyst? Test at 5% level of significance. Use Kruskal Walli's H test.

14. In a tri-variate distribution:

$\sigma_1 = 3, \sigma_2 = \sigma_3 = 5, r_{12} = 0.7, r_{23} = r_{31} = 0.6$ Find:

i) partial correlation coefficient $r_{12.3}$

ii) multiple correlation coefficient $R_{1.23}$

iii) regression coefficient $b_{12.3}$

15. what is "analysis of variance" and where is it used?

There varieties of coal were analysed by four chemists and the ash content in the varieties was found to be under as:

Varieties	Chemists			
	1	2	3	4
A	8	5	5	7
B	7	6	4	4
C	3	6	5	4

Do the varieties differ significantly in their ash content?

$$H = \frac{n(n+1)}{12} - \frac{\sum R_i^2}{n^2} (n+1)$$



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Bachelor of Science in Computer Science and Information Technology

Course Title: Mathematics II

Course Code: SCIT 113

Year/Semester: First/II

Full Marks: 60

Pass Marks: 24

Time: 3 hours

Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks.

[Group A]

Very short answer questions:

[5x2=10]

1. Show that every square matrix can be uniquely expressed as the sum of a symmetric matrix and a skew-symmetric matrix.
2. Prove, by taking a third order determinant, that a skew determinant of odd order vanishes.
3. Define linearly dependence and linearly independent vectors.
4. Let a transformation $T: R^2 \rightarrow R^2$ be defined by $T(v) = T(x, y) = (x + y, y)$. Show that T is linear.
5. Verify Cayley-Hamilton theorem for the following matrix: $\begin{bmatrix} 3 & -1 \\ 1 & 1 \end{bmatrix}$.

Five [Group B]

Short answer questions (Attempt any five):

[6x5=30]

6. Show that the standard basis $e_1 = (1, 0, 0)$, $e_2 = (0, 1, 0)$, and $e_3 = (0, 0, 1)$ forms an orthogonal basis of R^3 .
7. The composition of two linear transformations is linear.
8. Show that the set of all vectors of the form (x, y, z) in R^3 such that $x + y + 2z = 0$ is a subspace of R^3 .
9. Find the most general solution of the system $AX = C$;
 a. $A = \begin{bmatrix} 1 & 2 & -1 \\ 2 & 4 & 3 \\ -1 & -2 & 6 \end{bmatrix}$, $X = \begin{bmatrix} x \\ y \\ z \end{bmatrix}$, and $C = \begin{bmatrix} 4 \\ 5 \\ -7 \end{bmatrix}$.
10. Show that: $\begin{vmatrix} (b+c)^2 & a^2 & a^2 \\ b^2 & (c+a)^2 & b^2 \\ c^2 & c^2 & (a+b)^2 \end{vmatrix} = 2abc(a+b+c)^3$.
11. Find scalar and vector projection of $Q = (1, 2, 3)$ onto $P = (4, -1, 3)$.

[Group C]

Long answer questions (Attempt any two):

[2x10=20]

12. (a) Find the Eigen values of the matrix $A = \begin{bmatrix} 1 & 0 & -1 \\ 0 & 1 & 0 \\ 1 & 0 & 1 \end{bmatrix}$.
 (b) Define norm and write all the properties of norm.
13. (a) The intersection of any two subspaces of a vector space is also a vector space.
 (b) Let V and W be two vector spaces over the same field F . A transformation $T: V \rightarrow W$ is linear if and only if $T(C_1V_1 + V_2C_2) = C_1T(V_1) + C_2T(V_2)$, for any $C_1, C_2 \in F$ and $V_1, V_2 \in V$.
14. (a) Reduce the matrix $A = \begin{bmatrix} 3 & -2 & 0 & -1 \\ 0 & 1 & 2 & 1 \\ 1 & -2 & -3 & 2 \\ 0 & 2 & 2 & 1 \end{bmatrix}$ into triangular form and hence find rank.
 (b) Write the algebraic operations of the points in n -space.
