CSc. 209-2077(NEW) ✡

Tribhuvan University

Institute of Science and Technology

2077

✡

Bachelor Level / Second Year/ Third Semester/ Science
Computer Science and Information Technology (CSc. 209)
(Computer Graphics)
(NEW COURSE)

Full Marks: 60
Pass Marks: 24
Time: 3 hours.

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

Attempt any Two questions: (2×10=20)

1. List the major differences between DDA and Bresenham's Line drawing algorithm. Illustrate the DDA algorithm to the line with end points (2, 2) and (9, 2). [3 + 7]

2. How polygon table is used in representing polygons? Explain the representations of any three curves. [6 + 4]

3. Define realism in human perception. What is the significance difference between rendering and image synthesis in creating computer generated 3D image? Describe any two polygon rendering methods. [2 + 2 + 6]

Section B

Attempt any Eight questions: [8 × 5 = 40]

4. Differentiate between vector and raster graphics. [5]

5. Translate a triangle ABC with co-ordinates A(0, 0), B(5, 0) and C(5, 5) by 2 units in x – direction and 3 units in y – direction. [5]

6. Differentiate between orthographic, parallel and perspective projections. [5]

7. Describe how a polygon can be represented using BSP tree with example. [5]

8. What is the role of ray tracing in visible surface detection? Explain how scan line algorithm is used for back face detection. [1 + 4]

9. How virtual realities differ with our real world? Describe some components of VR system. [2 + 3]

10. Write a procedure to draw a line in OpenGL? Describe Painter's algorithm. [2 + 3]

11. Let ABCD be the rectangular window with A(0, 0), B(10, 0), C(10, 10) and D(0, 10). Use Liang Barsky line clipping algorithm to clip the line XY, where X(-5, 3) and Y(15,9). [5]

12. Define blobby objects. Describe about basic illumination models. [2 + 3]

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Computer Science and Information Technology (CSc. 208)

(Computer Architecture)

(NEW COURSE)

Full Marks: 60
Pass Marks: 24
Time: 3 hours.

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Long Answer Questions:

Attempt any Two questions: (2×10=20)

1. What do you mean by pipeline? Explain with spare time diagram for a six segmented pipeline showing the time it takes to process eight tasks.
2. Explain the Booth multiplication algorithm with hardware implementation diagram Multiply -4 ×-3 using Booth multiplication algorithm.
3. Define the I/O Interface. Comparision between programmed I/O, Interrupt driven I/O and direct memory access (DMA)

Short Answer Questions:

Attempt any Eight questions: (8×5=40)

4. Draw an instruction cycle and state diagram with interupt and explain it.
5. Explain register transfer language with example.
6. Write codes using 3, 2 and 1 address instruction formats to perform the given operation.
   $X = A/B + C \times D/C$
7. Explain the various addressing modes with example.
8. Differentiate between hardwared control unit and microprogram control unit.
9. How performance of computer is increased using pipeline? Explain with practical exampie.
10. Differentiate between restoring division and non-restoring division.
11. Give the appropriate reasons why replacement algorithm is required in associative mapping?
12. Differentiate between isolated versus memory mapped I/O.

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Bachelor Level / Second Year/ Third Semester/ Science
Computer Science and Information Technology (CSc. 206)
(Data Structure and Algorithms)
(NEW COURSE)

Full Marks: 60
Pass Marks: 24
Time: 3 hours.

Candidates are required to give their answers in their own words as for as practicable.
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Long Questions:

Attempt any Two questions: (2×10=20)

1. What is stack? What are different applications of stack? Explain stack operations with example. (1+3+7)
2. Differentiate between singly linked list and doubly linked list. How do you insert and delete a node from doubly linked list? Explain. (3 + 7)
3. What is shortest path? Expalin Dijkstra algorithm for finding shortest path using suitable example. (2 + 8)

Short Questions:

Attempt any Eight questions: (8×5=40)

4. What is dynamic memory allocation? Compare data structure with abstract data type. (2 + 3)
5. Explain algorithm for evaluation of postfix expression using stack. (5)
6. Explain queue as an ADT. (5)
7. Write a recursive program to find GCD of two numbers. (5)
8. What is linked list? How is it different from array? (2 + 3)
9. Hand test bubble sort with array of numbers 53, 42, 78, 3, 5, 2, 15 in ascending order. (4 + 1)
10. What is hashing? Explain concept of hash table and hash function with example. (1+4)
11. What is minimum spanning tree? Explain. (5)
12. Write short notes on: (2 × 2.5 = 5)
    a. Trial recursion
    b. Collision resolution techiques.

a. Tail recursion.

CSc. 210-2077(NEW)

Tribhuvan University

Institute of Science and Technology

2077

Bachelor Level / Second Year/ Third Semester/ Science

Computer Science and Information Technology (STA 210)

(Statistics II)

(NEW COURSE)

Full Marks: 60

Pass Marks: 24

Time: 3 hours

Candidates are required to give their answers in their own words as for as practicable.

All notations have the usual meanings.

The figures in the margin indicate full marks.

Group A

Attempt any Two questions: **[2X10=20]**

1. Describe the concept of sampling distribution of mean with reference to the population data (20, 21, 22 & 23) of size 4. In order to explain this, perform simple random sampling with replacement taking all possible samples with sample of size n = 2. While describing the sampling distribution following issues will be covered.
   I. population mean & population variance, and its distribution
   II. Sample mean & sample variance, and its distribution
   III. Comparison of population mean and sample mean; population variance and sample variance; population distribution and sampling distribution based on the given data
   IV. Standard error of mean
   V. Final comments based on your result.

2. It was reported somewhere that children whenever plays the game in computer, they used the computer very roughly which may reduce the lifetime of a computer. The random access memory (RAM) of a computer also plays a crucial role on the lifetime of a computer. A researcher wanted to examine how the lifetime of a personal computer which is used by children is affected by the time (in hours) spends by the children per day to play games and the available random access memory (RAM) measured in megabytes (MB) of a used computer. The data is provided in the following table.

Lifetime (years)	5	1	7	2	3	4	6
Play time (hours)/day	2	8	1	5	6	3	2
RAM (in MB)	8	2	6	3	2	4	7

Identify which one is dependent variable? Solve this problem using multiple linear regression model and provide problem specific interpretations based on the regression model developed.

3. Explain the fundamental concepts of Latin Square Design (LSD) with its necessary conditions. Perform the analysis of variance from the following data and make final comments based on the analysis.

A (5)	B (10)	C (15)
C (20)	A (15)	B (10)
B (20)	C (5)	A (10)

Group B

Attempt any Eight questions: **[8X5=40]**

4. A dealer of a DELL company located at New Road claimed that the average lifetime of a multimedia projector produced by Dell Company is greater than 60,000 hours with standard deviation of 6000 hours. In order to test his claim, sample of 100 DELL projectors are taken and the average life time was monitored and it was found to be 55,000 hours. Test the claim of the dealer at 5% level of significance.

5. Based on the following information, perform the following:
   I. Test whether two mean are significantly different ($\alpha = 5\%$) using independent t-test
   II. Compute 95% confidence interval estimation for the difference of mean
   III. Show the linkage between testing of hypothesis and confidence interval estimation in this problem.

	Group I	Group II
Sample mean	10	15
Sample standard deviation	3	5
Sample size	49	64

6. A study of 1000 computer engineers conducted by their professional organization reported that 300 stated that their firms' greatest concern was to uplift the professional quality of work. In order to conduct a follow up study to estimate the population proportion of computer engineers to fulfill their greatest concern within ± 0.01 with 99% confidence interval, how many computer engineers would be required to be surveyed?

7. A survey was conducted to see the association between hacking status of the email and the type of e-mail account. The survey has reported the following cross tabulation.

Type of e-mail account	Hacking status	
	Yes	No
Yahoo	60	15
Gmail	20	120

Do the information provide sufficient evidence to conclude that the type email account and the hacking status is associated? Use Chi-square test at 1% level of significance.

8. A machine produces metal rods used in an automobile suspension system. A random sample of 6 rods is selected and diameter is measured. The measuring data (in millimeters) are as follows. Assuming that the samples drawn from the normally distributed population.

8.24	8.26	8.20	8.28	8.21	8.23

Find 95% two sided confidence interval on the mean rod diameter, and interpret the result with reference to the given problem.

9. Use Mann-Whitney U test to assess whether the following satisfaction score based on the performance of two different special types of gadgets at 5 % level of significance.

Gadget A	50	40	30	20
Gadget B	40	30	10	40

10. Define Markov chain and describe its characteristics.

11. Every day is generally considered as either sunny or rainy. A sunny day is followed by another sunny day with probability 0.8 whereas a rainy day is followed by a sunny day with probability 0.4. Suppose it rains on Monday. Make forecasts for Tuesday and Wednesday.

12. Write short notes on the following:
   I. Test of equality of two variances
   II. Adjusted R^2

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Computer Science and Information Technology (CSc. 207)
(Numerical Method)
(NEW COURSE)

Full Marks: 60
Pass Marks: 24
Time: 3 hours.

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Group A

Attempt any Two questions: (10×2=20)

1. Derive the formula for Newton Raphson Method. Solve the equation $x^2 + 4x - 9 = 0$ using Newton raphson method. Assume error precision is 0.01. Discuss drawbacks of the Newton Raphson method.

2. How interpolation differs from regression? Write down algorithm and program for Lagrange interpolation.

3. Why partial pivoting is used with Naïve Gauss Elimination method? Solve the following system of equations using Gauss Elimination with partial piovoting? How Gauss Jordan method differs from Gauss elimination method?

$$2x + 2y - z = 6$$
$$4x + 2y + 3z = 4$$
$$x + y + z = 0$$

Group B

Attempt any Eight questions: (5×8=40)

4. Define the terms true error and relative error? Use Horner' method to evaluate polynomial $2x^3 - 3x^2 + 5x - 2$ at $x = 3$ and write down its algorithm.

5. Construct Newton's forward difference table for the given data points and approximate the value of $f(x)$ at $x = 15$.

x	10	20	30	40	50
$f(x)$	0.173	0.342	0.5	0.643	0.766

6. Fit the curve $y = ae^{bx}$ through the following data points.

x	1	2	3	4
y	1.65	2.70	4.50	7.35

7. Discuss the Doolittle LU decomposition method for matrix factorization.

8. Write down algorithm and program for differentiating continuous function using three point formula.

9. How Simpson's 1/3 rule differs from trapezoidal rule? Derive the formula for Simpson's 1/3 rule.

10. Appropriate the solution of $y' = 2x + y, y(0) = 1$ using Eulers method with step size of 0.1. Approximate the value of $y(0.4)$.

11. A plate of dimension 18cm × 18cm is subjected to temperatures as follows: left siode at 100^0C, right side at 200^0C, Upper part at 50^0C, and lower part at 150^0C. If squarte grid length of 6cm × 6cm is assumed, what will be temperature at the interior nodes?

12. How boundary value problems differs from initial value problems? Discuss shooting method for solving boundary value problem.