

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

Bachelor Level / First Year/ Second Semester/ Science  
Computer Science and Information Technology (CSC167)  
(Microprocessor)

**(NEW COURSE)**

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

### Section A

Long answer questions.

Attempt any TWO questions.

1. Differentiate between 8085 and 8086 microprocessor. Explain the concept of demultiplexing of address bus and why is it required? (2×10=20)  
(4+4+2)
2. Write an Assembly Language Program for calculating the factorial of a number using 8085 microprocessor. (10)
3. Draw the block diagram of 80286 microprocessor and explain. (10)

### Section B

Short answer questions.

Attempt any EIGHT questions.

4. What is Paging? Explain the concept of memory access in protected mode. (8×5=40)  
(5)
5. What is the importance of direct memory access? Explain the mechanism of direct memory access. (1+4)
6. List different types of ports. What are the main characteristics of programmable interrupt controller 8259A? (1+4)
7. Differentiate between instruction cycle and machine cycle. Draw timing diagram of MVI A, 32 H. (1+4)
8. Write an Assembly Language Program to reverse the given string. (5)
9. Explain different types of system buses and also indicate whether they are unidirectional or bidirectional. (5)
10. What is the significance of interrupt masking? Differentiate between vectored and polled interrupt. (1+4)
11. Illustrate memory access in GDT. (5)
12. Write short notes on: (2×2.5=5)
  - a) Jumps
  - b) Accumulator

Bachelor Level / First Year / Second Semester / Science  
Computer Science and Information Technology (MTH 168)  
(Mathematics II)  
**(NEW COURSE)**

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

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Group A

(2 × 10 = 20).

Attempt any TWO questions:

1. What is a system of linear equations? When the system is consistent? Find a condition on  $g, h, k$  that makes the system consistent

$$x_1 - 4x_2 + 7x_3 = g$$

$$3x_2 - 5x_3 = h$$

$$-2x_1 + 5x_2 - 9x_3 = k.$$

[1+1+8]

2. Let  $A = \begin{bmatrix} 1 & -5 & -7 \\ -3 & 7 & 5 \end{bmatrix}$ ,  $u = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$ ,  $b = \begin{bmatrix} -2 \\ -2 \end{bmatrix}$ . Define  $T: \mathbb{R}^3 \rightarrow \mathbb{R}^2$  by  $T(x) = Ax$

(a) Compute  $T(u)$ (b) Find a vector  $x \in \mathbb{R}^3$  whose image under  $T$  is  $b$ .(c) Is  $x$  unique?

[3+5+2]

3. Find a least square solution of  $Ax = b$  where  $A = \begin{bmatrix} 1 & -3 & -3 \\ 1 & 5 & 1 \\ 1 & 7 & 2 \end{bmatrix}$ ,  $b = \begin{bmatrix} 5 \\ -3 \\ -5 \end{bmatrix}$ . Also, compute the associated least square error.

[7+3]

Group B

(8 × 5 = 40).

Attempt any EIGHT questions:

4. Are the vectors  $v_1 = \begin{bmatrix} 1 \\ 4 \\ 0 \end{bmatrix}$ ,  $v_2 = \begin{bmatrix} 10 \\ 2 \\ 1 \end{bmatrix}$ ,  $v_3 = \begin{bmatrix} -5 \\ 0 \\ 6 \end{bmatrix}$  linearly independent? Justify.

[5]

5. Find LU factorization of  $\begin{bmatrix} 2 & 3 & 4 \\ 4 & 5 & 10 \\ 4 & 8 & 2 \end{bmatrix}$

[5]



6. Compute Det A where  $A = \begin{bmatrix} 2 & -8 & 6 & 8 \\ 3 & -9 & 5 & 10 \\ -3 & 0 & 1 & -2 \\ 1 & -4 & 0 & 6 \end{bmatrix}$ .

$$A = \begin{bmatrix} 2 & -8 & 6 & 8 \\ 3 & -9 & 5 & 10 \\ -3 & 0 & 1 & -2 \\ 1 & -4 & 0 & 6 \end{bmatrix}$$

[5]

7. Show that  $H = \{(a - 3b, b - a, a, b) : a, b \in \mathbb{R}\}$  is a subspace of  $\mathbb{R}^4$ .

[5]

8. Is  $\begin{bmatrix} 3 \\ 2 \end{bmatrix}$  an eigenvector of  $\begin{bmatrix} 5 & -3 \\ -4 & 9 \end{bmatrix}$ ? If so, find the eigenvalue.

[3+2]

9. Let  $u = (1, -2, 2, 0)$ . Find a unit vector  $v$  in the same direction as  $u$ .

[5]

10. Find the basis and dimension of  $\text{Nul } A$  where  $A = \begin{bmatrix} 1 & 2 & 3 & 4 \\ 2 & 4 & 7 & 8 \end{bmatrix}$ .

[3+2]

11. Define group. Show that  $(\mathbb{Z}, +)$  doesn't form a group.

[2+3]

12. Show that every field is an integral domain.

[5]

Applying  $R_2 \rightarrow 2R_2 - 3R_1$   $R_3 \rightarrow 2R_3 + 3R_1$

$$\begin{array}{cccc} 2 & -8 & 6 & 8 \\ 0 & 6 & -2 & -14 \\ 0 & -24 & 20 & 20 \end{array}$$

$$\begin{array}{r} 2x - 9 - 3x - 8 \\ -18 + 24 \end{array}$$

$$\begin{array}{r} 0 \quad 2x5 - 3x \\ 40 - 3x - 18 \\ 10 - 24 \\ 0 + 3x \\ 2x1 + 3x \end{array}$$

Tribhuvan University  
Institute of Science and Technology  
2080



Bachelor Level / First Year/ Second Semester/ Science  
Computer Science and Information Technology (CSC166)  
(Object Oriented Programming)  
(NEW COURSE)

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

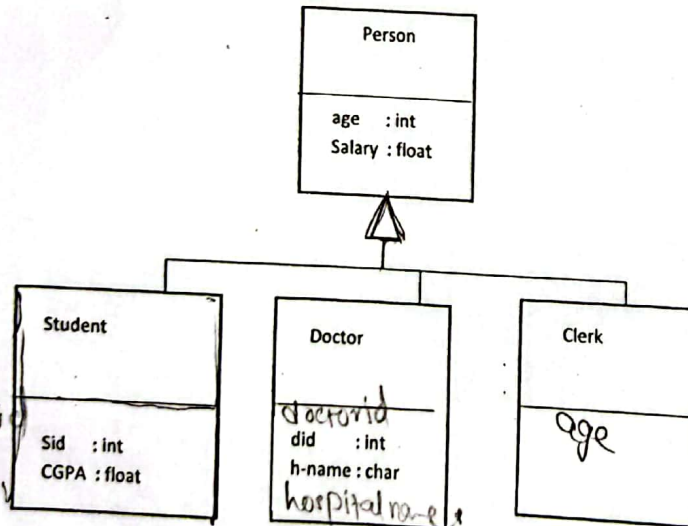
Candidates are required to give their answers in their own words as far as practicable.  
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### Section A

Long answer questions.

Attempt any TWO questions.

1. What is a destructor? List its characteristics. Explain the use of default copy constructor with an appropriate example. (2×10=20)  
(1+2+7)
2. Write a program to create a class named height with data members meter(int) and centimeter (int). Overload the binary + operator using friend function to add two heights h1 and h2. (10)



Write a program to realize the above hierarchy. Create necessary member functions (constructors) to initialize and display necessary information. (10)

## Section B

### Short answer questions.

Attempt any EIGHT questions.

(8×5=40)

4. Define object. What are the benefits of Object Oriented Programming language?  
(5)
5. Explain the significance of type conversion. How do we achieve dynamic memory allocation in C++? Explain with an example.  
(1+4)
6. What is the benefit of passing object as arguments? Write a program to create a class named Actor with data members name and rating. Initialize the data members and display those names whose rating is greater than 5 using the concept of constant object.  
(1+4)
7. Create two classes Rupee and Dollar respectively. Write conversion operators to convert between Rupee and Dollar assuming that 1 dollar equals 133 rupees. Write a main () program that allows the user to enter an amount in either currency and then converts it to other currency and displays the result.  
(5)
8. Explain the practical implication of protected specifier in inheritance. List the advantages and disadvantages of inheritance.  
(1+4)
9. Differentiate between compile time and run time polymorphism.  
(5)
10. Explain function template overloading with suitable example.  
(5)
11. Write a program that stores information of employees in a file and displays the file's content in ascending order of their salary.  
(5)
12. Write short notes on  
a) This pointer  
b) ios member function  
(2×2.5=5)



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2080



Bachelor Level / First Year/ Second Semester/ Science  
Computer Science and Information Technology (STA 169)  
(Statistics I)  
**(NEW COURSE)**

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.

**Section A**

*Arrange*

**Long answer questions.**

(2×10=20)

Attempt any TWO questions.

1. Define statistics and discuss its importance in the field of computational sciences. The following are the numbers of minutes that a person had to wait for the bus to work on 20 working days: 15, 10, 2, 17, 5, 8, 3, 10, 2, 9, 5, 9, 13, 1, 10, 12, 5, 10, 8, 4. Compute mean, median, mode, standard, variance and coefficient of variation.

2. Define normal distribution. What are the main characteristics of a normal distribution? Extruded plastic rods are automatically cut into length 5 inches. Actual lengths are normally distributed about a mean of 5 inches and their standard deviation is 0.05 inches. (i) What proportion of rods exceed tolerance limits of 4.9 inches to 5.1 inches? (ii) Proportion of rods having tolerance rod which is greater than 6.5 inches.

3. Differentiate between correlation and regression analysis. Raw materials used in the production of synthetic fiber are stored in a place which has no humidity control. Measurements of the relative humidity in the storage place and the moisture content of a sample of the raw materials (both in percentage) on 10 days yielded the following results.

Humidity % (x)	48	55	30	44	36	31	62	48	42	50
Moisture content % (y)	11	13	10	12	9	7	16	11	9	14

- (i) Compute correlation coefficient between humidity and moisture content and interpret the result.  
(ii) Find the regression equation of moisture content on humidity.  
(iii) Estimate the moisture content if humidity is 45%.  
(iv) Interpret the value of regression coefficient.

**Section B**

**Short answer questions.**

Attempt any EIGHT questions.

(8×5=40)

4. What is sampling? Explain the main purpose of sampling. Describe briefly Stratified sampling.
5. What do you understand by measurements of dispersion? Two batsmen A and B made the following runs in a series of cricket matches.

A	19	25	10	30	18	28	50	33	28
B	5	75	80	17	38	40	90	0	55

Who is more consistent player? Give your statistical reasoning.

6. Define skewness and kurtosis. The first four moments about the mean are 0, 14.75, 39.75 and 152.31. Compute skewness and kurtosis and interpret the results.
7. What are the partition values? From the following distribution of scores 200 students of a college:



Scores	30-40	40-50	50-60	60-70	70-80	80-90
Number of students	14	50	60	45	20	11

Compute (i) the minimum scores obtained by top 10% students (ii) the range of middle 60% students.

8. Define mutually exclusive events and independent events in probability. A problem of mathematics is given to three students, A, B and C whose chances of solving the problem are in ratio 2:3:5. Find the probability that (i) all of them solve the problem. (ii) none of them solve the problem. (iii) the problem will be solved.

9. Define Baye's theorem. Stores A, B and C have 100, 75 and 50 employees and, respectively, 70, 60 and 50 percent of these are women. Registration are equally likely among all employees regardless of sex. One employee resigns, and this is woman. What is the probability that she works in store B?

10. Under what conditions binomial probability distribution is used? Five unbiased coins are tossed 100 times and the following results were obtained:

No. of heads	0	1	2	3	4	5
Frequency	5	24	35	22	10	4

Fit the Binomial distribution.

11. Define Poisson probability distribution. Cars arrive at a petrol station at an average rate of 3 per minute. Assuming that the cars arrive at random, find the probability that (a) no cars arrive during a particular minute (b) at least one car arrive during a particular minute (c) four cars arriving per 2 minute.

12. Let X and Y be two continuous random variable having joint pdf  
 $f(x,y) = c(x^2 + y^2)$ ,  $0 < x < 1$ ,  $0 < y < 1$   
 $= 0$ , otherwise

Determine (a) the value of c (b)  $P(x < 0.5, y > 0.5)$ .

13. Write short notes on any two : (a) Random variable and probability distribution (b) Five number summary (c) Sampling error.

$$n < n p n q n - n$$

$$n = 0, 1$$