OBJECT ORIENTED PROGRAMMING WITH C++

(Time: 2½ hours)

Total Marks: 75

N. B.: (1) **All** questions are **compulsory**.
(2) Make **suitable assumptions** wherever necessary and **state the assumptions** made.
(3) Answers to the **same question** must be **written together**.
(4) Numbers to the **right** indicate **marks**.
(5) Draw **neat labeled diagrams** wherever **necessary**.
(6) Use of **Non-programmable** calculators is **allowed**.

1. **Attempt *any three* of the following:**   15
   a. Explain the concept of data abstraction and encapsulation.
   b. Explain switch statement with example.
   c. Explain the structure of C++ program.
   d. Explain logical operators with example
   e. Write a c++ program to find factorial of a number.
   f. Explain OOAD methodologies .

2. **Attempt *any three* of the following:**   15
   a. Write a program to demonstrate function with default arguments.
   b. Differentiate between call by value and call by reference.
   c. Explain the concept of friend function with example.
   d. Explain constructor with example.
   e. Explain function overloading with example.
   f. Write a program to overload – decrement operator.

3. **Attempt *any three* of the following:**   15
   a. Explain the importance of pointers in C++.
   b. Explain virtual function with example.
   c. Explain manipulator and write a program to demonstrated any five manipulator.
   d. Write a program to access member of student class using pointer to object members
   e. Explain single inheritance with example.
   f. Write a c++ program to illustrate multiple inheritance.

4. **Attempt *any three* of the following:**   15
   a. What is a template? Explain function template with example.
   b. Write a program to design a simple calculator of two numbers (operations like add,subtract,multiply,divide) using class template
   c. Write a program to read and write student details from a .txt file?
   d. Explain the importance of exception handling in C++
   e. Write a program to illustrate eof() function?
   f. Write a program to throw an exception if number is negative .

5. **Attempt *any three* of the following:**   15
   a. Explain the core components of STL.
   b. Write a program to demonstrate inbuild functions of vector.
   c. Explain the difference between string and char array.
   d. Write a program to compare 2 strings using compare()
   e. Explain the following operators:
      1. static_cast
      2. Dynamic_cast
   f. List and explain any 5 string functions to access characters of a string?

WEB APPLICATION DEVELOPMENT

(Time: 2½ hours)   **Total Marks: 75**

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  (3) Answers to the **same question** must be **written together**.
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  (5) Draw **neat labeled diagrams** wherever **necessary**.
  (6) Use of **Non-programmable** calculators is **allowed**.

1. Attempt _any three_ of the following: 15
a. Write a short on Video Conferencing.
b. What is Internet Address? List and explain the two types of Internet Addresses.
c. Discuss the anatomy of URL.
d. Write HTML code to create a web page using any 5 formatting tags. Explain the purpose of each tag used on the web page.
e. Write a short note on Ordered Lists.
f. Write HTML code to create a web page with different CSS border properties.

2. Attempt _any three_ of the following: 15
a. What is an inline frame? Write HTML code to create a web page demonstrating inline frames.
b. Write a short note on Client-side Image Map.
c. How is video embedded on a web page? List and explain the attributes of the element used for embedding video on a web page.
d. Write HTML code to create a web page with a table to demonstrate use of following:
  i. Header cells and Standard cells   ii. Border   iii. Height and Width
e. Write HTML code to design the following web page:

Sandwich Order Form

Name: [_____]

Address:
[_____]

Bread: ○ White   ○ Brown   ○ Multigrain

Sauce: [Please Select ˅]

[Place Order] [Reset]

f. Explain the range form control with its properties.

3. Attempt _any three_ of the following: 15
a. What is a comparison operator? List and explain the different comparison operators in JavaScript.
b. Write a JavaScript program to accept a number from the user and display its factorial.
c. List and explain the JavaScript methods used to add and remove elements from the beginning and end of array with suitable examples.
d. What are the properties and methods of Number object in JavaScript?
e. Write a JavaScript program to demonstrate following mouse events:
  i. onDblClick   ii. onMouseDown   iii. onMouseOver   iv. onMouseOut
f. Write a JavaScript program to validate a form with field textbox for name, radio buttons for gender and a submit button. Name should contain only alphabetic characters and should not be blank. Gender must be selected by the user.

4. **Attempt** *any three* **of the following:**

a. Explain the following:
   i. Server-side Scripting   ii. WAMP Server

b. Write a short on PHP functions.

c. What is the syntax of switch statement? Write PHP code to demonstrate use of switch statement.

d. What is an array? Explain indexed and associative array. Name the functions that return total number of elements in an array.

e. What will be the output of the following PHP code? Also explain the functions used in the code given below:

```php
<?php
        $s1 = "Hello World";
        $s2 = "web application development";
        echo "<p> Character Value of 87 = ", chr(87);
        echo "<p> strlen($s1) = ", strlen($s1);
        echo "<p> ucfirst($s2) = ", ucfirst($s2);
        echo "<p> strpos($s2, 'A') = ", strpos($s2, "A");
        echo "<p> str_replace('World', 'BScIT', $s1) = ", str_replace("World",
                                                                "BScIT", $s1);
?>
```

f. Write PHP code to demonstrate PHP Regular Expression pattern matching functions to match one pattern of each type.

5. **Attempt** *any three* **of the following:**

15

a. Write PHP code to perform the following and explain functions used in the code:
   i. Display current timezone
   ii. Display date and time of current timezone
   iii. Change timezone to Asia/Kolkatta
   iv. Display date and time of new timezone

b. Write PHP code that displays number of times a page has been viewed using PHP Session.

c. Write a short note on cookies in PHP.

d. What is a query? Explain queries to
   i. Insert values into a table.
   ii. Select data from a database.

e. Using SQL Prepared, write PHP code to add one row to table emp (eno, ename, dept) in database fy.

f. Explain following functions in MySQL and MySQLi
   i. Executing Single Query
   ii. Fetch one row from resultset
   iii. Return number of rows in resultset

FUNDAMENTALS OF MICROPROCESSORS AND MICROCONTROLLERS

(Time: 2½ hours)

Total Marks: 75

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1. **Attempt *any three* of the following:**   15
a. What is a microprocessor? What are different features of microprocessor 8085?
b. Explain in detail programmable registers of 8085.
c. Write the functions of following pins of 8085:
    i) ALE   ii) READY iii) HOLD iv) SID v) RD'

d. Differentiate between: i) Low level language and High-level language
                              ii) Interpreter and Compiler
e. Write a short note on control and status signals of 8085.
f. Explain the concept of Tri-State. Discuss any one Tri-state device.

2. **Attempt *any three* of the following:**   15
a. I) Write the length of following instructions in bytes.
    i) LDA 8097H ii) MOV D, E iii) ADI 65H iv) SHLD 3090H v) SUB B

    II) Write addressing mode of following instructions:
      i) STAX B ii) MVI C, 78H iii) MOV A, B iv) LHLD 6790H   v) DCR M

b. i) Write a set of instructions to alter the contents of flag register in 8085.
    ii) Register D holds a data byte. Write an assembly language program to find two's complement of contents of register D.

c. Explain the following instructions with suitable example.
    I) DAD Rp   II) SUB R

d. Differentiate between Memory mapped I/O and Peripheral mapped I/O.
e. Write a short note on Arithmetic Group of instructions.
f. What are addressing modes of microprocessor? Discuss various addressing modes of 8085.

3. **Attempt *any three* of the following:**   15
a. Explain in detail following interrupt instruction of 8085: Set Interrupt Mask (SIM)
b. Assume that the contents of the Accumulator are 81H and CY= 0. Illustrate the Accumulator contents after RRC and RAR instructions.
c. What is a stack memory? Explain the instruction PUSH and POP associated with it.
d. Differentiate between: i) Maskable and Non-Maskable Interrupts
                       ii) Vectored and Non-Vectored Interrupts
e. Explain the following instructions: i) LDAX R_p ii) CMP M
f. Explain the concept of subroutine and also discuss the instructions associated with it.

FUNDAMENTALS OF MICROPROCESSORS AND MICROCONTROLLERS

4. **Attempt _any three_ of the following:**   15
a. Differentiate between SRAM and DRAM.
b. Write a short note on applications of Embedded System.
c. With help of suitable diagram, explain Harvard architecture design of microcontroller.
d. Explain different classification of embedded system.
e. How microprocessor differs from microcontroller?
f. What are the characteristics of Embedded Systems.

5. **Attempt _any three_ of the following:**   15
a. With neat and labelled diagram explain block diagram of 8051.
b. Explain in detail PSW register of 8051.
c. State different features of 8051 microcontroller.
d. Write a short note on RAM memory space allocation in 8051.
e. What are the factors to be considered while selecting microcontroller.
f. Write a short note on Embedded Product Development Cycle.

GREEN IT

(Time: 2½ hours)

Total Marks: 75

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     (4) Numbers to the **right** indicate **marks**.
     (5) Draw **neat labeled diagrams** wherever **necessary**.
     (6) Use of **Non-programmable** calculators is **allowed**.

1.   **Attempt _any three_ of the following:**   15
   a.   Write a note on Carbon footprint. Explain the steps in measuring the Carbon footprint.
   b.   Explain about the ReUse and ReCycle task force which addresses e-waste issues.
   c.   Explain in detail about WEEE directive and RoHS.
   d.   What is meant by properly dressed cables? Explain it with diagram.
   e.   Explain goals of Greenpeace website.
   f.   Explain it with statistical analysis power consumption vs. CPU utilization of Desktop computers.

2.   **Attempt _any three_ of the following:**   15
   a.   What is meant by virtualization? Explain in detail.
   b.   What is meant by Bigger drives. Explain in detail.
   c.   Write a short note on Green Server.
   d.   What is an Economizer? Explain different types of Economizer.
   e.   Explain HP's solution for cooling.
   f.   What is Aisle? Explain its different types.

3.   **Attempt _any three_ of the following:**   15
   a.   Explain the advantages and disadvantages of outsourcing.
   b.   What is telecommuting? Explain its relation with teleworking.
   c.   What is paperless billing? Explain why would an organization choose paper-free billing?
   d.   Explain the difference between handheld computers vs. clippers.
   e.   Define Intranet and explain the benefits of Intranet.
   f.   Write a short note on Microsoft Office SharePoint Server 2007.

4.   **Attempt _any three_ of the following:**   15
   a.   Write a short note on Check List and Certifications for recycling.
   b.   What is meant by Hard Drive Recycling and its consequences.
   c.   Explain in detail about David vs. America Online (AOL).
   d.   Write a note on Blade Server and explain how less power can be utilized using it.
   e.   Explain in detail about virtualized server.
   f.   Explain the features of SAN.

5.   **Attempt _any three_ of the following:**   15
   a.   Explain the Global Impact of billions of PC's.
   b.   Explain flow of task for computing metrics parameter with diagram.
   c.   Explain the tracking progress can be adopted for Climate change and Renewable Energy.
   d.   Explain in detail about Water conservation.
   e.   Explain the role of Analysis of Data for staying green.
   f.   Write a short note on conducting audits for maintaining green.

NUMERICAL METHODS

(Time: 2½ hours)

Total Marks: 75

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    (3) Answers to the **same question** must be **written together**.
    (4) Numbers to the **right** indicate **marks**.
    (5) Draw **neat labeled diagrams** wherever **necessary**.
    (6) Use of **Non-programmable** calculators is **allowed**.

1. **Attempt _any three_ of the following:**   **15**

a. The height of tower was estimated at 47 meters where as its actual height was 45 meters. Find absolute error, relative error & percentage relative error

b. Explain the term Significant Digits with suitable examples

c. Find the truncation error in the series of exponential function given as

$$e^x = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + - - - - - - \frac{x^n}{n!}$$ for the computation of first 6 terms

in the expansion at $x = 2.5$

d. Let $u = \frac{1}{4}xyz^3$. Find relative error of given function at $x = 1, y = 2, z = 1$ when $\Delta x = 0.001, \Delta y = 0.002$ & $\Delta z = 0.015$

e. Explain the following terms
    i)   Blunders
    ii)   Accuracy
    iii)   Precision

f. Use third order Taylor's series expansion to predict $f(3)$ for
$f(x) = 25x^3 - 6x^2 + 7x - 88$ taking $h = 1$. Also compute % relative error

2. **Attempt _any three_ of the following:**   **15**

a. Find positive real root of $x - 2\sin x = 0$ using Newton Raphson method [Take $x_0 = 2$]

b. Find the real root of $x^3 - 5x - 7 = 0$ using Regula -false method up to 4 stages.

c. Define the following terms:
    i)   Algebraic Non-Linear Equation
    ii)   Transcendental Non-Linear Equation
    iii)   Interpolation

d. From the table given below find the value of y at $x = 1.6$ using appropriate interpolation formula.

x	1	2	3	4
y	7.5854	7.6922	7.8991	7.9252

e. Determine Lagrange's interpolating polynomial $f(x)$ passing through following set of values & hence find $f(3.8)$

x	3	4	6
$f(x)$	9	30	132

f. If $(0.10, 0.1003)$, $(0.15, 0.1511)$, $(0.20, 0.2027)$, $(0.25, 0.2553)$ is the given set of values of (x, y). Find the value of y at $x = 0.24$ using appropriate interpolation formula.

3. **Attempt _any three_ of the following:**   **15**

a. Solve the following system of linear equations by Gauss-Elimination method

$$x + 2y + 6z = 22, \quad 3x + 4y + z = 26, \quad 6x - y - z = 19$$

b. Solve the following system of linear equations by Gauss-Seidel method

$$43x + 2y + 3z = 91, \quad 3x + 53y + z = 60, \quad 2x - 4y + 49z = -49$$

c. From the following set of values, determine $\frac{dy}{dx}$ at $x = 1.2$

x	1	1.2	1.4	1.6	1.8
y	2.7183	3.3201	4.0552	4.9530	6.0496

d. Evaluate: $\int_2^8 \frac{dx}{3x+7}$ dividing the interval into 6 equal parts by Simpson's $\frac{3}{8}$th rule

e. Evaluate: $\int_0^\pi x\sin x\,dx$ dividing the interval into 7 equal parts by appropriate rule

f. Evaluate: $\int_4^{5.6} \log x\,dx$ dividing the interval into 8 equal parts by Simpson's $\frac{1}{3}$rd rule

4. **Attempt _any three_ of the following:**   **15**

a. Find the solution of ordinary differential equation $\frac{dy}{dx} = \log(x+y)$ with initial condition $y(1) = 2$ at $x = 1.2$ taking $h = 0.2$ using Modified Euler's Method

b. Find the solution of ordinary differential equation $\frac{dy}{dx} = \sqrt{xy}$ with initial condition $y(1.3) = 1.63$ at $x = 1.4$ taking $h = 0.05$ using Runge-Kutta Method of 2nd order

c. Given $\frac{dy}{dx} = y - x$ with initial condition $y(0) = 2$ Determine $y(0.1)$ & $y(0.2)$ taking $h = 0.1$ by Taylor's Series Method

d. Fit second degree equation of the form $y = a + bx + cx^2$ from the data given below

x	0	1	3	6
y	1.2	3.8	18	61.8

e. Fit an equation of 3-D plane of the form $z = a + bx + cy$ from the data given below

x	2	1	8	5
y	-1	0	3	4
z	3	5	41	37

f. Using the method of Least square fit a line $y = a + bx$ & hence, find the value of y at $x = 3.8$

x	3	4	5	6	7	8
y	0.15	0.05	0.1	0.2	0.2	0.3

5. **Attempt _any three_ of the following:**   **15**

a. A company manufactures two types of ornaments A & B which requires gold & silver. One unit of A requires 2 gm of silver & 2 gm of gold. One unit of B requires 1gm of silver & 2 gm of gold. Company must utilized maximum 80 gm of silver & maximum 90 gm of gold. Profit per unit of A & B is Rs. 100 & Rs. 80 respectively. Formulate the above problem as LPP

b. Explain unbounded solution of LPP by graphical method. Support your answer with suitable example.

c. Solve the following LPP by graphical method

$$Min\ z = 5x + 4y \text{ Subject to } 10x + 20y \le 600, 40x + 40y \ge 1600, x, y \ge 0$$
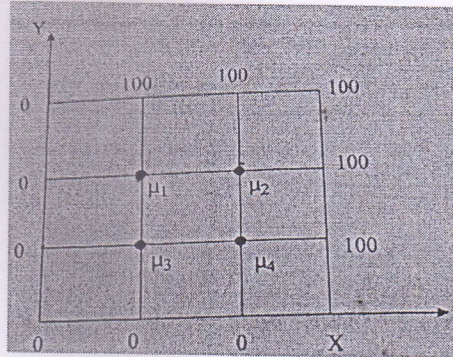
d. Classify the following equations as Elliptic equation, Parabolic Equation & Hyperbolic Equation

i) $\dfrac{\partial^2 u}{\partial x^2} - 4\dfrac{\partial^2 u}{\partial x \partial y} + 4\dfrac{\partial^2 u}{\partial y^2} - \dfrac{\partial u}{\partial x} + 3u = 0$

ii) $(1 + x^2)\dfrac{\partial^2 u}{\partial x^2} + (5 + 2x^2)\dfrac{\partial^2 u}{\partial x \partial t} + (4 + x^2)\dfrac{\partial^2 u}{\partial t^2} = 0$

iii) $3\dfrac{\partial^2 u}{\partial x^2} + 4\dfrac{\partial^2 u}{\partial x \partial y} + 6\dfrac{\partial^2 u}{\partial y^2} - 2\dfrac{\partial u}{\partial y} + \dfrac{\partial u}{\partial y} - 4u = 0$

e. Solve the Laplace equation $\dfrac{\partial^2 u}{\partial x^2} + \dfrac{\partial^2 u}{\partial y^2} = 0$ up to 2 decimal places from the square mesh given below

f. Explain the following terms of LPP

i)   Feasible Region

ii) Objective Function

iii) Constraints