

SET – 4

Series : GBM/C

Code No. 91

Roll No.

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Candidates must write the Code on the title page of the answer-book.

- Please check that this question paper contains **16** printed pages.
- Code number given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.
- Please check that this question paper contains **7** questions.
- **Please write down the Serial Number of the question before attempting it.**
- 15 minute time has been allotted to read this question paper. The question paper will be distributed at 10.15 a.m. From 10.15 a.m. to 10.30 a.m., the students will read the question paper only and will not write any answer on the answer-book during this period.

COMPUTER SCIENCE

Time allowed : 3 hours

Maximum marks : 70

General Instructions :

- SECTION A* refers to programming language C++.
- SECTION B* refers to programming language Python.
- SECTION C* is compulsory for all.
- Answer either *SECTION A* or *SECTION B*.
- It is compulsory to mention on the page **1** in the answer book whether you are attempting *SECTION A* or *SECTION B*.
- All** questions are compulsory within each section.

SECTION – A

(Only for Candidates, who opted for C++)

- (a) Write the type of C++ tokens (keywords and user defined identifiers) from the following : 2
 - case
 - _delete
 - WHILE
 - 21stName

- (b) Jayneel has just started learning C++. He typed the following C++ code and during the compilation of the code, he got some errors. When Jayneel asked his teacher, the teacher told him to include necessary header files in the code. 1

Write the names of those header files, which Jayneel needs to include, for successful compilation and execution of the following code.

```
void main()
{
    cout <<"We win !" <<endl;
    cout <<strlen("The World") <<endl ;
}
```

- (c) Rewrite the following C++ code after removing any/all syntactical errors with each correction underlined. 2

Note : Assume all header files required in the code are already being included.

```
#define 10*Number MAX(Number)
void main()
{
    int Num, NewNum;
    cout <<"Number: ";
    cin <<Num;
    if Num < 10
        NewNum = MAX (Num) ;
    else
        NewNum = Num - 2;
    cout <<"New Number: " <<NewNum <<endl;
}
```

- (d) Find and write the output of the following C++ program code : 2

Note : Assume all required header files are already included in the program.

```
void Decider (int &K, int L=70)
{
    if (K > L)
        K -= L;
    else
        K += L;
}
void main()
{
```

```

    int M=100,N=40;
    Decider (M, N) ;
    cout<<M<<"#"<<N<<endl;
    Decider (M) ;
    cout<<N<<"#"<<M<<endl;
}

```

- (e) Find and write the output of the following C++ program code : 3

Note : Assume all required header files are already being included in the program.

```

void DispScore (int S [], int N)
{
    for (int Count = 0; Count < N; Count++)
        cout << S [Count] << "#";
    cout << endl;
}

void main ()
{
    int *Point, Score [] = {10, 5, 20, 15};
    Point = Score;
    DispScore (Score, 2);
    for (int Count = 0; Count < 4; Count++)
    {
        cout << *Point << ":";
        if (Count % 2 == 0)
            Point++;
        else
        {
            *Point += 10;
            Point++;
        }
    }
    cout << endl;
    DispScore (Score, 4);
}

```

- (f) Look at the following C++ code and find the possible output(s) from the options (i) to (iv) following it. Also, write the maximum values that can be assigned to each of the variables Low and High. 2

Note :

- Assume all the required header files are already being included in the code.
- The function random(n) generates an integer between 0 and n – 1.

```

void main()
{
    randomize();
    int Low=2+random(3), High=5+random(3);
    int C[] = "ABCDEFGHJIJ";

    for(int I=Low; I<=High; I++)
        cout<<C[I];
    cout<<endl;
}

```

(i)	(ii)
BCDE	CDEF
(iii)	(iv)
CDE	DCEFG

2. (a) Differentiate between Data Hiding and Data Encapsulation in context of Object Oriented Programming. Also give a suitable example illustrating the same in C++. 2
- (b) Observe the following C++ code and answer the questions (i) and (ii).

Note : Assume all necessary files are included.

```

class GAME
{
    int Pcode, Round, Score;
public:
    GAME ()                //Member Function 1
    {
        Pcode=1; Round=0; Score=0;
    }
    GAME (GAME &G)        //Member Function 2
    {
        Pcode=G.Pcode+1;
        Round=G.Round+2;
        Score=G.Score+10;
    }
};

void main()
{
    _____ //Statement 1
    _____ //Statement 2
}

```

- (i) Which Object Oriented Programming feature is illustrated by the Member Function 1 and Member Function 2 together in the class GAME ? 1
- (ii) Write Statement 1 and Statement 2 to execute Member Function 1 and Member Function 2 respectively. 1
- (c) Write the definition of a class FRAME in C++ with following description : 4
- Private Members
- FID // data member of integer type
 - Height // data member of float type
 - Width // data member of float type
 - Amount // data member of float type
 - GetAmount() // Member function to calculate and assign
// Amount as 10*Height*Width
- Public Members
- GetDetail() // A function to allow user to enter values of
// FID, Height, Width. This Function should
// also call GetAmount() function to calculate
// Amount
 - DispDetail() // A function to display the
// values of all data members
- (d) Answer the questions (i) to (iv) based on the following : 4

```

class DIGITAL
{
    int ID;
protected:
    float Amount;
    int Seconds;
public:
    DIGITAL();
    void Register(); void Disp();
};
class PRINT
{
    int PID;
protected:
    float Amount;
    int SQinch;
public:
    PRINT();
    void Get();
    void Print();
};

class MEDIA : Public PRINT, private DIGITAL
{
    int MID;

```

```

public:
    MEDIA();
    void Enter();
    void Print();
};
void main()
{
    MEDIA M;          //Statement 1
    _____;      //Statement 2
}

```

- (i) Which type of Inheritance out of the following is illustrated in the above example ?
 - Single Level Inheritance, Multilevel Inheritance, Multiple Inheritance
- (ii) Write the names of all the member functions, which are directly accessible by the object M of class MEDIA as declared in main() function.
- (iii) What will be the order of execution of the constructors, when the object M of class MEDIA is declared inside main () ?
- (iv) Write Statement 2 to call function Print() of class PRINT from the object M of class MEDIA.

3. (a) Write the definition of a function MIXER(int A[], int N) in C++, which should multiply 2 to the odd values present in the array and multiply 3 to the even values present in the array. The entire content of the array A having N elements should change without using any other array. 2

Example : if the array Arr contains

23	20	5	11	10
----	----	---	----	----

Then the array should become

46	60	10	22	30
----	----	----	----	----

Note :

- The function should not display the content of the array.
- (b) Write definition for a function TOPBOTTOM(int M[][5],int N,int M) in C++, which finds and displays sum of the values in topmost row and sum of the values in bottommost row of a matrix M (Assuming the parameter N represents number of Row and the parameter M represents number of Columns). 3

For example, if the content of array M having N as 4 and M as 5 is as follows :

10	20	30	40	50
12	15	32	4	15
38	4	11	24	15
5	10	15	20	25

The function should find the sum and display the same as :

Sum of Top Row : 150

Sum of Bottom Row : 75

- (c) G[15][20] is a two dimensional array, which is stored in the memory along the column with each of its element occupying 4 bytes, find the address of the element G[5] [10], if the element G[2] [4] is stored at the memory location 52000. **3**
- (d) Write the definition of a member function PUSHBOOK() in C++ to add information of BOOL in a static stack implemented using an array of structure BOOK (definition of struct BOOK is defined below for reference). **4**

```
struct BOOK  
{  
    int BNO;  
    char TITLE[20];  
};
```

- (e) Evaluate the following Postfix expression showing the stack contents for each step of conversion. **2**
- 50, 40, -, 4, 5, *, +**

4. (a) Write a function definition ARTICLES() in C++ to count all the articles “the”, “a” and “an” present in a text file “BOOK.TXT”. **3**

Note : Ensure that “the”, “a” and “an” are counted as independent words and not as a part of any other word.

Example :

If the following is content in the file **BOOK.TXT** :

We should choose <u>a</u> low fat diet. <u>The</u> chef is really good in <u>the</u> hotel. <u>An</u> article came in <u>the</u> newspaper about him.
--

The function **ARTICLE()** should display the following output :

5

- (b) Write definition of a function CALSAL() in C++ to find the total salary paid to all the workers in a company. The worker’s detail of this company is stored in a binary file WORKERS.DAT. **2**

Assume that the file WORKERS.DAT is created with the help of objects of class WORKER, which is defined below :

```
class WORKER  
{  
    int WID; char Name[20];  
    float Salary;  
}
```

```

public:
    void INPUT()
    {
        cin>>WID; gets (Name) ; cin>>Salary;
    }
    void OUTPUT()
    {
        cout<<WID<<" : "<<Name<<endl;
        cout<<Salary<<endl;
    }
    float *GetSal () {return Salary;}
};

```

- (c) Find the output of the following C++ code considering that the binary file PRODUCT.DAT exists on the hard disk with a list of data of 350 products. 1

```

class PRODUCT
{
    int PCode; char PName[20];
public:
    void Entry(); void Disp();
};
void main()
{
    fstream In;
    In.open("PRODUCT.DAT", ios::binary|ios::in);
    PRODUCT P;
    In.seekg(0, ios::end);
    cout<<"Total Count: "<<In.tellg()/sizeof(P)<<endl;
    In.seekg(70*sizeof(P));
    In.read((char*)&P, sizeof(P));
    In.read((char*)&P, sizeof(P));
    cout<<"At Product:"<<In.tellg()/sizeof(P) + 1;
    In.close();
}

```

SECTION – B
(Only for Candidates, who opted for Python)

1. (a) Which of the following can be used as valid variable identifier(s) in Python ? 2
- (i) **elif**
 - (ii) **BREAK**
 - (iii) **in**
 - (iv) **_Total**
- (b) Name the Python Library modules which need to be imported to invoke the following functions : 1
- (i) **ceil()**
 - (ii) **randint()**
- (c) Rewrite the following code in Python after removing all syntax error(s). Underline each correction done in the code. 2
- ```
NUM1=1234
1=DAY1
for C in range[1,4]:
 NUM+C=NUM1
 DAY1=DAY1+2
 print C
print NUM1:DAY1
```
- (d) Find and write the output of the following Python code : 2
- ```
L1 = [100, 900, 300, 400, 500]
START = 1
SUM = 0
for C in range (START, 4):
    SUM = SUM + L1[C]
    print C, ":", SUM
    SUM = SUM + L1[0]*10
    print SUM
```
- (e) Find and write the output of the following Python code : 3
- ```
class BOX:
 def __init__(self, C=1, L=1, B=1, H=1): #constructor
 self.C=C
 self.L=L
 self.B=B;
 self.H=H;
 def New(self, Size):
 self.L = self.L + Size
 self.B = self.B + Size
 def Raise(self, Height):
 self.H = self.H + Height
 def Dimension(self):
 print self.C, ":", self.L, "x", self.B, "x", self.H

B1=BOX()
B2=BOX(15, 5, 4)
B3=BOX(101, 3, 2, 4)
B1.Raise(10)
```

```

B1.Dimension()
B3.New(5)
B3.Dimension()
B2.New(15)
B2.Dimension()

```

- (f) What are the possible outcome(s) executed from the following code ? Also specify the maximum and minimum values that can be assigned to variable N. 2

```

import random
PLAY=[40,50,10,20]"EAST", "WEST", "NORTH", "SOUTH";
ROUND=random.randint(2,3)
for J in range(ROUND,1,-1):
print PLAY[J],":":

```

|            |                |
|------------|----------------|
| (i) 20:10: | (ii) 20:10:50: |
| (iii) 20:  | (iv) 40:50:20: |

2. (a) List four characteristics of Object Oriented Programming. 2

- (b) `class ITEM:` 2

```

 Ino = 1
 Qty = 75
 def Get(self, I, Q): #function 1
 Ino = I
 Qty = Q
 def __init__(self, I, Q): #function 2
 self.Ino = I
 self.Qty = Q
 def Display(self): #function 3
 print self.Ino, self.Qty
print Ino, Qty

```

- (i) Differentiate between function 1 and function 2 with respect to their execution.

- (ii) Write statements, which will execute function 1 and function 2.

- (c) Define a class RING in Python with following specifications : 4

**Instance Attributes**

```

- RingID # Numeric value with a default value 101
- Radius # Numeric value with a default value 10
- Area # Numeric value

```

**Methods:**

```

- AreaCal() # Method to calculate Area as
 # 3.14*Radius*Radius
- NewRing() # Method to allow user to enter values of
 # RingID and Radius. It should also
 # Call AreaCal Method

```

- ViewRing() # Method to display all the Attributes

Instance Attributes

- FID # data member of integer type

- Height # data member of float type

- Width # data member of float type

- Amount # data member of float type

Methods:

- GetAmount() # Member function to calculate and assign  
# Amount as 10\*Height\*Width

- GetDetail() # A function to allow user to enter values of  
# FID, Height, Width. This function should  
# also call GetAmount() function to calculate  
# Amount

- DispDetail() # A function to display the  
# values of all data members

(d) Write a program in Python to input a number and display its each digit reversed.

Example :

If the number is 6534

The program should display 4345 2

(e) Write any two features that make it an important characteristic of Object Oriented Programming. 2

3. (a) What will be the status of the following list after the First, Second and Third pass of the bubble sort method used for arranging the following elements in **descending order** ? 3

Note : Show the status of all the elements after each pass very clearly underlining the changes.

**52, -10, 34, 60, -19, 20**

(b) Write definition of a method **ZeroEndingSum(POINTS)** to add those values in the list of POINTS, which are ending with 0. 3

(c) Write AddScore(GAME) and DelScore(GAME) methods in Python to Add a new SCORE in the list of scores of a GAME and Remove a SCORE from a list of scores of a GAME, considering these methods to act as PUSH and POP operations of the data structure Stack. 4

- (d) Write definition of a Method SEARCHNAME(MEMBERS, NAME) to search and display the serial number of first presence of a NAME from a list of MEMBERS. **2**

For example :

If the list of MEMBERS contain

```
["ZAHEEN", "TOM", "CATHERINE", "AMIT", "HEENA"]
```

And

The NAME to search is "CATHERINE"

The following should get displayed

3

- (e) Evaluate the following Postfix notation of expression : **2**

```
20, 30, +, 180, 20, 3, *, /, -
```

4. (a) Differentiate between file modes **r+** and **r** with respect to Python. **1**
- (b) Write a method in Python to read lines from a text file NOTES.TXT, and count those lines, which are ending with '.' or ','. **2**
- (c) Considering the following definition of class FURNITURE, write a method in Python to search and display the content in a pickled file COMPANY.DAT, where FTYPE is matching with the value 'HOME'. **3**

```
class FURNITURE:
```

```
 def __init__(self, CODE, FTYPE, PRICE) :
```

```
 self.CODE = CODE
```

```
 self.FTYPE = FTYPE
```

```
 self.PRICE = 1000
```

```
 def Display(self) :
```

```
 print self.CODE, ":", self.FTYPE, ":", self.PRICE
```

**SECTION – C**

**(For all the Candidates)**

5. (a) Observe the following table CANDIDATE carefully and write the name of the RDBMS operation out of (i) SELECTION (ii) PROJECTION (iii) UNION (iv) CARTESIAN PRODUCT, which has been used to produce the output as shown in OUTPUT ? Also, find the Degree and Cardinality of the OUTPUT. **2**

**TABLE \_ A**

| <b>NO</b> | <b>ALPHA</b> |
|-----------|--------------|
| <b>C1</b> | <b>X</b>     |
| <b>C2</b> | <b>Y</b>     |
| <b>C3</b> | <b>Z</b>     |

**TABLE \_ B**

| <b>CODE</b> | <b>VALUE</b> |
|-------------|--------------|
| <b>101</b>  | <b>3000</b>  |
| <b>102</b>  | <b>4000</b>  |

**OUTPUT**

| <b>NO</b> | <b>ALPHA</b> | <b>CODE</b> | <b>VALUE</b> |
|-----------|--------------|-------------|--------------|
| <b>C1</b> | <b>X</b>     | <b>101</b>  | <b>3000</b>  |
| <b>C1</b> | <b>X</b>     | <b>102</b>  | <b>4000</b>  |
| <b>C2</b> | <b>Y</b>     | <b>101</b>  | <b>3000</b>  |
| <b>C2</b> | <b>Y</b>     | <b>102</b>  | <b>4000</b>  |
| <b>C3</b> | <b>Z</b>     | <b>101</b>  | <b>3000</b>  |
| <b>C3</b> | <b>Z</b>     | <b>102</b>  | <b>4000</b>  |

- (b) Write SQL queries for (i) to (iv) and find outputs for SQL queries (v) to (viii), which are based on the tables : **6**

**TABLE : SALESPERSON**

| Code | NAME         | SALARY | ITCODE |
|------|--------------|--------|--------|
| 1001 | TANDEEP JHA  | 60000  | I2     |
| 1002 | YOGRAJ SINHA | 70000  | I5     |
| 1003 | TENZIN JACK  | 45000  | I2     |
| 1005 | ANOKHI RAJ   | 50000  | I7     |
| 1004 | TARANA SEN   | 55000  | I7     |

**TABLE : ITEM**

| ITCODE | ITEMTYPE   | TURNOVER |
|--------|------------|----------|
| I5     | STATIONARY | 3400000  |
| I7     | HOSIERY    | 6500000  |
| I2     | BAKERY     | 10090000 |

- (i) To display the CODE and NAME of all SALESPERSON having "I7" Item Type Code from the table SALESPERSON.
- (ii) To display all details from table SALESPERSON in descending order of SALARY.
- (iii) To display the number of SALESPERSON dealing in each TYPE of ITEM. (Use ITCODE for the same)
- (iv) To display NAME of all the salespersons from the SALESPERSON table along with their corresponding ITEMTYPE from the ITEM table.
- (v) **SELECT MAX(SALARY) FROM SALESPERSON;**
- (vi) **SELECT DISTINCT ITCODE FROM SALESPERSON;**
- (vii) **SELECT CODE, NAME, I.ITCODE  
FROM SALESPERSON S, ITEM I  
WHERE S.ITCODE=I.ITCODE AND TURNOVER>=700000;**
- (viii) **SELECT SUM(SALARY) FROM SALESPERSON  
WHERE ITCODE="I2";**

6. (a) State Absorption Laws of Boolean Algebra and verify them using truth table. 2
- (b) Draw the Logic Circuit of the following Boolean Expression using only NOR Gates : 2

**A.  $B' + C$**

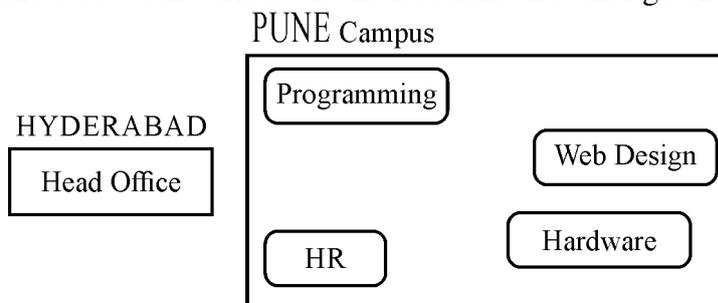
- (c) Derive a Canonical POS expression for a Boolean function F, represented by the following truth table : 1

| A | B | C | F (A, B, C) |
|---|---|---|-------------|
| 0 | 0 | 0 | 0           |
| 0 | 0 | 1 | 1           |
| 0 | 1 | 0 | 0           |
| 0 | 1 | 1 | 1           |
| 1 | 0 | 0 | 0           |
| 1 | 0 | 1 | 0           |
| 1 | 1 | 0 | 1           |
| 1 | 1 | 1 | 1           |

- (d) Reduce the following Boolean Expression to its simplest form using K-Map : 3  
 $F(P, Q, R, S) = \Sigma(0, 1, 2, 3, 4, 5, 6, 9, 13)$

7. (a) Write one name of wireless and one wired communication medium. 2  
 (b) Name any two private Internet Service Providers (company) in India. 2  
 (c) Pratibha is an IT expert and a freelancer. She is undertakes those jobs, which are related to setting up security software/tools and managing networks in various companies. If we name her role in these companies, what it will be out of the following : 2  
 (i) Cracker  
 (ii) Network Admin  
 (iii) Hacker  
 (iv) Operator (justify the reason for you chosen option)  
 (d) Go-Fast corporation is a Hyderabad based company, which is planning to set up training campuses in various cities in next 3 years. Their first campus is coming up in Pune. At Pune campus, they are planning to have 4 different blocks for HR, Web Design Training, Programming Training and Hardware Training. Each block has number of computers, which are required to be connected in a network for communication, data and resource sharing.

As a network consultant of this company, you have to suggest the best network related solutions for them for issues/problems raised in (i) to (iv), keeping in mind the distances between various blocks/locations and other given parameters.



Shortest distances between various blocks/locations :

|                                       |            |
|---------------------------------------|------------|
| Programming Block to HR Block         | 60 metres  |
| Programming Block to Web Design Block | 50 metres  |
| Programming Block to Hardware Block   | 70 metres  |
| HR Block to Web Design Block          | 120 metres |
| HR Block to Hardware Block            | 85 metres  |
| HYDERABAD Head Office to PUNE Campus  | 504 Km     |

Number of Computers installed at various blocks are as follows :

|                   |     |
|-------------------|-----|
| HR Block          | 10  |
| Programming Block | 100 |
| Web Design Block  | 60  |
| Hardware          | 40  |

- (i) Suggest the most appropriate block/location to house the SERVER in the PUNE Campus (out of the 4 blocks) to get the best and effective connectivity. Justify your answer. **1**
  - (ii) Suggest a device/software to be installed in the PUNE Campus to take care of data security. **1**
  - (iii) Suggest the best wired medium and draw the cable layout (Block to Block) to efficiently connect various Blocks within the PUNE campus. **1**
  - (iv) Suggest a device and the protocol that shall be needed to provide Video Conferencing solution between PUNE Campus and Hyderabad Head Office. **1**
-