

# CBSE AISSCE 2016-2017 Marking Scheme for Computer Science

(Sub Code: 083 Paper Code 91 Outside Delhi)

## General Instructions:

- The answers given in the marking scheme are SUGGESTIVE. Examiners are requested to award marks for all alternative correct Solutions/Answers conveying the similar meaning
- All programming questions have to be answered with respect to C++ Language / Python only
- In C++ / Python, ignore case sensitivity for identifiers (Variable / Functions / Structures / Class Names)
- In Python indentation is mandatory, however, number of spaces used for indenting may vary
- In SQL related questions - both ways of text/character entries should be acceptable for Example: "AMAR" and 'amar' both are acceptable.
- In SQL related questions - all date entries should be acceptable for Example: 'YYYY-MM-DD', 'YY-MM-DD', 'DD-Mon-YY', "DD/MM/YY", 'DD/MM/YY', "MM/DD/YY", 'MM/DD/YY' and {MM/DD/YY} are correct.
- In SQL related questions - semicolon should be ignored for terminating the SQL statements
- In SQL related questions, ignore case sensitivity.

## SECTION A - (Only for candidates, who opted for C++)

1	(a)	Write the type of C++ tokens (keywords and user defined identifiers) from the following: (i) new (ii) While (iii) case (iv) Num_2	2
	Ans	(i) new - Keyword (ii) While - User defined Identifier (iii) case - Keyword (iv) Num_2 - User defined Identifier	
		<i>(½ Mark for writing each correct keywords) (½ Mark for writing each correct user defined identifiers)</i>	
	(b)	Anil typed the following C++ code and during compilation he found three errors as follows: (i) Function strlen should have prototype (ii) Undefined symbol cout (iii) Undefined symbol endl  On asking, his teacher told him to include necessary header files in the code. Write the names of the header files, which Anil needs to include, for successful compilation and execution of the following code  <pre>void main() {     char Txt[] = "Welcome";     for(int C= 0; C&lt;strlen(Txt); C++)         Txt[C] = Txt[C]+1;     cout&lt;&lt;Txt&lt;&lt;endl; }</pre>	1

# CBSE AISSCE 2016-2017 Marking Scheme for Computer Science

(Sub Code: 083 Paper Code 91 Outside Delhi)

	Ans	<code>string.h</code> <code>iostream.h</code> OR <code>fstream.h</code> OR <code>iomanip.h</code>	
		(½ Mark each for writing correct header files) <b>NOTE:</b> <i>Ignore additional header file(s)</i>	
	(c)	<p>Rewrite the following C++ code after removing any/all syntactical errors with each correction underlined.</p> <p>Note: Assume all required header files are already being included in the program.</p> <pre>void main() {     cout&lt;&lt;"Enter an Alphabet:";     cin&gt;&gt;CH;     switch(CH)          case 'A' cout&lt;&lt;"Ant";    Break;         case 'B' cout&lt;&lt;"Bear" ; Break; }</pre>	2
	Ans	<pre>void main() {     cout&lt;&lt;"Enter an Alphabet:";     <u>char</u> CH;                                // Error 1     cin&gt;&gt;CH;     switch(CH)     {         case 'A' <u>:</u>                        // Error 2(i)         case 'A' <u>:</u>                        // Error 3(i)             cout&lt;&lt;"Ant";    <u>break</u>;        // Error 4(i)         case 'B' <u>:</u>                        // Error 3(ii)             cout&lt;&lt;"Bear"; <u>break</u>;        // Error 4(ii)     } }</pre>	
		<p>(½ Mark for correcting Error 1)</p> <p>(½ Mark for correcting Error 2(i) and Error 2(ii))</p> <p>(½ Mark for correcting Error 3(i) and Error 3(ii))</p> <p>(½ Mark for correcting Error 4(i) and Error 4(ii))</p> <p>OR</p> <p>(1 Mark for identifying all the errors without corrections)</p>	
	(d)	<p>Find and write the output of the following C++ program code:</p> <p>Note: Assume all required header files are already included in the program.</p> <pre>#define Diff(N1,N2) ((N1&gt;N2)?N1-N2:N2-N1) void main() {     int A,B,NUM[] = {10,23,14,54,32};     for(int CNT =4; CNT&gt;0; CNT--)     {</pre>	2

# CBSE AISSCE 2016-2017 Marking Scheme for Computer Science

(Sub Code: 083 Paper Code 91 Outside Delhi)

		<pre> A=NUM[CNT] ; B=NUM[CNT-1] ; cout&lt;&lt;Diff(A,B)&lt;&lt;' #' ;     } } </pre>	
	Ans	22#40#9#13#	
		<p><i>(½ Mark for writing each correct value)</i>  <b>OR</b>  <i>(1 Mark to be awarded if the output written in reverse order as 13#9#40#22#)</i>  <b>Note: Deduct ½ Mark for not considering any/all # as separator and/or writing the values in different lines</b></p>	
	(e)	<p>Find and write the output of the following C++ program code:  <b>Note: Assume all required header files are already being included in the program.</b></p> <pre> void main() {     int *Point, Score[]={100,95,150,75,65,120};     Point = Score;     for(int L = 0; L&lt;6; L++)     {         if((*Point)%10==0)             *Point /= 2;         else             *Point -= 2;         if((*Point)%5==0)             *Point /= 5;         Point++;     }     for(int L = 5; L&gt;=0; L--)         cout&lt;&lt;Score[L]&lt;&lt;"*"; } </pre>	3
	Ans	12*63*73*15*93*10*	
		<p><i>(½ Mark for writing each correct value)</i></p> <p><b>Note:</b></p> <ul style="list-style-type: none"> <li>• Deduct ½ Mark for not considering any/all * as separator and or writing the values in different lines</li> <li>• Deduct ½ Mark if the output written in reverse order as 10*93*15*73*63*12*</li> <li>• Full 3 Marks to be awarded if “Multiple declaration/syntax error for L” is mentioned</li> </ul>	
	(f)	<p>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 N and M.</p> <p><b>Note:</b></p>	2

# CBSE AISSCE 2016-2017 Marking Scheme for Computer Science

(Sub Code: 083 Paper Code 91 Outside Delhi)

- 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 N=random(3),M=random(4);
    int DOCK[3][3] = {{1,2,3},{2,3,4},{3,4,5}};
    for(int R=0; R<N; R++)
    {
        for(int C=0; C<M; C++)
            cout<<DOCK[R][C]<<" ";
        cout<<endl;
    }
}
```

(i)	(ii)
1 2 3 2 3 4 3 4 5	1 2 3 2 3 4
(iii)	(iv)
1 2 2 3	1 2 2 3 3 4

**Ans** Correct Options : (ii) and (iii)

Maximum value of N = 2

Maximum value M = 3

*(1 Mark for writing the correct options)*

**NOTE:** No marks to be awarded for writing any other option or any other combination

*(½ Mark for writing correct Maximum value of N)*

*(½ Mark for writing correct Maximum value of M)*

2. (a) Differentiate between protected and private members of a class in context of Object Oriented Programming. Also give a suitable example illustrating accessibility/non-accessibility of each using a class and an object in C++.

**Ans**

private	protected
Implicit Visibility Mode	Explicit Visibility Mode
Not accessible to member functions of derived class	Accessible to member functions of derived class

Example:

```
class A
{
    int X;
```

## CBSE AISSCE 2016-2017 Marking Scheme for Computer Science

(Sub Code: 083 Paper Code 91 Outside Delhi)

	<pre>protected:     int Y; public:     void Z(); };</pre> <p><b>OR</b></p> <p>Any other correct example demonstrating difference between private and protected members of a class</p>	
	<p><i>(Full 2 Marks for any one correct difference between private and protected members in a class using a suitable code in C++)</i></p> <p><b>OR</b></p> <p><i>(1 Mark for writing any one correct difference between private and protected members in a class without any example)</i></p>	
(b)	<p>Observe the following C++ code and answer the questions (i) and (ii).  <b>Note:</b> Assume all necessary files are included.</p> <pre>class TEST {     long TCode;     char TTitle[20];     float Score; public:     TEST()                                //Member Function 1     {         TCode=100;strcpy(TTitle,"FIRST Test");Score=0;     }     TEST(TEST &amp;T)                          //Member Function 2     {         TCode=E.TCode+1;         strcpy(TTitle,T.TTitle);         Score=T.Score;     } };</pre> <pre>void main() {     _____ //Statement 1     _____ //Statement 2 }</pre>	
(i)	Which Object Oriented Programming feature is illustrated by the Member Function 1 and Member Function 2 together in the class TEST?	1
Ans	<b>Polymorphism OR Constructor overloading OR Function Overloading</b>	
	<i>(1Mark for mentioning the correct concept name )</i>	
(ii)	Write Statement 1 and Statement 2 to execute Member Function 1 and Member Function 2 respectively.	1
Ans	<b>TEST T1; //Statement 1</b>	

## CBSE AISSCE 2016-2017 Marking Scheme for Computer Science

(Sub Code: 083 Paper Code 91 Outside Delhi)

	TEST T2(T1); //Statement 2 OR TEST T2=T1; //Statement 2	
	( ½ Mark for writing statement 1 correctly) ( ½ Mark for writing statement 2 correctly OR ½ Mark for mentioning E not declared)	
(c)	Write the definition of a class BOX in C++ with following description: Private Members - BoxNumber // data member of integer type - Side // data member of float type - Area // data member of float type - ExecArea() // Member function to calculate and assign // Area as Side * Side  Public Members - GetBox() // A function to allow user to enter values of // BoxNumber and Side. Also, this // function should call ExecArea() to calculate // Area - ShowBox() // A function to display BoxNumber, Side // and Area	4
Ans	class BOX { int BoxNumber ; float Side ; float Area ; void ExecArea(){ Area=Side*Side;} public: void GetBox(); void ShowBox(); }; void BOX::GetBox() { cin>>BoxNumber>>Side; ExecArea(); } void BOX::ShowBox() { cout<<BoxNumber<<" "<<Side<<" "<<Area<<endl; }	
	(½ Mark for declaring class header correctly) (½ Mark for declaring data members correctly) (1 Mark for defining ExecArea() correctly) (½ Mark for taking inputs of BoxNumber and Side in GetBox()) (½ Mark for invoking ExecArea() inside GetBox()) (½ Mark for defining ShowBox() correctly) (½ Mark for correctly closing class declaration with a semicolon ; ) NOTE: Marks to be awarded for defining the member functions inside or outside the class	

# CBSE AISSE 2016-2017 Marking Scheme for Computer Science

(Sub Code: 083 Paper Code 91 Outside Delhi)

	<p>(d) Answer the questions (i) to (iv) based on the following:</p> <pre> class First {     int X1; protected:     float X2; public:     First();     void Enter1(); void Display1(); }; class Second : private First {     int Y1; protected:     float Y2; public:     Second();     void Enter2();     void Display(); }; class Third : public Second {     int Z1; public:     Third();     void Enter3();     void Display(); }; void main() {     Third T;           //Statement 1     _____; //Statement 2 } </pre>	4
	<p>(i) Which type of Inheritance out of the following is illustrated in the above example? Single Level Inheritance, Multilevel Inheritance, Multiple Inheritance</p>	
Ans	Multilevel Inheritance	
	<i>(1 Mark for writing correct option)</i>	
	<p>(ii) Write the names of all the member functions, which are directly accessible by the object T of class Third as declared in main() function.</p>	
Ans	<p>Enter2(), Display() of class Second Enter3(), Display() of class Third</p> <p>OR</p>	

# CBSE AISSEE 2016-2017 Marking Scheme for Computer Science

(Sub Code: 083 Paper Code 91 Outside Delhi)

		<b>Enter2 ()</b> <b>Second::Display ()</b> <b>Enter3 ()</b> <b>Display () OR Third::Display ()</b>													
		<b>(1 Mark for writing all correct function names )</b> <b>NOTE:</b> <ul style="list-style-type: none"><li>• Marks not to be awarded for partially correct answer</li><li>• Ignore the mention of Constructors</li></ul>													
	(iii)	Write Statement 2 to call function Display() of class Second from the object T of class Third.													
	<b>Ans</b>	<b>T.Second::Display () ;</b>													
		<b>(1 Mark for writing Statement 2 correctly)</b>													
	(iv)	What will be the order of execution of the constructors, when the object T of class Third is declared inside main()?													
	<b>Ans</b>	First, Second, Third													
		<b>(1 Mark for writing correct order)</b> <ul style="list-style-type: none"><li>• No Marks to be awarded for any other combination/order.</li><li>• Names of the constructor/class without parenthesis is acceptable</li></ul>													
<b>3</b>	(a)	Write the definition of a function AddUp(int Arr[], int N) in C++, in which all even positions (i.e. 0,2,4,...) of the array should be added with the content of the element in the next position and odd positions (i.e. 1,3,5,...) elements should be incremented by 10. Example: if the array Arr contains <table border="1"><tr><td>23</td><td>30</td><td>45</td><td>10</td><td>15</td><td>25</td></tr></table> Then the array should become <table border="1"><tr><td>53</td><td>40</td><td>55</td><td>20</td><td>40</td><td>35</td></tr></table> <b>NOTE:</b> <ul style="list-style-type: none"><li>• The function should only alter the content in the same array.</li><li>• The function should not copy the altered content in another array.</li><li>• The function should not display the altered content of the array.</li><li>• Assuming, the Number of elements in the array are Even.</li></ul>	23	30	45	10	15	25	53	40	55	20	40	35	<b>3</b>
23	30	45	10	15	25										
53	40	55	20	40	35										
	<b>Ans</b>	<pre>void AddUp(int Arr[], int N) {     for(int i=0; i&lt;N; i++)     {         if(i%2==0)             Arr[i]=Arr[i]+Arr[i+1];         else             Arr[i]=Arr[i]+10;     } }</pre> <b>OR</b>													



# CBSE AISSCE 2016-2017 Marking Scheme for Computer Science

(Sub Code: 083 Paper Code 91 Outside Delhi)

		Any other correct C++ code for the required function definition.																
		<p><i>(1 Mark for correctly writing the loop)</i> <i>(1 Mark for correctly checking condition for even/odd locations)</i> <i>(½ Mark for adding the element in the next position to the even positioned elements)</i> <i>(½ Mark for incrementing the element by 10 for odd positioned elements)</i></p>																
(b)	Write a definition for a function SUMMIDCOL(int MATRIX[][10],int N,int M) in C++, which finds the sum of the middle column's elements of the MATRIX (Assuming N represents number of rows and M represents number of columns, which is an odd integer). Example: if the content of array MATRIX having N as 5 and M as 3 is as follows:	<table><tr><td>1</td><td>2</td><td>1</td></tr><tr><td>2</td><td>1</td><td>4</td></tr><tr><td>3</td><td>4</td><td>5</td></tr><tr><td>4</td><td>5</td><td>3</td></tr><tr><td>5</td><td>3</td><td>2</td></tr></table> <p>The function should calculate the sum and display the following: Sum of Middle Column: 15</p>	1	2	1	2	1	4	3	4	5	4	5	3	5	3	2	2
1	2	1																
2	1	4																
3	4	5																
4	5	3																
5	3	2																
Ans	<pre>void SUMMIDCOL(int MATRIX[][10],int N,int M) {     int mid=M/2;     int sum=0;     for(int i=0; i&lt;N; i++)     {         sum=sum+MATRIX[i][mid];     }     cout&lt;&lt;" Sum of Middle Column"&lt;&lt;sum; }</pre> <p>OR</p> <p>Any other correct C++ code for the required function definition</p>																	
		<p><i>(½ Mark for correctly writing the loop)</i> <i>(1 Mark for adding middle column elements)</i> <i>(½ Mark for displaying the sum of middle column elements)</i></p>																
(c)	ARR[15][20] is a two-dimensional array, which is stored in the memory along the row with each of its elements occupying 4 bytes. Find the address of the element ARR[5][15], if the element ARR[10][5] is stored at the memory location 35000.		3															
Ans	<p>ROW MAJOR:</p> <p>Loc (ARR[I][J]) =BaseAddress + W [( I - LBR)*C + (J - LBC) ]</p> <p>(where W=size of each element = 4 bytes, R=Number of Rows=15, C=Number of Columns=20 )</p> <p>Assuming LBR = LBC = 0</p>																	

# CBSE AISSCE 2016-2017 Marking Scheme for Computer Science

(Sub Code: 083 Paper Code 91 Outside Delhi)

	<pre> LOC (ARR[10][5]) 35000          = BaseAddress + W(I*C + J) 35000          = BaseAddress + 4(10*20 + 5) 35000          = BaseAddress + 4(205) 35000          = BaseAddress + 820 BaseAddress    = 35000 - 820                = 34180  LOC (ARR[5][15])= BaseAddress + W(I*C + J)                = 34180          + 4(5*20 + 15)                = 34180          + 4(100 + 15)                = 34180          + 4 x 115                = 34180          + 460                = 34640  OR  Loc (ARR[I][J]) = Ref. Address + W (( I - LR)*C + (J - LC)) (where W=size of each element = 4 bytes, R=Number of Rows =15, C=Number of Columns=20 Reference Address= Address of given cell ARR[10][5]=35000 LR = Row value of given cell = 10 LC = Column value of given cell = 5  LOC (ARR[5][15]) = LOC (ARR[10][5]) + 4((5-10)*20 + (15-5)) LOC (ARR[5][15]) = 35000 + 4(-100 + 10)                   = 35000 + 4[-90]                   = 35000 -360                   = 34640 </pre>	
	<p><i>(1 Mark for writing correct formula (for Row major) OR substituting formula with correct values)</i></p> <p><i>(1Mark for correct calculation)</i></p> <p><i>(1 Mark for final correct address)</i></p>	
(d)	<p>Write the definition of a member function PUSHGIFT() for a class STACK in C++, to add a GIFT in a dynamically allocated stack of GIFTS considering the following code is already written as a part of the program:</p> <pre> struct GIFT {     int GCODE;           //Gift Code     char GDESC[20];      //Gift Description     GIFT *Link; };  class STACK {     Gift *TOP; public:     STACK() {TOP=NULL;}     void PUSHGIFT();     void POPGIFT();     ~STACK(); }; </pre>	4

# CBSE AISSCE 2016-2017 Marking Scheme for Computer Science

(Sub Code: 083 Paper Code 91 Outside Delhi)

ANS	<pre>void STACK::PUSHGIFT() {     GIFT *T = new GIFT;     cin&gt;&gt;T-&gt;GCODE;     gets(T-&gt;GDESC);     T-&gt;Link = TOP;     TOP = T; }</pre>																																																																															
	<p>(1 Mark for creating a new Node)                  (1 Mark for fetching values of GCODE and GDESC)                  (1 Mark for assigning TOP to the Link of the new Node)                  (1 Mark for assigning TOP to the new Node)</p> <p><b>NOTE:</b>                  GIFT/Gift - Both acceptable</p>																																																																															
(e)	<p>Convert the following Infix expression to its equivalent Postfix expression, showing the stack contents for each step of conversion:</p> <p><b>X - ( Y + Z ) / U * V</b></p>	2																																																																														
Ans	<table border="1"> <thead> <tr> <th>ELEMENT</th><th>Stack</th><th>POSTFIX</th></tr> </thead> <tbody> <tr><td>X</td><td></td><td>X</td></tr> <tr><td>-</td><td>-</td><td>X</td></tr> <tr><td>(</td><td>-(</td><td>X</td></tr> <tr><td>Y</td><td>-(</td><td>XY</td></tr> <tr><td>+</td><td>-(+</td><td>XY</td></tr> <tr><td>Z</td><td>-(+</td><td>XYZ</td></tr> <tr><td>)</td><td>-</td><td>XYZ+</td></tr> <tr><td>/</td><td>-/</td><td>XYZ+</td></tr> <tr><td>U</td><td>-/</td><td>XYZ+U</td></tr> <tr><td>*</td><td>-*</td><td>XYZ+U/</td></tr> <tr><td>V</td><td>-*</td><td>XYZ+U/V</td></tr> <tr><td></td><td></td><td>XYZ+U/V*-</td></tr> </tbody> </table> <p>OR</p> <p><b>X- (Y+Z) /U*V = (X- ( ( (Y+Z) /U) *V) )</b></p> <table border="1"> <thead> <tr> <th>ELEMENT</th><th>Stack</th><th>POSTFIX</th></tr> </thead> <tbody> <tr><td>(</td><td></td><td></td></tr> <tr><td>X</td><td></td><td>X</td></tr> <tr><td>-</td><td>-</td><td></td></tr> <tr><td>(</td><td></td><td></td></tr> <tr><td>(</td><td></td><td></td></tr> <tr><td>(</td><td></td><td></td></tr> <tr><td>Y</td><td></td><td>XY</td></tr> <tr><td>+</td><td>- +</td><td></td></tr> <tr><td>Z</td><td></td><td>XYZ</td></tr> <tr><td>)</td><td>-</td><td>XYZ+</td></tr> <tr><td>/</td><td>-/</td><td></td></tr> <tr><td>U</td><td></td><td>XYZ+U</td></tr> </tbody> </table>	ELEMENT	Stack	POSTFIX	X		X	-	-	X	(	-(	X	Y	-(	XY	+	-(+	XY	Z	-(+	XYZ	)	-	XYZ+	/	-/	XYZ+	U	-/	XYZ+U	*	-*	XYZ+U/	V	-*	XYZ+U/V			XYZ+U/V*-	ELEMENT	Stack	POSTFIX	(			X		X	-	-		(			(			(			Y		XY	+	- +		Z		XYZ	)	-	XYZ+	/	-/		U		XYZ+U	
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# CBSE AISSCE 2016-2017 Marking Scheme for Computer Science

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V		XYZ+U/V																
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)		XYZ+U/V*-																
		<p><i>(½ Mark for correctly converting till each operator)</i></p> <p><b>OR</b></p> <p><i>(1 Mark to be given for writing correct answer without showing the stack content on each step)</i></p>																
4.	(a)	<p>Polina Raj has used a text editing software to type some text in an article. After saving the article as MYNOTES.TXT, she realised that she has wrongly typed alphabet K in place of alphabet C everywhere in the article.</p> <p>Write a function definition for PURETEXT() in C++ that would display the corrected version of the entire article of the file MYNOTES.TXT with all the alphabets “K” to be displayed as an alphabet “C” on screen.</p> <p>Note: Assuming that MYNOTES.TXT does not contain any C alphabet otherwise.</p> <p>Example:</p> <p>If Polina has stored the following content in the file MYNOTES.TXT:</p> <div><p>I OWN A KUTE LITTLE KAR.</p><p>I KARE FOR IT AS MY KCHILD.</p></div> <p>The function PURETEXT() should display the following content:</p> <div><p>I OWN A CUTE LITTLE CAR.</p><p>I CARE FOR IT AS MY CHILD.</p></div>	3															
	Ans	<pre>void PURETEXT() {     char ch;     ifstream F("MYNOTES.TXT" );     while(F.get(ch))     {         if(ch=='K')             ch='C';         cout&lt;&lt;ch;     }     F.close(); //IGNORE }</pre> <p><b>OR</b></p> <p>Any other correct function definition</p> <div><p>OR</p><pre>fstream F; F.open("MYNOTES.TXT", ios::in); OR fstream F("MYNOTES.TXT", ios::in);</pre></div>																
		<p><i>(1 Mark for opening MYNOTES.TXT correctly)</i></p> <p><i>(1 Mark for reading each character (using any method) from the file)</i></p> <p><i>(1 Mark for displaying ‘C’ in place of ‘K’)</i></p>																

# CBSE AISSCE 2016-2017 Marking Scheme for Computer Science

(Sub Code: 083 Paper Code 91 Outside Delhi)

(b)	<p>Write a definition for function COUNTPICS ( ) in C++ to read each object of a binary file PHOTOS.DAT, find and display the total number of PHOTOS of type PORTRAIT. Assume that the file PHOTOS.DAT is created with the help of objects of class PHOTOS, which is defined below:</p> <pre> class PHOTOS {     int PCODE;     char PTYPE[20]; //Photo Type as "PORTRAIT", "NATURE" public:     void ENTER()     {         cin&gt;&gt;PCODE; gets(PTYPE);     }     void SHOWCASE()     {         cout&lt;&lt;PCODE&lt;&lt;": "&lt;&lt;PTYPE&lt;&lt;endl;     }     char *GETPTYPE() {return PTYPE;} };         </pre>	2
Ans	<pre> void COUNTPICS() {     ifstream F;     F.open("PHOTOS.DAT",            ios::binary);      int count=0;     PHOTOS obj;     while(F.read((char*)&amp;obj,                  sizeof(obj)))      {         if(strcmp(obj.GETPTYPE(), "PORTRAIT")==0)             count++;     }     cout&lt;&lt;"Number of PORTRAIT photos : "&lt;&lt;count;     F.close(); //IGNORE }         </pre> <div data-bbox="970 1041 1452 1326" style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>OR</p> <pre> fstream F; F.open("PHOTOS.DAT",        ios::binary ios::in);         </pre> </div> <p>OR</p> <p>Any other correct function definition</p>	
	<p>(½ Mark for opening PHOTOS.DAT correctly)                  (½ Mark for reading records from PHOTOS.DAT)                  (½ Mark for comparing PHOTOS of type PORTRAIT(ignore case sensitive checking) with strcmp or strcmpi)                  (½ Mark for displaying counter for matching records)</p>	
(c)	<p>Find the output of the following C++ code considering that the binary file 1 CLIENTS.DAT exists on the hard disk with a data of 200 clients.</p> <pre> class CLIENTS {     int CCode; char CName[20]; public:         </pre>	1

(Sub Code: 083 Paper Code 91 Outside Delhi)

Page #14 of 28

# CBSE AISSCE 2016-2017 Marking Scheme for Computer Science

(Sub Code: 083 Paper Code 91 Outside Delhi)

Ans	<p><u>STRING="WELCOME"</u> <u>NOTE=""</u> for S in range(0,8):     print STRING[S] print S,STRING</p> <p>Also range(0,8) will give a runtime error as the index is out of range. It should be range(0,7)</p> <p><i>(½ Mark for each for any four corrections)</i> <b>OR</b> <i>(1 mark for identifying the errors, without suggesting corrections)</i></p>	
(d)	<p>Find and write the output of the following python code:</p> <pre> TXT    = ["20", "50", "30", "40"] CNT    = 3 TOTAL  = 0 for C in [7,5,4,6]:     T = TXT[CNT]     TOTAL = float (T) + C print TOTAL CNT-=1 </pre>	2
Ans	<p>47.0 35.0 54.0 26.0</p> <p><i>( ½ mark for each correct line of output)</i> <b>NOTE:</b> <i>Deduct ½ Mark for writing the answer in same line</i> <i>Deduct ½ Mark for writing numbers without decimal point</i></p>	
(e)	<p>Find and write the output of the following python code:</p> <pre> class INVENTORY:     def __init__(self,C=101,N="Pad",Q=100): #constructor         self.Code=C         self.IName=N         self.Qty=int(Q) ;     def Procure(self,Q):         self.Qty = self.Qty + Q     def Issue(self,Q):         self.Qty -= Q     def Status(self):         print self.Code,":",self.IName,"#",self.Qty  I1=INVENTORY() I2=INVENTORY(105,"Thumb Pin",50) I3=INVENTORY(102,"U Clip") I1.Procure(25) I2.Issue(15) I3.Procure(50) I1.Status() I3.Status() </pre>	3

# CBSE AISSCE 2016-2017 Marking Scheme for Computer Science

(Sub Code: 083 Paper Code 91 Outside Delhi)

		I2.Status()					
	Ans	<p><b>Output</b></p> <p>101 : Pad # 125</p> <p>102 : U Clip # 150</p> <p>105 : Thumb Pin # 35</p> <p>( 1 mark for each correct line of output)</p> <p><b>NOTE:</b></p> <ul style="list-style-type: none"><li>•Deduct ½ Mark for not writing any or all ‘:’ / ‘#’ symbol(s)</li><li>•Deduct ½ Mark for not considering any or all line breaks at proper place(s)</li></ul>					
	(f)	<p>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.</p> <pre>import random NAV = ["LEFT", "FRONT", "RIGHT", "BACK"] ; NUM = random.randint(1,3) NAVG = "" for C in range(NUM,1,-1):     NAVG = NAVG+NAV[I] print NAVG</pre> <table border="1"><tr><td>(i) BACKRIGHT</td><td>(ii) BACKRIGHTFRONT</td></tr><tr><td>(iii) BACK</td><td>(iv) LEFTFRONTRIGHT</td></tr></table>	(i) BACKRIGHT	(ii) BACKRIGHTFRONT	(iii) BACK	(iv) LEFTFRONTRIGHT	2
(i) BACKRIGHT	(ii) BACKRIGHTFRONT						
(iii) BACK	(iv) LEFTFRONTRIGHT						
	Ans	<p>(i) BACKRIGHT</p> <p>Max value 3 and minimum value 1 for variable NUM</p> <p>OR</p> <p>I or N not defined</p> <p>OR</p> <p>; wrongly placed in line 2</p> <p>(1 mark for mentioning the first option)</p> <p><b>NOTE: No marks to be awarded for writing any other option or any other combination</b></p> <p>(½ mark each for max and min values of NUM)</p> <p>OR</p> <p>(Full 2 Marks for mentioning the specific error(s))</p>					
2	(a)	List four characteristics of Object Oriented programming.	2				
	Ans	<ul style="list-style-type: none"><li>• Encapsulation</li><li>• Data Hiding</li><li>• Abstraction</li><li>• Inheritance</li><li>• Polymorphism</li></ul> <p>(½ mark for naming each characteristic - upto 4 characteristics)</p>					
	(b)	<b>class Exam:</b>	2				



# CBSE AISSCE 2016-2017 Marking Scheme for Computer Science

(Sub Code: 083 Paper Code 91 Outside Delhi)

	<pre> Regno=1 Marks=75 def __init__(self,r,m):          #function 1     self.Regno=r     self.Marks=m def Assign(self,r,m):           #function 2     Regno = r     Marks = m def Check(self):                #function 3     print self.Regno, self.Marks     print Regno, Marks </pre> <p>(i) In the above class definition, both the functions - function 1 as well as function 2 have similar definition. How are they different in execution?</p> <p>(ii) Write statements to execute function 1 and function 2.</p>	
Ans	<p>(i) Function 1 is the constructor which gets executed automatically as soon as the object of the class is created. Function 2 is a member function which has to be called to assign the values to Regno and Marks.</p> <p>(ii) Function 1     E1=Exam(1,95) # Any values in the parameter  Function 2        E1.Assign(1,95) # Any values in the parameter</p> <p><i>(1 mark for correct difference)</i>  <i>( ½ mark for each statement for executing Function 1 and Function 2)</i></p>	
(c)	<p>Define a class BOX in Python with following specifications</p> <p><b>Instance Attributes</b></p> <ul style="list-style-type: none"> <li>- BoxID     # Numeric value with a default value 101</li> <li>- Side       # Numeric value with a default value 10</li> <li>- Area       # Numeric value with a default value 0</li> </ul> <p><b>Methods:</b></p> <ul style="list-style-type: none"> <li>- ExecArea() # Method to calculate Area as                     # Side * Side</li> <li>- NewBox()    # Method to allow user to enter values of                     # BoxID and Side. It should also                     # Call ExecArea Method</li> <li>- ViewBox()   # Method to display all the Attributes</li> </ul>	4
Ans	<pre> class BOX: # can also be given as class BOX( ):     # or class BOX(Object):     def __init__(self):         self.BoxID=101         self.Side=10         self.Area=0     def ExecArea(self):         self.Area=self.Side*self.Side     def NewBox(self):         self.BoxID=input("Enter BoxID")         self.Side=input("Enter side")         self.ExecArea()          # OR ExecArea(self)     def ViewBox(self): </pre> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <pre> def __init__(self,B,S,A): #Any variable instead of B, S, A may be used     self.BoxID=B     self.Side=S     self.Area=A </pre> </div>	

# CBSE AISSCE 2016-2017 Marking Scheme for Computer Science

(Sub Code: 083 Paper Code 91 Outside Delhi)

		<pre>print self.BoxID print self.Side print self.Area</pre> <p>(½ Mark for correct syntax for class header)  (½ Mark for correct declaration of instance attributes)  (1 Mark for correct definition of ExecArea( ) method)  (1 Mark for correct definition of NewBox( ) with proper invocation of ExecArea( ))  (1 Mark for correct definition of ViewBox( ))  <b>NOTE:</b>  Deduct ½ Mark if ExecArea( ) is not invoked properly inside NewBox( ) method</p>	
	(d)	Differentiate between static and dynamic binding in Python? Give suitable examples of each.	2
	Ans	<p>Static Binding: It allows linking of function call to the function definition during compilation of the program.</p> <p>Dynamic Binding: It allows linking of a function during run time. That means the code of the function that is to be linked with function call is unknown until it is executed. Dynamic binding of functions makes the programs more flexible.</p> <p>(1 mark for each correct explanation of static and dynamic binding)  <b>OR</b>  (1 for each correct example of static and dynamic binding)</p>	
	(e)	<p>Write two methods in python using concept of Function Overloading (Polymorphism) to perform the following operations:</p> <p>(i) A function having one argument as Radius, to calculate Area of Circle as <b>3.14#Radius#Radius</b></p> <p>(ii) A function having two arguments as Base and Height, to calculate Area of right angled triangle as <b>0.5#Base#Height</b>.</p>	2
	Ans	<pre>def Area (R) :     print 3.14*R*R def Area (B,H) :     print 0.5*B*H</pre> <p><b>Note: Python does not support function overloading “as illustrated in the example shown above”. If you run the code, the second Area(B,H) definition will override the first one.</b></p> <p>(1 mark for each function definition)  <b>OR</b>  (Full 2 Marks for mentioning Python does not support function overloading)</p>	
3.	(a)	<p>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 <b>ascending order</b>?</p> <p>Note: Show the status of all the elements after each pass very clearly underlining the changes.</p> <p><b>52, 42, -10, 60, 90, 20</b></p>	3
	Ans	I Pass	

# CBSE AISSCE 2016-2017 Marking Scheme for Computer Science

(Sub Code: 083 Paper Code 91 Outside Delhi)

		<table><tr><td>52</td><td>42</td><td>-10</td><td>60</td><td>90</td><td>20</td></tr><tr><td>42</td><td>52</td><td>-10</td><td>60</td><td>90</td><td>20</td></tr><tr><td>42</td><td>-10</td><td>52</td><td>60</td><td>90</td><td>20</td></tr><tr><td>42</td><td>-10</td><td>52</td><td>60</td><td>90</td><td>20</td></tr><tr><td>42</td><td>-10</td><td>52</td><td>60</td><td>90</td><td>20</td></tr><tr><td>42</td><td>-10</td><td>52</td><td>60</td><td>20</td><td>90</td></tr></table>	52	42	-10	60	90	20	42	52	-10	60	90	20	42	-10	52	60	90	20	42	-10	52	60	90	20	42	-10	52	60	90	20	42	-10	52	60	20	90	
52	42	-10	60	90	20																																		
42	52	-10	60	90	20																																		
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	II Pass	<table><tr><td>42</td><td>-10</td><td>52</td><td>60</td><td>20</td><td>90</td></tr><tr><td>-10</td><td>42</td><td>52</td><td>60</td><td>20</td><td>90</td></tr><tr><td>-10</td><td>42</td><td>52</td><td>60</td><td>20</td><td>90</td></tr><tr><td>-10</td><td>42</td><td>52</td><td>60</td><td>20</td><td>90</td></tr><tr><td>-10</td><td>42</td><td>52</td><td>20</td><td>60</td><td>90</td></tr></table>	42	-10	52	60	20	90	-10	42	52	60	20	90	-10	42	52	60	20	90	-10	42	52	60	20	90	-10	42	52	20	60	90							
42	-10	52	60	20	90																																		
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-10	42	52	20	60	90																																		
-10	42	52	20	60	90																																		
-10	42	52	20	60	90																																		
-10	42	20	52	60	90																																		
	(1 mark for last set of values of each correct pass)																																						
(b)	Write definition of a method EvenSum(NUMBERS) to add those values in the list of NUMBERS, which are odd.			3																																			
Ans	<pre>def EvenSum (NUMBERS) :     n=len (NUMBERS)     s=0     for i in range (n) :         if (i%2!=0) :             s=s+NUMBERS [i]     print(s)</pre> <p>(½ mark for finding length of the list) ( ½ mark for initializing s (sum) with 0) ( ½ mark for reading each element of the list using a loop) ( ½ mark for checking odd location) ( ½ mark for adding it to the sum) ( ½ mark for printing or returning the value)</p>																																						
(c)	Write Addnew(Member) and Remove(Member) methods in python to Add a new Member and Remove a Member from a List of Members, considering them to act as INSERT and DELETE operations of the data structure Queue.			4																																			
Ans	<pre>class queue:     Member=[]     def Addnew(self) :         a=input("enter member name: ")         queue.Member.append(a)     def Remove(self) :         if (queue.Member==[]) :             print "Queue empty"         else:             print "deleted element is: ",queue.Member[0]</pre>																																						

# CBSE AISSCE 2016-2017 Marking Scheme for Computer Science

(Sub Code: 083 Paper Code 91 Outside Delhi)

	<pre>del queue.Member[0] # queue.Member.delete()</pre> <p>( ½ mark for Addnew header) ( ½ mark for accepting a value from user) ( ½ mark for adding value in list) ( ½ mark for Remove header) ( ½ mark for checking empty list condition) ( ½ mark for displaying removed Member) ( ½ mark for displaying the value to be deleted) ( ½ mark for deleting value from list)</p> <p><b>NOTE:</b> Marks not to be deducted for methods written without using a class</p>																					
(d)	Write definition of a Method MSEARCH(STATES) to display all the state names from a list of STATES, which are starting with alphabet M. For example: If the list STATES contains [ "MP" , "UP" , "WB" , "TN" , "MH" , "MZ" , "DL" , "BH" , "RJ" , "HR" ] The following should get displayed MP MH MZ	2																				
Ans	<pre>def MSEARCH(STATES):     for i in STATES:         if i[0]=='M':             print i</pre> <p>( ½ mark method header) ( ½ mark for loop) ( ½ mark for checking condition of first letter M) ( ½ mark for displaying value)</p>																					
(e)	Evaluate the following Postfix notation of expression: 4,2,*,22,5,6,+/, -	2																				
Ans	<table border="1"><thead><tr><th>Element</th><th>Stack Contents</th></tr></thead><tbody><tr><td>4</td><td>4</td></tr><tr><td>2</td><td>4, 2</td></tr><tr><td>*</td><td>8</td></tr><tr><td>22</td><td>8,22</td></tr><tr><td>5</td><td>8, 22, 5</td></tr><tr><td>6</td><td>8, 22, 5, 6</td></tr><tr><td>+</td><td>8, 22, 11</td></tr><tr><td>/</td><td>8, 2</td></tr><tr><td>-</td><td>6</td></tr></tbody></table> <p>Answer: 6</p> <p>(½ Mark for evaluation till each operator) OR (1 Mark for only writing the Final answer without showing stack status)</p>	Element	Stack Contents	4	4	2	4, 2	*	8	22	8,22	5	8, 22, 5	6	8, 22, 5, 6	+	8, 22, 11	/	8, 2	-	6	
Element	Stack Contents																					
4	4																					
2	4, 2																					
*	8																					
22	8,22																					
5	8, 22, 5																					
6	8, 22, 5, 6																					
+	8, 22, 11																					
/	8, 2																					
-	6																					

# CBSE AISSCE 2016-2017 Marking Scheme for Computer Science

(Sub Code: 083 Paper Code 91 Outside Delhi)

4	(a)	Differentiate between file modes <b>r+</b> and <b>rb+</b> with respect to Python.	1
	Ans	<p><b>r+</b> Opens a file for both reading and writing. The file pointer placed at the beginning of the file.</p> <p><b>rb+</b> Opens a file for both reading and writing in binary format. The file pointer placed at the beginning of the file.</p> <p><i>(1 mark for correct difference )</i>  <b>OR</b>  <i>(½ Mark for each correct use of r+ and rb+)</i></p>	
	(b)	Write a method in python to read lines from a text file MYNOTES.TXT, and display those lines, which are starting with an alphabet 'K'.	2
	Ans	<pre>def display():     file=open('MYNOTES.TXT','r')     line=file.readline()     while line:         if line[0]=='K' :             print line             line=file.readline()     file.close()    #IGNORE</pre> <p><i>(½ Mark for opening the file)</i>  <i>(½ Mark for reading all lines)</i>  <i>(½ Mark for checking condition for line starting with K)</i>  <i>(½ Mark for displaying line)</i></p>	
	(c)	<p>Considering the following definition of class FACTORY, write a method in Python to search and display the content in a pickled file FACTORY.DAT, where FCTID is matching with the value '105'.</p> <pre>class Factory:     def __init__(self,FID,FNAM):         self.FCTID = FID      # FCTID   Factory ID         self.FCTNM = FNAM     # FCTNM   Factory Name         self.PROD  = 1000     # PROD    Production     def Display(self):         print self.FCTID,":",self.FCTNM,":",self.PROD</pre>	3
	Ans	<pre>import pickle def ques4c():     f=Factory()     file=open('FACTORY.DAT','rb')     try:         while True:             f=pickle.load(file)             if f.FCTID==105:                 f.Display()     except EOF Error:         pass     file.close()    #IGNORE</pre> <p><i>(½ Mark for correct method header)</i>  <i>(½ Mark for opening the file FACTORY.DAT correctly)</i></p>	

# CBSE AISSCE 2016-2017 Marking Scheme for Computer Science

(Sub Code: 083 Paper Code 91 Outside Delhi)

		<div>(½ Mark for correct loop) (½ Mark for correct load( )) (½ Mark for correct checking of FCTID) (½ Mark for displaying the record)</div>																																			
SECTION C - (For all the candidates)																																					
5	(a)	<div>Observe the following table MEMBER 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 RESULT. Also, find the Degree and Cardinality of the RESULT.</div> <div>MEMBER</div> <table><tr><td>NO</td><td>MNAME</td><td>STREAM</td></tr><tr><td>M001</td><td>JAYA</td><td>SCIENCE</td></tr><tr><td>M002</td><td>ADIYTA</td><td>HUMANITIES</td></tr><tr><td>M003</td><td>HANSRAJ</td><td>SCIENCE</td></tr><tr><td>M004</td><td>SHIVAK</td><td>COMMERCE</td></tr></table> <div>RESULT</div> <table><tr><td>NO</td><td>MNAME</td><td>STREAM</td></tr><tr><td>M002</td><td>ADITYA</td><td>HUMANITIES</td></tr></table>	NO	MNAME	STREAM	M001	JAYA	SCIENCE	M002	ADIYTA	HUMANITIES	M003	HANSRAJ	SCIENCE	M004	SHIVAK	COMMERCE	NO	MNAME	STREAM	M002	ADITYA	HUMANITIES	2													
NO	MNAME	STREAM																																			
M001	JAYA	SCIENCE																																			
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M003	HANSRAJ	SCIENCE																																			
M004	SHIVAK	COMMERCE																																			
NO	MNAME	STREAM																																			
M002	ADITYA	HUMANITIES																																			
	Ans	<div>(i) SELECTION</div> <div>Degree=3 Cardinality=1</div>																																			
		<div>(1 Mark for writing the correct name of RDBMS operation) (½ Mark for writing correct degree) (½ Mark for writing correct cardinality)</div>																																			
	(b)	<div>Write SQL queries for (i) to (iv) and find outputs for SQL queries (v) to (viii), which are based on the tables</div> <div>DVD</div> <table><tr><td>DCODE</td><td>DTITLE</td><td>DTYPE</td></tr><tr><td>F101</td><td>Henry Martin</td><td>Folk</td></tr><tr><td>C102</td><td>Dhrupad</td><td>Classical</td></tr><tr><td>C101</td><td>The Planets</td><td>Classical</td></tr><tr><td>F102</td><td>Universal Soldier</td><td>Folk</td></tr><tr><td>R102</td><td>A day in life</td><td>Rock</td></tr></table> <div>MEMBER</div> <table><tr><td>MID</td><td>NAME</td><td>DCODE</td><td>ISSUEDATE</td></tr><tr><td>101</td><td>AGAM SINGH</td><td>R102</td><td>2017-11-30</td></tr><tr><td>103</td><td>ARTH JOSEPH</td><td>F102</td><td>2016-12-13</td></tr><tr><td>102</td><td>NISHA HANS</td><td>C101</td><td>2017-07-24</td></tr></table>	DCODE	DTITLE	DTYPE	F101	Henry Martin	Folk	C102	Dhrupad	Classical	C101	The Planets	Classical	F102	Universal Soldier	Folk	R102	A day in life	Rock	MID	NAME	DCODE	ISSUEDATE	101	AGAM SINGH	R102	2017-11-30	103	ARTH JOSEPH	F102	2016-12-13	102	NISHA HANS	C101	2017-07-24	6
DCODE	DTITLE	DTYPE																																			
F101	Henry Martin	Folk																																			
C102	Dhrupad	Classical																																			
C101	The Planets	Classical																																			
F102	Universal Soldier	Folk																																			
R102	A day in life	Rock																																			
MID	NAME	DCODE	ISSUEDATE																																		
101	AGAM SINGH	R102	2017-11-30																																		
103	ARTH JOSEPH	F102	2016-12-13																																		
102	NISHA HANS	C101	2017-07-24																																		
	(i)	To display all details from the table MEMBER in descending order of ISSUEDATE.																																			

# CBSE AISSCE 2016-2017 Marking Scheme for Computer Science

(Sub Code: 083 Paper Code 91 Outside Delhi)

	Ans	SELECT * FROM MEMBER ORDER BY ISSUEDATE DESC;													
		(½ Mark for correct SELECT statement) (½ Mark for correct ORDER BY clause)													
	(ii)	To display the DCODE and DTITLE of all Folk Type DVDs from the table DVD													
	Ans	SELECT DCODE,DTITLE FROM DVD WHERE DTYPE='Folk' ;													
		(½ Mark for correct SELECT statement) (½ Mark for correct WHERE clause)													
	(iii)	To display the DTYPE and number of DVDs in each DTYPE from the table DVD													
	Ans	SELECT COUNT(*) ,DTYPE FROM DVD GROUP BY DTYPE;													
		(½ Mark for correct SELECT statement) (½ Mark for correct GROUP BY clause)													
	(iv)	To display all NAME and ISSUEDATE of those members from the table MEMBER who have DVDs issued (i.e ISSUEDATE) in the year 2017													
	Ans	SELECT NAME, ISSUEDATE FROM MEMBER WHERE ISSUEDATE>='2017-01-01' AND ISSUEDATE<='2017-12-31' ; OR SELECT NAME, ISSUEDATE FROM MEMBER WHERE ISSUEDATE BETWEEN '2017-01-01' AND '2017-12-31' ; OR SELECT NAME, ISSUEDATE FROM MEMBER WHERE ISSUEDATE LIKE '2017%' ;													
		(½ Mark for correct SELECT statement) (½ Mark for correct WHERE clause)													
	(v)	SELECT MIN(ISSUEDATE) FROM MEMBER;													
	Ans	<u>MIN(ISSUEDATE)</u> 2016-12-13													
		(½ Mark for correct output)													
	(vi)	SELECT DISTINCT DTYPE FROM DVD;													
	Ans	<u>DISTINCT DTYPE</u> Folk Classical Rock													
		(½ Mark for correct output) NOTE: Values may be written in any order													
	(vii)	SELECT D.DCODE ,NAME,DTITLE FROM DVD D, MEMBER M WHERE D.DCODE=M.DCODE ;													
	Ans	<table><tr><td><u>DCODE</u></td><td><u>NAME</u></td><td><u>DTITLE</u></td></tr><tr><td>R102</td><td>AGAM SINGH</td><td>A day in life</td></tr><tr><td>F102</td><td>ARTH JOSEPH</td><td>Universal Soldier</td></tr><tr><td>C101</td><td>NISHA HANS</td><td>The Planets</td></tr></table>	<u>DCODE</u>	<u>NAME</u>	<u>DTITLE</u>	R102	AGAM SINGH	A day in life	F102	ARTH JOSEPH	Universal Soldier	C101	NISHA HANS	The Planets	
<u>DCODE</u>	<u>NAME</u>	<u>DTITLE</u>													
R102	AGAM SINGH	A day in life													
F102	ARTH JOSEPH	Universal Soldier													
C101	NISHA HANS	The Planets													
		(½ Mark for correct output)													

# CBSE AISSCE 2016-2017 Marking Scheme for Computer Science

(Sub Code: 083 Paper Code 91 Outside Delhi)

	(viii)	SELECT DTITLE FROM DVD WHERE DTYPE NOT IN ("Folk", "Classical");																																																																							
	Ans	<u>DTITLE</u> A day in life																																																																							
		(½ Mark for correct output)  NOTE: No marks to be awarded for any other output																																																																							
6	a.	State DeMorgan’s Laws of Boolean Algebra and verify them using truth table.	2																																																																						
	Ans	(i) (A.B)'=A'+B' (ii) (A+B)'=A'.B'  Truth Table Verification: (i) <table><tr><td>A</td><td>B</td><td>A.B</td><td>(A.B)'</td><td>A'</td><td>B'</td><td>A'+B'</td></tr><tr><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td>1</td><td>1</td></tr><tr><td>0</td><td>1</td><td>0</td><td>1</td><td>1</td><td>0</td><td>1</td></tr><tr><td>1</td><td>0</td><td>0</td><td>1</td><td>0</td><td>1</td><td>1</td></tr><tr><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td></tr></table> <div><div></div><div></div></div> (ii) <table><tr><td>A</td><td>B</td><td>A+B</td><td>(A+B)'</td><td>A'</td><td>B'</td><td>A'.B'</td></tr><tr><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td>1</td><td>1</td></tr><tr><td>0</td><td>1</td><td>1</td><td>0</td><td>1</td><td>0</td><td>0</td></tr><tr><td>1</td><td>0</td><td>1</td><td>0</td><td>0</td><td>1</td><td>0</td></tr><tr><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td></tr></table> <div><div></div><div></div></div>	A	B	A.B	(A.B)'	A'	B'	A'+B'	0	0	0	1	1	1	1	0	1	0	1	1	0	1	1	0	0	1	0	1	1	1	1	1	0	0	0	0	A	B	A+B	(A+B)'	A'	B'	A'.B'	0	0	0	1	1	1	1	0	1	1	0	1	0	0	1	0	1	0	0	1	0	1	1	1	0	0	0	0	
A	B	A.B	(A.B)'	A'	B'	A'+B'																																																																			
0	0	0	1	1	1	1																																																																			
0	1	0	1	1	0	1																																																																			
1	0	0	1	0	1	1																																																																			
1	1	1	0	0	0	0																																																																			
A	B	A+B	(A+B)'	A'	B'	A'.B'																																																																			
0	0	0	1	1	1	1																																																																			
0	1	1	0	1	0	0																																																																			
1	0	1	0	0	1	0																																																																			
1	1	1	0	0	0	0																																																																			
		(1 Mark for stating any one De Morgan’s Theorems correctly) (1 Mark for correctly verifying any one De Morgan’s Theorems using Truth Table)																																																																							
	b.	Draw the Logic Circuit of the following Boolean Expression using only NOR Gates: (A+B) . (C+D)	2																																																																						
	Ans																																																																								
		(Full 2 Marks for drawing the Logic Circuit for the expression correctly) OR																																																																							



# CBSE AISSEE 2016-2017 Marking Scheme for Computer Science

(Sub Code: 083 Paper Code 91 Outside Delhi)

		<p>(½ Mark for drawing Logic circuit for (A NOR B) correctly) (½ Mark for drawing Logic circuit for (C NOR D) correctly)</p>																																					
c.	Derive a Canonical POS expression for a Boolean function G, represented by the following truth table:	<table><tr><th>X</th><th>Y</th><th>Z</th><th>G (X, Y, Z)</th></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>0</td><td>0</td><td>1</td><td>0</td></tr><tr><td>0</td><td>1</td><td>0</td><td>1</td></tr><tr><td>0</td><td>1</td><td>1</td><td>0</td></tr><tr><td>1</td><td>0</td><td>0</td><td>1</td></tr><tr><td>1</td><td>0</td><td>1</td><td>1</td></tr><tr><td>1</td><td>1</td><td>0</td><td>0</td></tr><tr><td>1</td><td>1</td><td>1</td><td>1</td></tr></table>	X	Y	Z	G (X, Y, Z)	0	0	0	0	0	0	1	0	0	1	0	1	0	1	1	0	1	0	0	1	1	0	1	1	1	1	0	0	1	1	1	1	1
X	Y	Z	G (X, Y, Z)																																				
0	0	0	0																																				
0	0	1	0																																				
0	1	0	1																																				
0	1	1	0																																				
1	0	0	1																																				
1	0	1	1																																				
1	1	0	0																																				
1	1	1	1																																				
Ans	<p><math>G(X, Y, Z) = (X+Y+Z) \cdot (X+Y+Z') \cdot (X+Y'+Z') \cdot (X'+Y'+Z)</math> OR <math>G(X, Y, Z) = \prod (0, 1, 3, 6)</math></p>																																						
	<p>(1 Mark for correctly writing the POS form) OR (½ Mark for any two correct terms) Note: Deduct ½ mark if wrong variable names are written in the expression</p>																																						
d.	Reduce the following Boolean expression to its simplest form using K-Map: $E(U, V, Z, W) = \Sigma (2, 3, 6, 8, 9, 10, 11, 12, 13)$		3																																				
Ans	<table><tr><th></th><th>U' V'</th><th>U' V</th><th>UV</th><th>UV'</th></tr><tr><th>Z' W'</th><td></td><td></td><td>1</td><td>1</td></tr><tr><th>Z' W</th><td></td><td></td><td>1</td><td>1</td></tr><tr><th>Z W</th><td>1</td><td></td><td></td><td>1</td></tr><tr><th>Z W'</th><td>1</td><td>1</td><td></td><td>1</td></tr></table> <p>OR</p>		U' V'	U' V	UV	UV'	Z' W'			1	1	Z' W			1	1	Z W	1			1	Z W'	1	1		1													
	U' V'	U' V	UV	UV'																																			
Z' W'			1	1																																			
Z' W			1	1																																			
Z W	1			1																																			
Z W'	1	1		1																																			

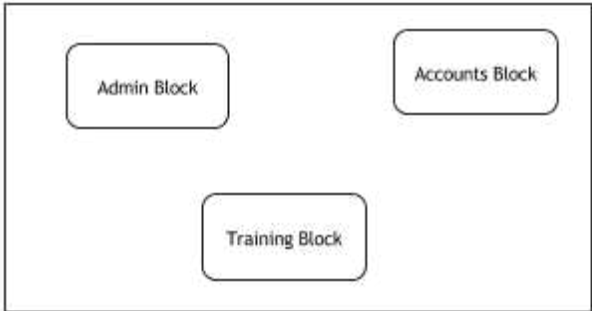
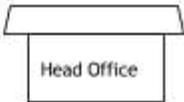
# CBSE AISSCE 2016-2017 Marking Scheme for Computer Science

(Sub Code: 083 Paper Code 91 Outside Delhi)

		<table><tr><td></td><td><math>Z'W'</math></td><td><math>Z'W</math></td><td><math>ZW</math></td><td><math>ZW'</math></td></tr><tr><td><math>U'V'</math></td><td></td><td></td><td>1</td><td>1</td></tr><tr><td><math>U'V</math></td><td></td><td></td><td></td><td>1</td></tr><tr><td><math>UV</math></td><td>1</td><td>1</td><td></td><td></td></tr><tr><td><math>UV'</math></td><td>1</td><td>1</td><td>1</td><td>1</td></tr></table> <p><math>E(U,V,Z,W)=UZ'+V'Z+U'ZW'</math></p>		$Z'W'$	$Z'W$	$ZW$	$ZW'$	$U'V'$			1	1	$U'V$				1	$UV$	1	1			$UV'$	1	1	1	1	
	$Z'W'$	$Z'W$	$ZW$	$ZW'$																								
$U'V'$			1	1																								
$U'V$				1																								
$UV$	1	1																										
$UV'$	1	1	1	1																								
		<p>(<math>\frac{1}{2}</math> Mark for drawing K-Map with correct variable names) (<math>\frac{1}{2}</math> Mark for correctly plotting 1s in the given cells) ( <math>\frac{1}{2}</math> Mark each for 3 groupings) ( <math>\frac{1}{2}</math> Mark for writing final expression in reduced/minimal form)</p> <p><b>NOTE</b></p> <ul style="list-style-type: none"><li>• Deduct <math>\frac{1}{2}</math> mark if wrong variable names are used</li><li>• Deduct <math>\frac{1}{2}</math> mark for any redundant group appearing in final expression</li></ul>																										
7	(a)	Differentiate between communication using Optical Fiber and Ethernet Cable in context of wired medium of communication technologies.	2																									
	Ans	<p><b>Optical Fibre</b></p> <ul style="list-style-type: none"><li>• Very Fast</li><li>• Expensive</li><li>• Immune to electromagnetic interference</li></ul> <p><b>Ethernet Cable -</b></p> <ul style="list-style-type: none"><li>• Slower as compared to Optical Fiber</li><li>• Less Expensive as compared to Optical Fiber</li><li>• prone to electromagnetic interference</li></ul>																										
		<p><b>Full 2 marks for any one correct difference between Optical Fibre and Ethernet Cable</b></p> <p><b>OR</b></p> <p><b>1 Mark for writing correct features of any one wired medium out of Optical Fibre or Ethernet Cable</b></p>																										
	(b)	<p>Janish Khanna used a pen drive to copy files from his friend’s laptop to his office computer. Soon his office computer started abnormal functioning. Sometimes it would restart by itself and sometimes it would stop different applications running on it. Which of the following options out of (i) to (iv), would have caused the malfunctioning of the computer? Justify the reason for your chosen option:</p> <p>(i) Computer Virus (ii) Spam Mail (iii) Computer Bacteria (iv) Trojan Horse</p>	2																									
	Ans	<p><b>(i) Computer Virus</b></p> <p><b>OR</b></p>																										

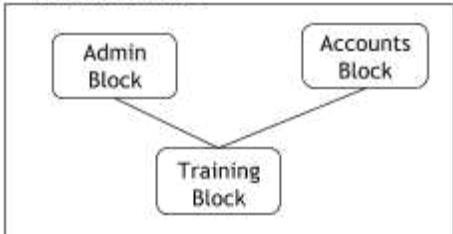
# CBSE AISSEE 2016-2017 Marking Scheme for Computer Science

(Sub Code: 083 Paper Code 91 Outside Delhi)

		<p>(iv) Trojan Horse</p> <p><b>Justification:</b></p> <ul style="list-style-type: none"> <li>• Pen drive containing Computer Virus / Trojan Horse was used before the abnormal functioning started, which might have corrupted the system files.</li> <li>• Computer Virus/ Trojan Horse affects the system files and start abnormal functioning in the computer</li> </ul>	
		<p><b>(1 Mark for writing any of the options (i) OR (iv))</b>  <b>(1 Mark for writing any one correct justification)</b></p>	
	(c)	<p>Ms. Raveena Sen is an IT expert and a freelancer. She recently used her skills to access the Admin password for the network server of Super Dooper Technology Ltd. and provided confidential data of the organization to its CEO, informing him about the vulnerability of their network security. Out of the following options (i) to (iv), which one most appropriately defines Ms.Sen?</p> <p>Justify the reason for your chosen option:</p> <p>(i) Hacker  (ii) Cracker  (iii) Operator  (iv) Network Admin</p>	2
	Ans	<p><b>(i) Hacker</b></p> <p><b>A Hacker is a person who breaks into the network of an organization without any malicious intent.</b></p>	
		<p><b>(1 Mark for writing correct option)</b>  <b>(1 Mark for writing correct justification)</b></p>	
	(d)	<p>Hi Standard Tech Training Ltd is a Mumbai based organization which is expanding its office set-up to Chennai. At Chennai office compound, they are planning to have 3 different blocks for Admin, Training and Accounts related activities. Each block has a number of computers, which are required to be connected in a network for communication, data and resource sharing.</p> <p>As a network consultant, you have to suggest the best network related solutions for them for issues/problems raised by them in (i) to (iv), as per the distances between various blocks/locations and other given parameters.</p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p><b>CHENNAI Office</b></p>  </div> <div style="text-align: center;"> <p><b>MUMBAI</b></p>  </div> </div>	

# CBSE AISSCE 2016-2017 Marking Scheme for Computer Science

(Sub Code: 083 Paper Code 91 Outside Delhi)

	<p>Shortest distances between various blocks/locations:</p> <table><tr><td>Admin Block to Account Block</td><td>300 Metres</td></tr><tr><td>Accounts Block to Training Block</td><td>150 Metres</td></tr><tr><td>Admin Block to Training Block</td><td>200 Metres</td></tr><tr><td>MUMBAI Head Office to CHENNAI Office</td><td>1300 KM</td></tr></table> <p>Number of computers installed at various blocks are as follows:</p> <table><tr><td>Training Block</td><td>150</td></tr><tr><td>Accounts Block</td><td>30</td></tr><tr><td>Admin Block</td><td>40</td></tr></table>	Admin Block to Account Block	300 Metres	Accounts Block to Training Block	150 Metres	Admin Block to Training Block	200 Metres	MUMBAI Head Office to CHENNAI Office	1300 KM	Training Block	150	Accounts Block	30	Admin Block	40	
Admin Block to Account Block	300 Metres															
Accounts Block to Training Block	150 Metres															
Admin Block to Training Block	200 Metres															
MUMBAI Head Office to CHENNAI Office	1300 KM															
Training Block	150															
Accounts Block	30															
Admin Block	40															
(i)	Suggest the most appropriate block/location to house the SERVER in the CHENNAI Office (out of the 3 blocks) to get the best and effective connectivity. Justify your answer.	1														
Ans	Training Block - Because it has maximum number of computers.															
	<p><i>(½ Mark for correct Block/location)</i> <i>(½ Mark for valid justification)</i></p>															
(ii)	Suggest the best wired medium and draw the cable layout (Block to Block) to efficiently connect various blocks within the CHENNAI office compound.	1														
Ans	<p><b>Best wired medium: Optical Fibre OR CAT5 OR CAT6 OR CAT7 OR CAT8 OR Ethernet Cable</b></p> <div><p>CHENNAI Office</p><pre>graph TD; AdminBlock[Admin Block] --- TrainingBlock[Training Block]; AccountsBlock[Accounts Block] --- TrainingBlock;</pre></div>															
	<p><i>(½ Mark for writing best wired medium)</i> <i>(½ Mark for drawing the layout correctly)</i></p>															
(iii)	Suggest a device/software and its placement that would provide data security for the entire network of the CHENNAI office.	1														
Ans	Firewall - Placed with the server at the Training Block OR Any other valid device/software name															
	<p><i>(½ Mark for writing device/software name correctly)</i> <i>(½ Mark for writing correct placement)</i></p>															
(iv)	Suggest a device and the protocol that shall be needed to provide wireless Internet access to all smartphone/laptop users in the CHENNAI office	1														
Ans	Device Name: WiFi Router OR WiMax OR RF Router OR Wireless Modem OR RF Transmitter  Protocol : WAP OR 802.16 OR TCP/IP OR VOIP OR MACP OR 802.11															
	<p><i>(Full 1 Mark for either writing correct writing device name OR writing correct protocol )</i></p>															