

**Strictly Confidential: (For Internal and Restricted use only)**  
**Senior School Certificate Examination**  
**September 2021**  
**Marking Scheme - Computer Science (OLD) (SUBJECT CODE: 283)**  
**(SET: 4 | SERIES: 3HKP35/C | CODE NO -491 )**

**General Instructions:**

1. You are aware that evaluation is the most important process in the actual and correct assessment of the candidates. A small mistake in evaluation may lead to serious problems which may affect the future of the candidates, education system and the teaching profession. To avoid mistakes, it is requested that before starting evaluation, you must read and understand the spot evaluation guidelines carefully. **Evaluation is a 10 -12 days mission for all of us. Hence, it is necessary that you put in your best efforts in this process.**
2. Evaluation is to be done as per instructions provided in the Marking Scheme. It should not be done according to one's own interpretation or any other consideration. Marking Scheme should be strictly adhered to and religiously followed. **However, while evaluating answers which are based on the latest information or knowledge and/or are innovative, they may be assessed for their correctness otherwise and marks be awarded to them.**
3. The Head-Examiner must go through the first five answer books evaluated by each evaluator on the first day, to ensure that evaluation has been carried out as per the instructions given in the Marking Scheme. The remaining answer books meant for evaluation shall be given only after ensuring that there is no significant variation in the marking of individual evaluators.
4. If a question has parts, please award marks on the right-hand side for each part. Marks awarded for different parts of the question should then be totaled up and written in the left-hand margin and encircled.
5. If a question does not have any parts, marks must be awarded in the left hand margin and encircled.
6. If a student has attempted an extra question, the answer of the question deserving more marks should be retained and the other answer scored out.
7. No marks to be deducted for the cumulative effect of an error. It should be penalized only once.
8. A full scale of marks 70 (example: 1-70) has to be used. Please do not hesitate to award full marks if the answer deserves it.
9. Every examiner has to necessarily do evaluation work for full working hours i.e. 8 hours every day and evaluate 25 answer books per day.
10. Ensure that you do not make the following common types of errors committed by the Examiner in the past:-
  - a. Leaving the answer or part thereof unassessed in an answer book.
  - b. Giving more marks for an answer than assigned to it.
  - c. Wrong transfer of marks from the inside pages of the answer book to the title page.
  - d. Wrong question wise totaling on the title page.
  - e. Wrong totaling of marks of the two columns on the title page.
  - f. Wrong grand total.
  - g. Marks in words and figures not tallying.
  - h. Wrong transfer of marks from the answer book to online award list.
  - i. Answers marked as correct, but marks not awarded. (Ensure that the right tick mark is correctly and clearly indicated. It should merely be a line. Same is with the X for incorrect answers.)
  - j. Half or a part of the answer marked correct and the rest as wrong, but no marks awarded.
11. While evaluating the answer books, if the answer is found to be totally incorrect, it should be marked as (X) and awarded zero (0) Marks.
12. Any unassessed portion, non-carrying over of marks to the title page, or totaling error detected by the candidate shall damage the prestige of all the personnel engaged in the evaluation work as also of the Board. Hence, in order to uphold the prestige of all concerned, it is again reiterated that the instructions be followed meticulously and judiciously.
13. The Examiners should acquaint themselves with the guidelines given in the Guidelines for spot Evaluation before starting the actual evaluation.
14. Every Examiner shall also ensure that all the answers are evaluated, marks carried over to the title page, correctly totaled and written in figures and words.

15. The Board permits candidates to obtain a photocopy of the Answer Book on request in an RTI application and also separately as a part of the re-evaluation process on payment of the processing charges.

**Specific Instructions:**

- 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, the 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++)**

Q. No	Part	Question Description	Marks
1	(a)	Write the type of C++ Operators (Arithmetic, Relational or Logical Operators) from the following : (i)    (ii) <= (iii) % (iv) *	2
	Ans	(i)    - Logical (ii) <= - Relational (iii) % - Arithmetic (iv) * - Arithmetic	
		<i>(½ mark for each correct answer)</i>	
	(b)	Write the names of the correct header files, which must be included in the following C++ code to compile the code successfully :  <pre>void main() {     char STR[]="india2020";     STR[0]=toupper(STR[0]);     puts(STR); }</pre>	1
	Ans	stdio.h ctype.h	
		<i>(½ mark for each of the two correct header files)</i>	
	(c)	Rewrite the following C++ program after removing any/all syntactical errors with each correction underlined :  Note : Assume all required header files are already included in the program.	2

		<pre> Typedef float REAL; void main() {     REAL Pie=3.1416,R,AREA;     cin&lt;&lt;R;     AREA=Pie*R*R;     cout&gt;&gt;'Area: '&gt;&gt;AREA&gt;&gt;endl; } </pre>	
	Ans	<pre> typedef float REAL;          //Error1 void main() {     REAL Pie=3.1416,R,AREA;     cin&gt;&gt;R;                  //Error2     AREA=Pie*R*R;     cout&lt;&lt;"Area: "&lt;&lt;AREA&lt;&lt;endl;  //Error3 and Error4 } </pre>	
		<p><i>(½ mark for each of the 4 corrections)</i>  <i>(Deduct ½ mark if the corrections are done correctly but not underlined)</i></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> void Manip(char S[]) {     for(int I=0;S[I]!='\0'; I++)         if (I%2 == 0)             if (S[I]&gt;='A' &amp;&amp; S[I]&lt;='M')                 S[I]=tolower(S[I]);             else                 S[I]='#';         else             if (S[I]&gt;='N' &amp;&amp; S[I]&lt;='Z')                 S[I]='*';             else                 S[I]=S[I]+1; } void main() {     char TXT[]="CaNW2GeT";     Manip(TXT);     cout&lt;&lt;TXT&lt;&lt;endl; } </pre>	2
	Ans	cb##H#*	
		<p><i>(½ mark for writing first 2 characters of the output as cb correctly)</i>  <i>(½ mark for writing next 2 characters of the output as #* correctly)</i>  <i>(½ mark for writing next 2 characters of the output as #H correctly)</i>  <i>(½ mark for writing last 2 characters of the output as #* correctly)</i></p>	
	(e)	Find and write the output of the following C++ program code :	3

		<p>Note : Assume all required header files are already included in the program.</p> <pre>void Exchange (int &amp;A, int B=2) {     A+=B;     B=A-B;     cout&lt;&lt;2*A&lt;&lt;"@"&lt;&lt;4*B&lt;&lt;endl; } void main() {     int P=100, Q=50;     Exchange(Q);     Exchange(P,Q);     Exchange(P); }</pre>					
	Ans	104@200 304@400 308@608					
		<p><i>(½ mark for each of the six correct output values)</i> <i>(Deduct only ½ mark if the output values are correctly written without '@' and line break)</i></p>					
	(f)	<p>Look at the following C++ code and find which output(s) from the options (i) to (iv) is/are not possible. Also, write the minimum and maximum values that can possibly be assigned to the variable Val.</p> <p>Note : Assume all the required header files are already being included in the code. The function random(N) generates any possible integer between 0 and N-1 (both values included).</p> <pre>void main() {     randomize();     int A[4],Val;     for(int I=3; I&gt;=0; I--)     {         Val = random(2+I) + 11;         A[I]=Val;     }     for (I=0;I&lt;4;I++)         cout&lt;&lt;A[I]&lt;&lt;"@"; }</pre> <table><tr><td>(i) 12@11@11@14@</td><td>(ii) 10@13@14@13@</td></tr><tr><td>(iii) 12@11@13@14@</td><td>(iv) 11@13@12@13@</td></tr></table>	(i) 12@11@11@14@	(ii) 10@13@14@13@	(iii) 12@11@13@14@	(iv) 11@13@12@13@	2
(i) 12@11@11@14@	(ii) 10@13@14@13@						
(iii) 12@11@13@14@	(iv) 11@13@12@13@						
	Ans	(ii) 10@13@14@13@					

		Maximum possible value for Val = 15 Minimum possible value for Val = 11	
		<b>(1 mark for writing the correct option)</b> <b>(½ mark each for the maximum and minimum value of Val)</b>	
2.	(a)	<p>Given the following class Packer and assuming all necessary header file(s) included, answer the questions that follow the code:</p> <pre> class Packer {     int PID; float WT; public:     Packer(int ID)           //Function 1     {         PID = ID;     }     Packer()                 //Function 2     {         PID = 1001;         WT = 100;     }     Packer(Packer &amp;P)        //Function 3     {         PID = P.PID + 1;         WT = P.WT + 10;     }     Packer(float W)          //Function 4     {         WT = W;     }     Packer(int ID, float W) //Function 5     {         PID = ID;         WT = W;     } };  void main() {     Packer P1;           //Statement I     Packer P2(70);       //Statement II     _____;         //Statement III }</pre>	
	(i)	Which function out of 1, 2, 3, 4 and 5 is a Copy Constructor and which one is a default constructor in the definition of class Packer ?	1
	Ans	Function 3 - Copy Constructor Function 2 - Default Constructor	
		<b>(½ mark each for identifying Copy and Default constructors correctly)</b>	
	(ii)	Write the Statement III, to declare an object P3 of class Packer with two parameters 75 and 32.5.	1

	Ans	Packer P3(75,32.5) OR Packer P3=Packer(75,32.5)	
		(1 mark for writing the correct declaration of the object)	
	(b)	<p>Observe the following C++ code and answer the questions (i) and (ii).</p> <p>Note : Assume all necessary files are included.</p> <pre> class Store {     int SID; public:     Store(int ID=10) //Function 1     {         SID=ID;         cout&lt;&lt;"Store"&lt;&lt;SID&lt;&lt;"Opened"&lt;&lt;endl;     }     ~Store() //Function 2     {         cout&lt;&lt;"Store Closed"&lt;&lt;endl;     }     void Display() //Function 3     {         cout&lt;&lt;"Store "&lt;&lt;SID&lt;&lt;" is Active"&lt;&lt;endl;     } };  void main() {     Store S(25);     S.Display(); }</pre>	
	(i)	What is the output of the above code, on execution ?	1
	Ans	Store25Opened Store 25 is Active Store Closed	
		( 1 mark for writing complete output) OR ( ½ mark for writing any one line of correct output)	
	(ii)	For the class Store, what is Function 2 known as ? When does this function get executed ?	1
	Ans	Destructor Function 2 gets executed when the object goes out off scope.	
		(½ mark for correctly writing Destructor) (½ mark for writing the correct answer of the second part)	

		OR											
	(b)	Explain Copy Constructor in context of Object Oriented Programming. Also give a supporting example in C++.	2										
	Ans	A copy constructor is an overloaded constructor in which an object of the same class is passed as a reference parameter.  class Point { int x; public: point() {x=0;} point(Point &P) // Copy Constructor { x=P.x;} . . . };											
		( 1 mark for correctly defining copy constructor) ( 1 mark for example of copy constructor) OR ( 2 mark for correct explanation using an example of copy constructor)											
	(c)	Write the definition of a class ACCESSORY in C++ with the following description:  Private Members <ul style="list-style-type: none"><li>• ANO // integer</li><li>• TYPE // char array of size 20</li><li>• SECTION // char</li><li>• SECASSIGN() /* Member function to assign value of SECTION based upon TYPE as follows : */</li></ul> <table><tr><td>TYPE</td><td>SECTION</td></tr><tr><td>MOBILE</td><td>A</td></tr><tr><td>COMPUTER</td><td>B</td></tr><tr><td>CAMERA</td><td>C</td></tr><tr><td>FASHION</td><td>D</td></tr></table> Public Members GetOne() /* Function to allow user to enter values of ANO and TYPE then invoke SECASSIGN() to assign SECTION */  ShowOne() /* Function to display values of ANO, TYPE and SECTION */	TYPE	SECTION	MOBILE	A	COMPUTER	B	CAMERA	C	FASHION	D	4
TYPE	SECTION												
MOBILE	A												
COMPUTER	B												
CAMERA	C												
FASHION	D												

Ans	<pre> class ACCESSORY { int ANO;   char TYPE[20],SECTION;   void SECASSIGN()   {     if (strcmp(TYPE,"MOBILE")==0)       SECTION='A';     else if (strcmp(TYPE,"COMPUTER")==0)       SECTION='B';     else if (strcmp(TYPE,"CAMERA")==0)       SECTION='C';     else if (strcmp(TYPE,"FASHION")==0)       SECTION='D';   } public:   void GetOne()   { cin&gt;&gt;Ano;     gets(TYPE);     SECASSIGN();   }   void ShowOne()   {     cout&lt;&lt;Ano&lt;&lt;TYPE&lt;&lt;SECTION&lt;&lt;endl;   } }; </pre>	
	<p>( 1 mark for correctly defining class with data members)  ( 1 mark for correctly defining member function SECASSIGN())  ( 1 mark for correctly defining member function GetOne())  ( 1 mark for correctly defining member function ShowOne())</p>	
(d)	<p>Answer the questions (i) to (iv) based on the following :</p> <pre> class GM {   int MID; protected:   double Sal;   void Calc(); public:   void Enter();   void Display(); }; class DIRECTOR {   int DID; protected:   double Fees; public:   void Enter();   void Display(); }; </pre>	4



		<pre> class STORE: private DIRECTOR, public GM {     int STID; public:     void Enter(); void Display(); };  void main() {     STORE ST;     _____; //Statement } </pre>	
	(i)	Which type of Inheritance out of the following is illustrated in the above example ? Single Level Inheritance, Multilevel Inheritance, Multiple Inheritance	
	Ans	Multiple Inheritance	
		<i>( 1 mark for correct type name of the inheritance)</i>	
	(ii)	Write the names of all the data members, which are directly accessible by the member function Display() of class STORE.	
	Ans	Data members: STID, Fees, Sal	
		<i>( 1 mark for correctly mentioning all the data members)</i>  <i>Note: No partial marks for writing partial answer in this question</i>	
	(iii)	Write the names of all the member functions, which are directly accessible by the object ST of class STORE in main().	
	Ans	Member Functions: Enter() , Display()	
		<i>( 1 mark for correctly mentioning the names of member functions)</i>  <i>Note: No partial marks for writing partial answer in this question</i>	
	(iv)	Write the statement to call and execute Display() function of class GM by the object ST declared in the main() function.	
	Ans	ST.GM::Display()	
		<i>( 1 mark for correct function call with scope resolution operator)</i>	
		OR	

	<p>(d) Consider the following class Company :</p> <pre> class COMPANY {     int CCODE;     char DES[20]; protected:     char LOCATION[40]; public:     void Register() {cin&gt;&gt;CCODE;gets (DES) ;gets (LOCATION) ;}     void Show() {cout&lt;&lt;CCODE&lt;&lt;DES&lt;&lt;CITY&lt;&lt;endl;} }; </pre> <p>Write a code in C++ to privately derive another class TRADER from the base class COMPANY with the following members.</p> <p>Data Members (private)</p> <ul style="list-style-type: none"> <li>• STATE of type string</li> <li>• TARGET of type float</li> </ul> <p>Member Functions (public)</p> <ul style="list-style-type: none"> <li>• A constructor function to assigns 1000.</li> <li>• TraderReg() to allow user to enter STATE and TARGET, also call Register() of COMPANY.</li> <li>• ShowTrade() to display STATE and TARGET.</li> </ul>	4
	<p>Ans</p> <pre> class TRADER::private COMPANY {     char STATE[20];     float TARGET; public:     TRADER()     { strcpy (STATE, "SOMESTATE") ;       TARGET=1000;     }     void TraderReg()     { gets (STATE) ;       cin&gt;&gt;TARGET;       Register() ;     }     void ShowTrade()     { cout&lt;&lt;STATE&lt;&lt;TARGET&lt;&lt;endl;} }; </pre>	
	<p>( 1 mark for correct syntax to inherit privately)  ( ½ mark for correctly including data members in class definition)  ( ½ mark correctly defining constructor function)  ( 1 mark for correctly defining TraderReg())  ( 1 mark for correctly defining ShowTrade())</p>	

3	(a)	<p>Write the definition of a function SWAPPER(int M[], int N) in C++, which should SWAP alternate elements of the array M[] containing N number of integers, where N is an even integer. The function should also display the swapped content of the array.</p> <p>Example : If the array M contains</p> <table> <tr> <td>0</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> <td>7</td> </tr> <tr> <td>18</td> <td>13</td> <td>12</td> <td>17</td> <td>16</td> <td>21</td> <td>14</td> <td>15</td> </tr> </table> <p>Then the function should display the output as follows :</p> <p>13 18 17 12 21 16 15 14</p>	0	1	2	3	4	5	6	7	18	13	12	17	16	21	14	15	3
0	1	2	3	4	5	6	7												
18	13	12	17	16	21	14	15												
	Ans	<pre>void SWAPPER (int M[], int N) { int T;   for(i=0;i&lt;N;i+=2)   {   T=M[i];       M[i]=M[i+1];       M[i+1]=T;   }   for(i=0;i&lt;N;i++)       cout&lt;&lt;M[i]&lt;&lt;endl; }</pre> <p>OR</p> <p>Any valid code which serves the purpose</p>																	
		<p><i>(1 mark for the correct uses of the first loop)</i></p> <p><i>(1 mark for swapping the adjacent elements of the array M)</i></p> <p><i>(1 mark for displaying the swapped array)</i></p>																	
		OR																	
		<p>Write the definition of a function FourQtr(int A[], int N) in C++, which should display the sum of four quarters of the array A[] containing N number of integers, where N is an even integer.</p> <p>Example : If the array A contains the following elements for N=8</p> <table> <tr> <td>0</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> <td>7</td> </tr> <tr> <td>70</td> <td>30</td> <td>20</td> <td>10</td> <td>60</td> <td>50</td> <td>5</td> <td>7</td> </tr> </table> <p>Then the function should display</p> <p>100 30 110 12</p>	0	1	2	3	4	5	6	7	70	30	20	10	60	50	5	7	3
0	1	2	3	4	5	6	7												
70	30	20	10	60	50	5	7												

Ans	<pre>void FourQtr(int A[], int N) {     int Jump=N/4,Q[4]={0,0,0,0};     for (int I=0;I&lt;N;I+=Jump)         for (int J=I;J&lt;I+Jump;J++)             Q[I/Jump]+=A[J];     for (I=0;I&lt;4;I++)         cout&lt;&lt;Q[I]&lt;&lt;endl; }  OR  void FourQtr(int A[], int N) {     int Q1=0,Q2=0,Q3=0,Q4=0;     int U1=N/4,U2=N/2,U3=3*N/4;     for(i=0;i&lt;U1;i++)         Q1+=A[i];     for(i=U1;i&lt;U2;i++)         Q2+=A[i];     for(i=U2;i&lt;U3;i++)         Q3+=A[i];     for(i=U3;i&lt;N;i++)         Q4+=A[i];     cout&lt;&lt;Q1&lt;&lt;endl&lt;&lt;Q2&lt;&lt;endl&lt;&lt;Q3&lt;&lt;endl&lt;&lt;Q4&lt;&lt;endl; }  OR  Any valid code which serves the purpose</pre>																																									
	<p><i>(1 mark for initialising four quarter correctly)</i> <i>(1 mark for calculating four quarter correctly)</i> <i>(1 mark for displaying four quarter correctly)</i></p>																																									
(b)	<p>Write the definition for a function TOPDIAG(int T[4][4]) in C++, which displays the portion content of the 2D array as displayed in the example below. For example :</p> <div><table><tr><th colspan="4">ARRAY T</th></tr><tr><td>12</td><td>14</td><td>16</td><td>18</td></tr><tr><td>10</td><td>11</td><td>13</td><td>15</td></tr><tr><td>22</td><td>24</td><td>26</td><td>28</td></tr><tr><td>20</td><td>21</td><td>23</td><td>25</td></tr></table><table><tr><th colspan="4">CONTENT TO BE DISPLAYED</th></tr><tr><td>12</td><td>14</td><td>16</td><td>18</td></tr><tr><td>10</td><td>11</td><td>13</td><td></td></tr><tr><td>22</td><td>24</td><td></td><td></td></tr><tr><td>20</td><td></td><td></td><td></td></tr></table></div>	ARRAY T				12	14	16	18	10	11	13	15	22	24	26	28	20	21	23	25	CONTENT TO BE DISPLAYED				12	14	16	18	10	11	13		22	24			20				2
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	<div>Ans</div> <pre>void TOPDIAG(int T[4][4]) {     for(int i=0;i&lt;4;i++)         for(int j=0;j&lt;4;j++)             if ((i+j)&lt;4)                 cout&lt;&lt;T[i][j]&lt;&lt;'\\t';             cout&lt;&lt;endl; }</pre> <div>OR</div> <div>Any valid code which serves the purpose</div>																								
	<div>(1 mark for uses of the correct loops)</div> <div>(½ mark for identifying the correct elements)</div>																								
	<div>OR</div>																								
	<div>(b)</div> <div>Write the definition for a function DiagSum(int P[4][4]) in C++, which finds and displays the sum of values on both the diagonal elements separately. For example :</div> <div><table><tr><th colspan="4">ARRAY P</th></tr><tr><td>20</td><td>15</td><td>25</td><td>50</td></tr><tr><td>35</td><td>30</td><td>40</td><td>15</td></tr><tr><td>55</td><td>50</td><td>60</td><td>45</td></tr><tr><td>70</td><td>75</td><td>85</td><td>80</td></tr></table><table><tr><th>OUTPUT</th></tr><tr><td>Sum of Diagonal 1 : 190</td></tr><tr><td>Sum of Diagonal 2 : 210</td></tr></table></div>	ARRAY P				20	15	25	50	35	30	40	15	55	50	60	45	70	75	85	80	OUTPUT	Sum of Diagonal 1 : 190	Sum of Diagonal 2 : 210	2
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	<div>Ans</div> <pre>void DiagSum(int P[4][4]) {     int D1=0,D2=0;     for(int I=0;I&lt;4;I++)     {         D1+=A[I][I];         D2+=A[3-I][I];     }     cout&lt;&lt;"Sum of Diagonal 1:"&lt;&lt;D1&lt;&lt;endl;     cout&lt;&lt;"Sum of Diagonal 2:"&lt;&lt;D2&lt;&lt;endl; }</pre> <div>OR</div> <div>Any valid code which serves the purpose</div>																								
	<div>(1 mark for uses of the correct loops)</div> <div>(½ mark for identifying the correct elements)</div>																								

	(c)	Let us assume S[15][25] 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 S[5][15], if the address of the element S[2][5] is 15000.	3
	Ans	$\text{LOC}(S[I][J]) = \text{Base}(S) + W * (\text{NR} * J + I)$ $\text{LOC}(S[2][5]) = \text{Base}(S) + W * (\text{NR} * J + I)$ $15000 = \text{Base}(S) + 4 * (15 * 5 + 2)$ $\text{Base}(S) = 15000 - 4 * 77$ $\text{Base}(S) = 15000 - 308$ $\text{Base}(S) = 14692$ $\text{LOC}(S[5][15]) = 14692 + 4 * (15 * 15 + 5)$ $= 14692 + 4 * (225 + 5)$ $= 14692 + 4 * 230$ $= 14692 + 920$ $= 15612$	
		<p><i>(1 Mark for using the correct formula/substitution of values in formula for column major)</i></p> <p><i>(1 Mark for using the given reference address to find Base(S))</i></p> <p><i>(1 Mark for final correct result)</i></p>	
		OR	
	(c)	If K[2...10][-2...20] is a two-dimensional array, which is stored in the memory along the row with a base address as 52000 and each of its element occupying 2 bytes, find the address of the element K[5][10].	3
	Ans	$\text{LOC}(K[I][J]) = \text{Base}(K) + W * (\text{NC} * (I - \text{LBR}) + (J - \text{LBJ}))$ $= 52000 + 2 * (23 * (5 - 2) + (10 + 2))$ $= 52000 + 2 * (23 * 3 + 12)$ $= 52000 + 2 * (69 + 12)$ $= 52000 + 2 * 81$ $= 52000 + 162$ $= 52162$	
		<p><i>(1 Mark for using the correct formula/substitution of values in formula for column major)</i></p> <p><i>(1 Mark for at least one line of intermediate calculation)</i></p> <p><i>(1 Mark for final correct result)</i></p>	
	(d)	<p>Write the definition of a function</p> <p><code>QInsert(float Q[], int &amp;R, int F),</code></p> <p>which inserts a value in a circular static queue Q[ ] (here, consider parameters R as rear end of the queue and F as front end of the Queue). Also, check for a condition if the queue is full or not before performing insertion, the function should display a message "Queue is FULL" when the Queue is full.</p>	4

Ans	<pre> void QInsert(float Q[], int &amp;R, int F) {     // Assuming global variable MAX is the size of Q[]     if ((R+1)%MAX == F)         cout&lt;&lt;"Queue is FULL\n";     else     {         R=(R+1)%MAX;         cout&lt;&lt;"Enter the new element: ";         cin&gt;&gt;Q[R];     } }  OR  void QInsert(float Q[], int &amp;R, int F) {     // Assuming global variable MAX is the size of Q[]     if ((F==0 &amp;&amp; R==MAX-1)    (F==R+1))         cout&lt;&lt;"Queue is FULL\n";     else     {         R=R+1;         if (R==MAX)             R=0;         cout&lt;&lt;"Enter the new element: ";         cin&gt;&gt;Q[R];     } } </pre>	
	<p><i>(1 mark for checking overflow)</i>  <i>(1 mark for displaying desired message in case of overflow)</i>  <i>(1 mark for updated the value of R)</i>  <i>(1 mark for assigning new element into the queue)</i></p>	
	OR	
(d)	<p>For the following structure of ITEM in C++</p> <pre> struct ITEM {     int ID;     char Qty;     ITEM *Next; }; </pre>	4

	<p>Given that the following declaration of class ITEMQUEUE in C++, which is representing a dynamic queue of ITEM (as per the structure ITEM declared above) :</p> <pre> class ITEMQUEUE {     ITEM *R, *F; //Pointers with addresses of Rear and Front public:     ITEMQUEUE ()     {         R=NULL; F=NULL;     }     //A Function to insert an Item in the dynamic queue     void QINSERT();     //A Function to delete an Item from the dynamic queue     void QDELETE();     ~ITEMQUEUE(); }; </pre> <p>Write the definition for the member function void ITEMQUEUE::QINSERT(), that will insert an item into the dynamic queue of ITEMQUEUE (take necessary input from user).</p>	
Ans	<pre> void ITEMQUEUE::QINSERT() {     ITEM *Temp = new ITEM;     cout&lt;&lt;"Enter ID : ";     cin&gt;&gt;Temp-&gt;ID;     cout&lt;&lt;"Enter Qty: ";     cin&gt;&gt;Temp-&gt;Qty;     Temp-&gt;Next=NULL;     if (F==NULL)         F=R=Temp;     else     {         R-&gt;Next=Temp;         R=Temp;     } } </pre>	
	<p><i>(1 mark for reading data from the user)</i>  <i>(½ mark for storing data from the user to a temporary pointer)</i>  <i>(½ mark for assigning NULL to the Next value of the temporary pointer)</i>  <i>(1 mark for checking empty queue)</i>  <i>(1 mark for updating the values of F and R)</i></p>	
(e)	<p>Evaluate the following Postfix expression, showing the stack contents :</p> <p>350,5,/ ,19,2,* ,20,-,-</p>	2



Ans	<table><tr><th>POSTFIX</th><th>OPERATION</th><th>STACK</th></tr><tr><td>350</td><td>PUSH</td><td>350</td></tr><tr><td>5</td><td>PUSH</td><td>350 5</td></tr><tr><td>/</td><td>POP POP OPERATE PUSH</td><td>70</td></tr><tr><td>19</td><td>PUSH</td><td>70 19</td></tr><tr><td>2</td><td>PUSH</td><td>70 19 2</td></tr><tr><td>*</td><td>POP POP OPERATE PUSH</td><td>70 38</td></tr><tr><td>20</td><td>PUSH</td><td>70 38 20</td></tr><tr><td>-</td><td>POP POP OPERATE PUSH</td><td>70 18</td></tr><tr><td>-</td><td>POP POP OPERATE PUSH</td><td>52</td></tr></table>	POSTFIX	OPERATION	STACK	350	PUSH	350	5	PUSH	350 5	/	POP POP OPERATE PUSH	70	19	PUSH	70 19	2	PUSH	70 19 2	*	POP POP OPERATE PUSH	70 38	20	PUSH	70 38 20	-	POP POP OPERATE PUSH	70 18	-	POP POP OPERATE PUSH	52							
POSTFIX	OPERATION	STACK																																				
350	PUSH	350																																				
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-	POP POP OPERATE PUSH	52																																				
	<p>(½ mark for evaluating up to the first operator '/') (½ mark for evaluating up to the second operator '*') (½ mark for evaluating up to the third operator '-') (½ mark for evaluating up to the last operator '-')</p>																																					
	OR																																					
(e)	Convert the following Infix expression to its equivalent Postfix expression, showing the stack contents for each step of conversion :  U - V / W * R + T	2																																				
Ans	<table><tr><th>Scanned Element</th><th>Stack</th><th>Postfix</th></tr><tr><td>(</td><td>(</td><td></td></tr><tr><td>U</td><td>(</td><td>U</td></tr><tr><td>-</td><td>( -</td><td>U</td></tr><tr><td>V</td><td>( -</td><td>UV</td></tr><tr><td>/</td><td>( - /</td><td>UV</td></tr><tr><td>W</td><td>( - /</td><td>UVW</td></tr><tr><td>*</td><td>( - *</td><td>UVW /</td></tr><tr><td>R</td><td>( - *</td><td>UVW / R</td></tr><tr><td>+</td><td>( +</td><td>UVW / R * -</td></tr><tr><td>T</td><td>( +</td><td>UVW / R * - T</td></tr><tr><td>)</td><td>Empty</td><td>UVW / R * - T +</td></tr></table>	Scanned Element	Stack	Postfix	(	(		U	(	U	-	( -	U	V	( -	UV	/	( - /	UV	W	( - /	UVW	*	( - *	UVW /	R	( - *	UVW / R	+	( +	UVW / R * -	T	( +	UVW / R * - T	)	Empty	UVW / R * - T +	
Scanned Element	Stack	Postfix																																				
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+	( +	UVW / R * -																																				
T	( +	UVW / R * - T																																				
)	Empty	UVW / R * - T +																																				

		<i>(½ mark for finding postfix up to the operator '-')  (½ mark for finding postfix up to the operator '/')  (½ mark for finding postfix up to the operator '*')  (½ mark for finding postfix up to the operator '+')</i>	
4.	(a)	A text file named PRAYER.TXT contains some text. Write a function definition GODLINES() in C++ that would read each line of PRAYER.TXT and display those lines, which are starting with GOD.	3
	Ans	<pre>void GODLINES() {     ifstream F("PRAYER.TXT");     char Line[80];     while (F.getline(Line,80))         if (Line[0]=='G' &amp;&amp; Line[1]=='O' &amp;&amp; Line[2]=='D')             cout&lt;&lt;Line&lt;&lt;endl;     F.close(); }</pre>	
		<i>(1 Mark for opening PRAYER.TXT correctly)  (1 Mark for reading each Line (using any method) from the file)  (½ Mark for checking the Line starting with GOD)  (½ Mark for displaying the Line)</i>	
		OR	
	(a)	<p>A text file named NOTES.TXT contains some text. Write the function definition DISPLAY2() in C++ which displays first 2 letters of each word of the text file.</p> <p>For example : If the file NOTES.TXT contains :  <b>PYTHON IS ONE LANGUAGE AND C++ IS ANOTHER LANGUAGE</b></p> <p>Then the function should display the output as :  <b>PY IS ON LA AN C+ IS AN LA</b></p>	3
	Ans	<pre>void DISPLAY2() {     ifstream f("NOTES.TXT");     char W[20];     while(f&gt;&gt;W)     {         if(strlen(W)&gt;1)             cout&lt;&lt;W[0]&lt;&lt;W[1]&lt;&lt;" ";     }     f.close(); }</pre>	
		<i>(1 Mark for opening NOTES.TXT correctly)  (1 Mark for reading each Word (using any method) from the file)  (1 Mark for displaying first two characters of the word correctly)</i>	

	<p>(b) Write a definition for function NORTHTRADE() in C++ to read each object of a binary file TRADER.DAT, find and display the Total amount of trade done by traders from NORTH region.</p> <p>Assume that the file TRADER.DAT is created with the help of objects of class Trader, which is defined below :</p> <pre> class Trader {     int Code;char Region[20]; float Amount; public:     void RegTrader();     void ShowTrader();     float GetAmount() { return Amount; }     char* GetRegion() { return Region; } }; </pre>	2
Ans	<pre> void NORTHTRADE() {     ifstream F;     F.open("TRADER.DAT",ios::binary ios::in);     Trader T;     int sum=0;     while(F.read((char*)&amp;T,sizeof(T)))         if (strcmp(T.GetRegion(),"NORTH")==0)             sum+=T.GetAmount();     cout&lt;&lt;"Total Amount= "&lt;&lt;sum;     F.close() } </pre>	
	<p><i>(½ Mark for opening TRADER.DAT correctly)</i>  <i>(½ Mark for reading each record from the file)</i>  <i>(½ Mark for calculating the Total Amount correctly)</i>  <i>(½ Mark for displaying the Total Amount)</i></p>	
	OR	
	<p>A binary file SWEETS.DAT contains records stored as objects of the following class :</p> <pre> class Sweet {     int SCode; char Sweet[20]; int Qty; public:     int GetSCode(){ return SCode; }     int GetQty(){ return Qty; }     void Show()     { cout&lt;&lt;SCode&lt;&lt;" : "&lt;&lt;Sweet&lt;&lt;" : "&lt;&lt;Qty&lt;&lt;endl;     }; </pre> <p>Write definition for function ShowHigh() in C++, which displays the details of those sweets from the file SWEETS.DAT, whose Qty is more than 1000.</p>	2

Ans	<pre>void ShowHigh() {     ifstream F;     F.open("SWEETS.DAT",ios::binary ios::in);     Sweet S;     while(F.read((char*)&amp;S,sizeof(s)))         if (S.GetQty()&gt;1000)             S.Show()     F.close() }</pre>															
	<p>(½ Mark for opening SWEETS.DAT correctly)</p> <p>(½ Mark for reading each record from the file)</p> <p>(½ Mark for checking quantity more than 1000 from the file)</p> <p>(½ Mark for displaying the record)</p>															
(c)	<p>Find the output of the following C++ code considering that the binary file CHANNEL.DAT exists on the hard disk with the following 6 records for the class CHANNEL containing CNAME and TO (TURNOVER in Crore).</p> <table border="1"> <thead> <tr> <th>CNAME</th> <th>TURNOVER</th> </tr> </thead> <tbody> <tr> <td>KIDIES</td> <td>11</td> </tr> <tr> <td>NEWSFAST</td> <td>60</td> </tr> <tr> <td>QUICKNEWS</td> <td>20</td> </tr> <tr> <td>CARTOONX</td> <td>45</td> </tr> <tr> <td>GAMEZ</td> <td>50</td> </tr> <tr> <td>MOVIETRACKER</td> <td>62</td> </tr> </tbody> </table> <pre>class CHANNEL {     char CNAME[20]; int TO; public:     void GetC();     void ShowC()     { cout&lt;&lt;CNAME&lt;&lt;": "         &lt;&lt;TO&lt;&lt;endl;} };  void main() {     fstream F;     F.open("CHANNEL.DAT",ios::binary ios::in);     CHANNEL C;     F.seekg(3*sizeof(C));     F.read((char*)&amp;C, sizeof(C));     F.read((char*)&amp;C, sizeof(C));     C.ShowC();     F.close(); }</pre>	CNAME	TURNOVER	KIDIES	11	NEWSFAST	60	QUICKNEWS	20	CARTOONX	45	GAMEZ	50	MOVIETRACKER	62	1
CNAME	TURNOVER															
KIDIES	11															
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QUICKNEWS	20															
CARTOONX	45															
GAMEZ	50															
MOVIETRACKER	62															
Ans	GAMEZ:50															
	(1 Mark for displaying correct values of Record 5 )															
	OR															
(c)	Differentiate between seekp() and tellp(). Give a suitable example to illustrate the difference.	1														
Ans	<p>tellp(): This function returns the position of the current put pointer in terms of bytes in a file.</p> <pre>int n = f.tellp();</pre> <p>seekp(): This function takes the file put pointer to the specified byte in a file.</p>															

		Eg: <code>f.seekp(30);</code> // It takes a pointer to the 30th byte.	
		(½ Mark for differentiating between <code>tellp()</code> and <code>seekp()</code> ) (½ Mark for giving suitable example)	
<p style="text-align: center;"><b>SECTION B</b> [Only for candidates, who opted for Python]</p>			
1	(a)	What is the difference between logical error and run-time error ? Give a suitable example of each.	2
	Ans	<p>Logical error: :Logical error occurs when there is a fault in the logic of Program Logical errors are difficult to trace and can cause a program to produce unexpected results.</p> <p>Example</p> <pre>A=10 B=20 C=A*B print C</pre> <p>Multiplying two numbers instead of adding them together may also produce unwanted results.</p> <p>Runtime error: A runtime error is an error that causes abnormal termination of program during running time.</p> <p>Example</p> <pre>A=10 B=int(raw_input("Value:")) print A/B # If B entered by user is 0, it will be run-time error</pre>	
		<p>( ½ mark each for defining Logical error and run-time error ) ( ½ mark for each correct example) OR ( Full 2 Marks for illustrating both through examples)</p>	
	(b)	Name the Python Library modules which need to be imported to invoke the following functions : (i) <code>factorial()</code> (ii) <code>group()</code>	1
	Ans	<p>(i) <code>math</code> (ii) <code>grp</code></p>	
		<p>(1 Mark for writing correct Library module for <code>factorial()</code> ) (ii) to be ignored</p>	
	(c)	<p>Rewrite the following code in Python after removing all syntax error(s). Underline each correction done in the code.</p> <pre>val = 32 for K in range(20:32):</pre>	2

		<pre> if K&gt;25     print K*Val Else:     PRINT K+ValNumber </pre>	
	Ans	<pre> Val = 32 for K in range(20,32):    # Error 1     if K&gt;25 :             # Error 2         print K*Val     else:                 # Error 3         <u>print</u> K+<u>Val</u>      # Error 4 and Error 5 </pre>	
		<p><i>(½ Mark for each correction, not exceeding 2 Marks)</i></p> <p><b>OR</b></p> <p><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="Some2Thing" STxt="" Fold=0 for C in range(0,len(Txt)):     if Txt[C]&gt;="0" and Txt[C]&lt;="9":         Fold=1         STxt = STxt + "#"     elif Fold==0 and Txt[C]&gt;="A" and Txt[C]&lt;="S":         STxt = STxt + "@"     elif Fold==1 and Txt[C]&gt;="T" and Txt[C]&lt;="Z":         STxt = STxt + "*"     else:         STxt = STxt + Txt[C] print STxt </pre>	2
	Ans	@ome#*hing	
		<p><i>( ½ Mark for mentioning @om)</i></p> <p><i>( ½ Mark for e# correctly)</i></p> <p><i>( ½ Mark for *hi)</i></p> <p><i>( ½ Mark for ng)</i></p>	
	(e)	<p>Find and write the output of the following Python code :</p> <pre> def Compute(A,B,C="*") :     for I in range(A,B+1):         if I%2==0:             print I,C,         else:             print I,"@",             print " " Compute(10,14) Compute(25,29,"#") Compute(5,10) </pre>	3
	Ans	<p>Indentation Error</p> <p><b>OR</b></p> <p>10 *</p>	

		11 @ 12 * 13 @ 14 * 25 @ 26 # 27 @ 28 # 29 @ 5 @ 6 * 7 @ 8 * 9 @ 10 * OR 10 * 12 * 14 * 14 @ 26 # 28 # 29 @ 6 * 8 * 10 * 10 @	
		<i>(3 Marks for mentioning Indentation Error in question)</i> OR <i>(Full 3 mark for writing six correct values out of the above outputs)</i>	
	(f)	Out of the (i) to (iv) options, which is/are not possible outputs(s) of the following program code ? Also specify the maximum value that can be assigned to the variable R. <pre>import random</pre>	2

		<pre>ALPHA=["A","C","E","F","G","B"] for I in range(1,4):     R=random.randint(I,5)     print ALPHA[R],":",</pre>					
		<table><tr><td>(i) F : B : F :</td><td>(ii) C : G : F :</td></tr><tr><td>(iii) A : G : F :</td><td>(iv) G : B : G :</td></tr></table>	(i) F : B : F :	(ii) C : G : F :	(iii) A : G : F :	(iv) G : B : G :	
(i) F : B : F :	(ii) C : G : F :						
(iii) A : G : F :	(iv) G : B : G :						
	Ans	Syntax Error OR (iii) A:G:F: Maximum value or R: 5					
		(2 Marks for mentioning Syntax Error in question) OR (1 mark for correct option) (1 mark for Maximum value of R)					
2	(a)	Explain the concept of Polymorphism in Python. Write suitable example to illustrate the concept of Polymorphism.	2				
	Ans	Polymorphism is the ability to use an operator or function in various forms. That is a single function or an operator behaves differently depending upon the data provided to them. Example <pre>def test():          #function 1     print "hello" def test(a, b):      #function 2     return a+b def test(a, b, c):   #function 3     return a+b+c</pre>					
		(1 Mark for correct explanation of Polymorphism) (1 Mark for writing any suitable example) OR (2 Marks if the concept is explained through an example)					
	(b)	<pre>class SHOP:          #Line 1     NUM = 100         #Line 2     CATEG="GEN.STORE" #Line 3     def __init__(self,C,N=25): #Line 4         self.NUM = N   #Line 5         self.CATEG = C #Line 6     def SHOW(self):    #Line 7         print self.NUM,self.CATEG #Line 8         print SHOP.CATEG,SHOP.NUM #Line 9 S1=SHOP("TOYS")       #Line 10 S1.SHOW()             #Line 11</pre>	2				



		S2=SHOP("FURNITURE",105) #Line 12 SHOP.CATEG="GAMES" #Line 13 S2.SHOW() #Line 14 Write the output of the above Python code.	
	Ans	25 TOYS GEN.STORE 100 105 FURNITURE GAMES 100	
		( ½ Mark for each correct line of output)	
		OR	
	(b)	class Flat: #Line 1 def __init__(self): #Line 2 self.No = 100 #Line 3 self.Floor = 2 #Line 4 def __del__(self): #Line 5 print "Sold Out" #Line 6 def VIEW(self): #Line 7 print self.No,self.Floor #Line 8 def Buy(): #Line 9 F=Flat() #Line 10 F.VIEW() #Line 11 Buy() #Line 12	
	(i)	Which statement (Line number) out of Line 1 to Line 8 will be called and get executed first, when statement at Line 10 gets executed ? Justify your answer.	
	Ans	Lines 2,3, 4 will get executed The given statement in Line 10 creates an Object of the Class Flat, which will invoke the constructor defined in lines 2,3,4	
		(½ Mark for writing the statements that will get executed) (½ Mark for writing the justification)	
	(ii)	What will be the output of the above code ?	
	Ans	100 2 Sold Out	
		( ½ Mark for each correct line of output)	
	(c)	Define a class CLUB in Python with following specifications : Instance Attributes - ID # Member Number - Mname # Member Name - Activity # Activity - Fee # Membership Fee  Methods/function	4

	<div>- GetFee() # To assign Fee # as per Activity chosen by member as follows :</div> <table><tr><td>Activity</td><td>Fee</td></tr><tr><td>Badminton</td><td>1500</td></tr><tr><td>Table Tennis</td><td>1200</td></tr><tr><td>Football</td><td>600</td></tr><tr><td>Gym</td><td>2500</td></tr></table> <div>- Register () # To allow user to enter value of # ID, Mname and Activity. # The function should also # call GetFee() to assign Fee</div> <div>- View() # To display ID, Mname, Activity and Fee</div>	Activity	Fee	Badminton	1500	Table Tennis	1200	Football	600	Gym	2500	
Activity	Fee											
Badminton	1500											
Table Tennis	1200											
Football	600											
Gym	2500											
Ans	<pre>class CLUB:     def __init__(self):         self.ID = 0         self.Mname = ""         self.Activity= ""         self.Fee=0     def GetFee(self):         if self.Activity=="Badminton":             self.Fee=1500         elif self.Activity=="Table Tennis":             self.Fee=1200         elif self.Activity=="Football":             self.Fee=600         elif self.Activity=="Gym":             self.Fee=2500     def Register(self):         self.ID=int(input("ID:"))         self.Mname=input("Name:")         self.Activity=input("Activity:")         GetFee(self)     def View(self):         print self.ID,self.Mname,self.Activity,self.Fee</pre>											
	<div>( 1 Mark for correct definition of class)</div> <div>( 1 Mark for defining GetFee())</div> <div>( 1 Mark for defining Register())</div> <div>( 1 Mark for defining View())</div>											
(d)	<div>Answer the questions (i) to (iii) based on the following :</div> <div>class Manager(object): #Line 1</div> <div>def __init__(self,SAL): #Line 2</div> <div>self.MSAL = SAL</div> <div>def LevelNext(self,S): #Line 3</div>											

		<pre> self.MSAL =self.MSAL+S def MView(self):     print self.MSAL class Consultant(object):     def __init__(self,FEE):         self.CTEE=FEE     def Hike(self,F):         self.FEE =self.FEE + F     def CView(self):         print self.FEE class Company(Manager,Consultant):     def __init__(self,BGT):         self.CBGT=BGT         Manager.__init__(self,BGT/5)         Consultant.__init__(self,BGT/10)     def Uplift(self,A):         self.BGT=self.BGT+A         Manager.LevelNext(self,A/4)         Consultant.Hike(self,A/2)     def CMView(self):         print self.BGT,         Manager.MView(self)         Consultant.CView(self) CM=Company(12000000) CM.UpLift(20000) CM.CMView() </pre>	
	(i)	Write the type of the inheritance illustrated in the above.	1
	Ans	Multiple Inheritance	
		<i>(1 Mark for writing correct type name of the Inheritance)</i>	
	(ii)	Which statements (line numbers) in the above program code will call and execute statements written at Line 2 and Line 6 ?	2
	Ans	Line 11 Line 12	
		<i>(1 Mark for writing Line 11)</i> <i>(1 Mark for writing Line 12)</i>	
	(iii)	Find and write the output of the above code.	1
	Ans	12020000 2405000.0 1210000.0	
		<i>( 1 Mark for mentioning error in Variable Name)</i>	

		<p><b>OR</b></p> <p><i>( 1 Mark for writing the output assuming corrected Variable Name)</i></p>	
		<p><b>OR</b></p>	
		<p>Write a Python code to illustrate example of inheritance depicting the following information.</p> <div style="border: 1px solid black; border-radius: 10px; padding: 10px; margin: 10px 0;"> <p><b>COMPANY</b></p> <ul style="list-style-type: none"> <li>• NAME</li> <li>• CITY</li> </ul> </div> <div style="text-align: center; margin: 5px 0;">↓</div> <div style="border: 1px solid black; border-radius: 10px; padding: 10px; margin: 10px 0;"> <p><b>BRANCH</b></p> <ul style="list-style-type: none"> <li>• NAME</li> <li>• CITY</li> </ul> </div> <div style="text-align: center; margin: 5px 0;">↓</div> <div style="border: 1px solid black; border-radius: 10px; padding: 10px; margin: 10px 0;"> <p><b>STORE</b></p> <ul style="list-style-type: none"> <li>• NAME</li> <li>• CITY</li> </ul> </div>	4
	Ans	<pre> class COMPANY(object):     def __init__(self,NAME,CITY):         self.NAME = NAME         self.CITY = CITY     def Get(self):         self.NAME = "AMAN"         self.CITY = "AGRA"     def View(self):         print self.NAME, self.CITY class BRANCH (COMPANY):     def __init__(self,NAME,CITY):         self.NAME = NAME         self.CITY = CITY     def Get(self):         self.NAME = "RAJ"         self.CITY = "CHENNAI"     def View(self):         print self.NAME, self.CITY class STORE (BRANCH):     def __init__(self,NAME,CITY):         self.NAME = NAME         self.CITY = CITY </pre>	

		<pre>def Get(self):     self.NAME = "TARUN"     self.CITY = "JAIPUR"  def View(self):     print self.NAME, self.CITY</pre>																																																		
		<p><i>(1 Mark for writing definition of each of the class)</i></p> <p><i>(1 Mark for correctly using the syntax of the inheritance)</i></p>																																																		
3	(a)	<p>Consider the following randomly ordered numbers stored in a list : 16, 14, 18, 12, 15, 11</p> <p>Show the content of list after the First, Second and Third pass of the bubble sort method used for arranging in <b>descending order</b> ?</p> <p>Note : Show the status of all the elements after each pass very clearly encircling the changes.</p>	3																																																	
	Ans	<table><tr><td>PASS</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr><tr><td></td><td>16</td><td>14</td><td>18</td><td>12</td><td>15</td><td>11</td></tr><tr><td>First</td><td>14</td><td>16</td><td>12</td><td>15</td><td>11</td><td>18</td></tr><tr><td>Second</td><td>14</td><td>12</td><td>15</td><td>11</td><td>16</td><td>18</td></tr><tr><td>Third</td><td>12</td><td>14</td><td>11</td><td>15</td><td>16</td><td>18</td></tr><tr><td></td><td>12</td><td>11</td><td>14</td><td>15</td><td>16</td><td>18</td></tr><tr><td></td><td>11</td><td>12</td><td>14</td><td>15</td><td>16</td><td>18</td></tr></table>	PASS	0	1	2	3	4	5		16	14	18	12	15	11	First	14	16	12	15	11	18	Second	14	12	15	11	16	18	Third	12	14	11	15	16	18		12	11	14	15	16	18		11	12	14	15	16	18	
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	11	12	14	15	16	18																																														
		<p><i>( 1 Mark for correctly showing status of the content after each pass upto Third Pass)</i></p>																																																		
		OR																																																		
		<p>Consider the following randomly ordered numbers stored in a list : 16, 14, 16, 12, 15, 17</p> <p>Show the content of the list after the First, Second and Third pass of the selection sort method used for arranging in <b>ascending order</b>.</p> <p>Note : Show the status of all the elements after each pass very clearly encircling the changes.</p>	3																																																	
	Ans	<table><tr><td>PASS</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr><tr><td></td><td>16</td><td>14</td><td>16</td><td>12</td><td>15</td><td>17</td></tr><tr><td>First</td><td>11</td><td>16</td><td>12</td><td>15</td><td>14</td><td>18</td></tr><tr><td>Second</td><td>11</td><td>12</td><td>16</td><td>15</td><td>14</td><td>18</td></tr><tr><td>Third</td><td>11</td><td>12</td><td>14</td><td>15</td><td>16</td><td>18</td></tr></table>	PASS	0	1	2	3	4	5		16	14	16	12	15	17	First	11	16	12	15	14	18	Second	11	12	16	15	14	18	Third	11	12	14	15	16	18															
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	11	12	14	15	16	18											
	11	12	14	15	16	18											
		( 1 Mark for correctly showing status of the content after each pass upto Third Pass)															
	(b)	<p>Write definition of a method/function <b>TenSum(SCORES)</b> to find and display sum of those scores which are less than 500 and ending with 0.</p> <p>For example, If the SCORES contain [150,206,370,110,920,530,501,120]</p> <p>The function should display <b>Ten Sum: 640</b></p>	3														
	Ans	<pre>def TenSum(SCORES) :     SUM=0     for S in SCORES:         if S&gt;=500 and S%10==0:             SUM+=S     print SUM</pre>															
		<p>( ½ Mark for correct syntax for function definition)</p> <p>( ½ Mark for initialization of a variable to 0 for SUM)</p> <p>( ½ Mark for correctly used loop)</p> <p>( ½ Mark for two conditions)</p> <p>( ½ Mark for adding the value to variable used for SUM)</p> <p>( ½ Mark for displaying the SUM)</p>															
		OR															
		<p>Write definition of a method/function <b>NotLess(PRICE, LowPrice)</b> to count and display number of values of PRICE, which are not less than LowPrice.</p> <p>For Example : If the PRICE contains [100,120,103,180,162,113] and LowPrice contains 115 The function should display</p> <p><b>3 Prices are not less than 115</b></p>	3														
	Ans	<pre>def NotLess(PRICE, LowPrice) :     NUM=0     for P in PRICE:         if P&gt;LowPrice:             NUM+=1     print NUM,"Prices are not less than",LowPrice</pre>															
		<p>( ½ Mark for correct syntax for function definition)</p> <p>( ½ Mark for initialization of a variable to 0 for NUM)</p> <p>( ½ Mark for correctly used loop)</p>															

		<p>( ½ Mark for condition)  ( ½ Mark for the increment in NUM)  ( ½ Mark for displaying the NUM)</p>	
	(c)	Write QueueIn(ITEM) and QueueDel(ITEM) methods/function in Python to add a new ITEM and delete an ITEM from a list ITEM containing item names, considering them to act as insert and delete operations of the Queue data structure.	4
	Ans	<pre>def QueueIn(ITEM):     A=input("A:")     ITEM.insert(0,A) def QueueDel(ITEM):     if ITEM == []:         print "Queue is EMPTY"     else:         print ITEM.pop()</pre>	
		<p>( 1 Mark for syntax of definitions of QueueIn() and QueueDel())  ( 1 Mark for correctly adding content in list as per Queue)  ( 1 Mark for correctly checking the Empty condition in QueueDel())  ( 1 Mark for correctly deleting the element from list as per Queue)</p>	
		OR	
	(c)	Write PushBox(BOX) and PopBox(BOX) methods/function in Python to add a new BOX and delete a BOX from a List of BOX of fruits, considering them to act as push and pop operations of the Stack data structure.	4
	Ans	<pre>def PushBox(BOX):     B=input("B:")     BOX.append(B) def PopBox(BOX):     if BOX == []:         print "Stack is EMPTY"     else:         print BOX.pop()</pre>	
		<p>( 1 Mark for syntax of definitions of PushBox() and PopBox())  ( 1 Mark for correctly adding content in list as per Stack)  ( 1 Mark for correctly checking the Empty condition in PopBox())  ( 1 Mark for correctly deleting the element from list as per Stack)</p>	
	(d)	<p>Write a Python method/function SWapPair(COLORS) to swap the alternate values of the content of a list COLORS and display the final values of COLORS.</p> <p>Note : Assuming that the list has even number of values in it. For Example :</p> <p>If the list COLORS contains  ["RED", "BLACK", "WHITE", "PINK", "CYAN", "BLUE"]  After swap pair operation the content should be displayed as  BLACK RED PINK WHITE BLUE CYAN</p>	2
	Ans	<pre>def SWapPair(COLORS):</pre>	

		<pre>for i in range(0,len(COLORS)-1,2):     COLORS[i],COLORS[i+1]=COLORS[i+1],COLORS[i]  for C in COLORS:     print C,end=" "</pre>																															
		<p>( ½ Mark for correct use of syntax of function definition)</p> <p>( ½ Mark for correct use of loop)</p> <p>( ½ Mark for correctly swapping the adjacent elements)</p> <p>( ½ Mark for displaying the content after change in content)</p>																															
		OR																															
	(d)	Write a Python method/function DispFactors(N) to find and display all the factors of an integer N (parameter).  For Example : If the value of N is 28  The output should be displayed as 1 2 4 7 14 28	2																														
	Ans	<pre>def DispFactors(N):     for i in range(N+1):         if N%i==0:             print(i, end=" ")</pre>																															
		<p>( ½ Mark for correct use of syntax of function definition)</p> <p>( ½ Mark for correct use of loop)</p> <p>( ½ Mark for divisibility check)</p> <p>( ½ Mark for displaying the factor)</p>																															
	(e)	Evaluate the following Postfix expression, showing the stack contents : 65,5,,/,40,+,9,5,*,-	2																														
	Ans	<table><tr><th>POSTFIX</th><th>OPERATIONS</th><th>STACK</th></tr><tr><td>65</td><td>PUSH</td><td>65</td></tr><tr><td>5</td><td>PUSH</td><td>65 5</td></tr><tr><td>/</td><td>POP POP OPERATE PUSH</td><td>13</td></tr><tr><td>40</td><td>PUSH</td><td>13 40</td></tr><tr><td>+</td><td>POP POP OPERATE PUSH</td><td>53</td></tr><tr><td>9</td><td>PUSH</td><td>53 9</td></tr><tr><td>5</td><td>PUSH</td><td>53 9 5</td></tr><tr><td>*</td><td>POP POP OPERATE PUSH</td><td>53 45</td></tr><tr><td>-</td><td>POP POP OPERATE PUSH</td><td>8</td></tr></table>	POSTFIX	OPERATIONS	STACK	65	PUSH	65	5	PUSH	65 5	/	POP POP OPERATE PUSH	13	40	PUSH	13 40	+	POP POP OPERATE PUSH	53	9	PUSH	53 9	5	PUSH	53 9 5	*	POP POP OPERATE PUSH	53 45	-	POP POP OPERATE PUSH	8	
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*	POP POP OPERATE PUSH	53 45																															
-	POP POP OPERATE PUSH	8																															
		<p>(½ mark for evaluating up to the first operator '/')</p> <p>(½ mark for evaluating up to the second operator '+')</p> <p>(½ mark for evaluating up to the third operator '*')</p> <p>(½ mark for evaluating up to the last operator '-')</p>																															
		OR																															
	(e)	Convert the following Infix expression to its equivalent Postfix expression, showing the stack contents for each step of conversion :	2																														



		$U * V + W / (X - Y)$																																																				
	Ans	$((U * V) + (W / (X - Y)))$																																																				
		<table><tr><th>INFIX</th><th>STACK</th><th>POSTFIX</th></tr><tr><td>( (</td><td></td><td></td></tr><tr><td>U</td><td></td><td>U</td></tr><tr><td>*</td><td>*</td><td>U</td></tr><tr><td>V</td><td>*</td><td>U V</td></tr><tr><td>)</td><td></td><td>U V *</td></tr><tr><td>+</td><td>+</td><td>U V *</td></tr><tr><td>(</td><td>+</td><td>U V *</td></tr><tr><td>W</td><td>+</td><td>U V * W</td></tr><tr><td>/</td><td>+ /</td><td>U V * W</td></tr><tr><td>(</td><td>+ /</td><td>U V * W</td></tr><tr><td>X</td><td>+ /</td><td>U V * W X</td></tr><tr><td>-</td><td>+ / -</td><td>U V * W X</td></tr><tr><td>Y</td><td>+ / -</td><td>U V * W X Y</td></tr><tr><td>)</td><td>+ /</td><td>U V * W X Y -</td></tr><tr><td>)</td><td>+</td><td>U V * W X Y - /</td></tr><tr><td>)</td><td></td><td>U V * W X Y - / +</td></tr></table>	INFIX	STACK	POSTFIX	( (			U		U	*	*	U	V	*	U V	)		U V *	+	+	U V *	(	+	U V *	W	+	U V * W	/	+ /	U V * W	(	+ /	U V * W	X	+ /	U V * W X	-	+ / -	U V * W X	Y	+ / -	U V * W X Y	)	+ /	U V * W X Y -	)	+	U V * W X Y - /	)		U V * W X Y - / +	
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		<p><i>(½ mark for finding postfix up to the operator '*')</i></p> <p><i>(½ mark for finding postfix up to the operator '+')</i></p> <p><i>(½ mark for finding postfix up to the operator '/')</i></p> <p><i>(½ mark for finding postfix up to the operator '-')</i></p>																																																				
4	(a)	Write a statement in Python to open a text file MEETUP.TXT so that existing content can be read from it.	1																																																			
	Ans	<pre>F.write(Line+"\n")</pre> <p>OR</p> <pre>F.write("Hello! Its a nice day\n")</pre>																																																				
		<p><i>( ½ Mark for using write function)</i></p> <p><i>( ½ Mark for displaying a line of content using write function)</i></p>																																																				
		OR																																																				
	(a)	Write a statement in Python to open a text file NOTICES.TXT so that new contents can be written in it.	1																																																			
	Ans	<pre>F=open("NOTICES.TXT", "w")</pre> <p>OR</p> <pre>F=open("NOTICES.TXT", "a")</pre> <p>OR</p> <pre>with open("NOTICES.TXT", "w") as F:</pre> <p>OR</p> <pre>with open("NOTICES.TXT", "a") as F:</pre>																																																				
		<p><i>( ½ Mark for using open function)</i></p> <p><i>( ½ Mark for correctly specifying file mode)</i></p>																																																				
	(b)	Write a method/function FIRSTTWO() in Python to read contents from a text	2																																																			

		<p>file PRAY.TXT, to find and display the first two characters of every word of the file. For example :</p> <p>If the content of the file is</p> <hr/> <p>WE LOVE OUR COUNTRY AND WE PRAY WELL BEING OF ALL</p> <hr/> <p>The method/function should display</p> <p>WE LO OU CO AN WE PR WE BE OF AL</p>	
	Ans	<pre>def FIRSTTWO():     with open("PRAY.TXT") as F:         TL=F.readlines()         for L in TL:             for W in L.split():                 print W[:2],end=" "</pre>	
		<p>( ½ Mark for using open function in "r" mode)</p> <p>( ½ Mark for reading the content from file)</p> <p>( ½ Mark for correctly extracting words from the content of the file)</p> <p>( ½ Mark for displaying the first two letters of each word)</p>	
		OR	
		<p>Write a method/function <b>APCount()</b> in Python to read and display the count of those lines from a text file <b>STATES.TXT</b>, which are starting either with M or starting with P.</p> <p>For example :</p> <p>If the content of the file is</p> <p>MIZORAM IS IN THE NORTH EAST OF INDIA</p> <p>PUNJAB IS PROSPEROUS LAND</p> <p>KERALA IS MOST LITERATE STATE</p> <p>MUMBAI IS FILM CITY</p> <p>MANIPUR IS FAMOUS FOR LOKTAK LAKE</p> <p>The method should display</p> <p>4</p>	2
	Ans	<pre>def APCOUNT():     with open("STATES.TXT") as F:         CNT=0         TL=F.readlines()         for L in TL:             if L[0] in "mM":                 CNT+=1         print CNT</pre>	
		<p>( ½ Mark for using open function in "r" mode)</p> <p>( ½ Mark for reading the content from file)</p> <p>( ½ Mark for correctly using loop)</p> <p>( ½ Mark for correctly checking first character M and counting)</p>	

	<p>(c) Considering the following definition of class <b>TRADING</b>, write a method/function <b>SOUTHTRADE()</b> in Python to find and display the total amount of trade happened in SOUTH region from a pickled file <b>TRADING.DAT</b> containing records of <b>TRADING</b>.</p> <pre> class TRADING:     def __init__(self,R,A):         self.Region=R         self.Amount=A     def Display(self):         print self.Region,"#", self.Amount </pre>	3
Ans	<pre> import pickle def SOUTHTRADE():     F=open("TRADING.DAT","rb")     while True:         try:             Recs=pickle.load(F)             if Recs.Region=="SOUTH":                 Recs.Display()         except:             break     F.close() </pre>	
	<p>( ½ Mark for correct import statement)  ( ½ Mark for opening the file)  ( ½ Mark for reading the content from file)  ( 1 Mark for correctly matching Region with "SOUTH" )  ( ½ Mark for correctly displaying matched record)</p>	
	OR	
	<p>Considering the following definition of class <b>GAMER</b>, write a method/function <b>GAMING()</b> in Python to search and display all the content from a pickled file <b>GAMER.DAT</b> where Type of <b>GAMER</b> is "MOBILE".</p> <pre> class GAMER:     def __init__(self,I,T):         self.ID=I         self.TYPE=T    # PC,CONSOLE, MOBILE, INTERNET     def Show(self):         print self.ID,"#", self.TYPE </pre>	3
Ans	<pre> import pickle def GAMING():     F=open("GAMER.DAT","rb")     while True:         try:             Recs=pickle.load(F) </pre>	

		<pre> if Recs.TYPE=="MOBILE":     Recs.Show() except:     break F.close() </pre>	
		<p>( ½ Mark for correct import statement)  ( ½ Mark for opening the file)  ( ½ Mark for reading the content from file)  ( 1 Mark for correctly matching TYPE with “MOBILE” )  ( ½ Mark for correctly displaying matched record)</p>	

**SECTION C**  
[For all candidates]

5	(a)	Observe the following table FOOD carefully and answer the questions that follow : TABLE: FOOD	2																																
		<table><tr><th>AVGPRICE</th><th>FNAME</th><th>FNO</th><th>ORIGIN</th></tr><tr><td>75</td><td>DOSA</td><td>F01</td><td>SOUTH INDIA</td></tr><tr><td>100</td><td>BURGER</td><td>F03</td><td>AMERICAN</td></tr><tr><td>45</td><td>VADA PAV</td><td>F04</td><td>MAHARASHTRA</td></tr><tr><td>70</td><td>CHOW MEIN</td><td>F09</td><td>CHINA</td></tr><tr><td>70</td><td>CHOLE BHATURE</td><td>F15</td><td>PUNJAB</td></tr><tr><td>80</td><td>SARSON KA SAAG</td><td>F12</td><td>RAJASTHAN</td></tr><tr><td>25</td><td>MAKKI KI ROTI</td><td>F11</td><td>RAJASTHAN</td></tr></table>	AVGPRICE	FNAME	FNO	ORIGIN	75	DOSA	F01	SOUTH INDIA	100	BURGER	F03	AMERICAN	45	VADA PAV	F04	MAHARASHTRA	70	CHOW MEIN	F09	CHINA	70	CHOLE BHATURE	F15	PUNJAB	80	SARSON KA SAAG	F12	RAJASTHAN	25	MAKKI KI ROTI	F11	RAJASTHAN	
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	(i)	What is the Degree and Cardinality of table FOOD ?																																	
	Ans	Degree: 4 Cardinality: 7																																	
		<i>(½ Mark for writing correct Degree)</i> <i>(½ Mark for writing correct Cardinality)</i>																																	
	(ii)	<i>Which attribute out of AVGPRICE, FNAME, FNO and ORIGIN of table FOOD is the ideal one for being considered as the Primary Key and why ?</i>																																	
	Ans	Primary Key: FNO OR FNAME (any one) Reason: Unique values for identification of each tuple/record																																	
		<i>(½ Mark for writing correct Primary key)</i> <i>(½ Mark for writing correct Reason)</i>																																	
	(b)	Write SQL queries for (i) to (iv) and write outputs for SQL queries (v) to (viii), which are based on the following tables :  <table><tr><th colspan="5">TABLE: FURNITURE</th></tr><tr><th>FNO</th><th>FNAME</th><th>MATERIAL</th><th>QTY</th><th>SUPID</th></tr><tr><td>F01</td><td>CLASSIC BED</td><td>WOOD</td><td>12</td><td>S01</td></tr><tr><td>F02</td><td>SOFT SOFA</td><td>LEATHER</td><td>50</td><td>S05</td></tr><tr><td>F03</td><td>SHAHI BED</td><td>METAL</td><td>5</td><td>S06</td></tr></table>	TABLE: FURNITURE					FNO	FNAME	MATERIAL	QTY	SUPID	F01	CLASSIC BED	WOOD	12	S01	F02	SOFT SOFA	LEATHER	50	S05	F03	SHAHI BED	METAL	5	S06	6							
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		<table><tr><td>F09</td><td>TERRACE CHAIR</td><td>PLASTIC</td><td>120</td><td>S04</td></tr><tr><td>F12</td><td>CLASSIC CHAIR</td><td>WOOD</td><td>300</td><td>S02</td></tr><tr><td>F11</td><td>DINING TABLE</td><td>WOOD</td><td>45</td><td>S01</td></tr><tr><td>F23</td><td>SIDE TABLE</td><td>GLASS</td><td>200</td><td>S02</td></tr><tr><td>F15</td><td>DINING CHAIR</td><td>WOOD</td><td>300</td><td>S01</td></tr><tr><td>F19</td><td>RELAXER</td><td>LEATHER</td><td>50</td><td>S05</td></tr><tr><td>F04</td><td>BUSINESS CHAIR</td><td>METAL</td><td>450</td><td>S06</td></tr></table> <p>TABLE: SUPPLIER</p> <table><tr><td>SUPID</td><td>SNAME</td><td>TURNOVER</td><td>CONTACT</td></tr><tr><td>S01</td><td>WOOD FINISHERS</td><td>5600000</td><td>P K MANTRA</td></tr><tr><td>S02</td><td>SHINE N CUT</td><td>12000000</td><td>F SAHOO</td></tr><tr><td>S04</td><td>PLASTINA TECH</td><td>32000000</td><td>T CHANDRA</td></tr><tr><td>S05</td><td>SOFTELIA</td><td>56000000</td><td>S JOHN</td></tr><tr><td>S06</td><td>SOLID METALS</td><td>45000000</td><td>P C KATKAR</td></tr></table>	F09	TERRACE CHAIR	PLASTIC	120	S04	F12	CLASSIC CHAIR	WOOD	300	S02	F11	DINING TABLE	WOOD	45	S01	F23	SIDE TABLE	GLASS	200	S02	F15	DINING CHAIR	WOOD	300	S01	F19	RELAXER	LEATHER	50	S05	F04	BUSINESS CHAIR	METAL	450	S06	SUPID	SNAME	TURNOVER	CONTACT	S01	WOOD FINISHERS	5600000	P K MANTRA	S02	SHINE N CUT	12000000	F SAHOO	S04	PLASTINA TECH	32000000	T CHANDRA	S05	SOFTELIA	56000000	S JOHN	S06	SOLID METALS	45000000	P C KATKAR	
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	(i)	To display details of all the furniture from table FURNITURE, which are either GLASS or LEATHER material.																																																												
	Ans	<pre>SELECT * FROM FURNITURE WHERE MATERIAL = 'GLASS' OR MATERIAL = 'LEATHER' ; Or SELECT * FROM FURNITURE WHERE MATERIAL IN ('GLASS', 'LEATHER') ;</pre>																																																												
		<p>(½ Mark for correct SELECT statement)</p> <p>(½ Mark for correct WHERE clause)</p>																																																												
	(ii)	To display the FNO, FNAME, QTY of those furnitures from table FURNITURE, whose QTY is more than 100.																																																												
	Ans	<pre>SELECT FNO, FNAME, QTY FROM FURNITURE WHERE QTY&gt;100;</pre>																																																												
		<p>(½ Mark for correct SELECT statement)</p> <p>(½ Mark for correct WHERE clause)</p>																																																												
	(iii)	To count number of suppliers from table SUPPLIER, whose TURNOVER is more than 25000000.																																																												
	Ans	<pre>SELECT COUNT(*) FROM SUPPLIER WHERE TURNOVER &gt; 25000000;</pre>																																																												
		<p>(½ Mark for correct SELECT statement)</p> <p>(½ Mark for correct WHERE clause)</p>																																																												
	(iv)	To display details of all furniture from table FURNITURE in descending order of FNO.																																																												
	Ans	<pre>SELECT * FROM FURNITURE ORDER BY FNO DESC;</pre>																																																												
		<p>(½ Mark for correct SELECT statement)</p> <p>(½ Mark for correct ORDER BY clause)</p>																																																												

	(v)	SELECT MAX (TURNOVER) , MIN (TURNOVER) FROM SUPPLIER;																																																																							
	Ans	<u>MAX (TURNOVER)</u> 56000000 <u>MIN (TURNOVER)</u> 5600000																																																																							
		(½ Mark for writing correct output, ignore the output heading)																																																																							
	(vi)	SELECT SUM(QTY) , MATERIAL FROM FURNITURE GROUP BY MATERIAL HAVING COUNT (*)>2;																																																																							
	Ans	<u>SUM(QTY)</u> 657 <u>MATERIAL</u> WOOD																																																																							
		(½ Mark for writing correct output, ignore the output heading)																																																																							
	(vii)	SELECT DISTINCT MATERIAL FROM FURNITURE;																																																																							
	Ans	<u>DISTINCT (MATERIAL)</u> WOOD LEATHER METAL PLASTIC GLASS																																																																							
		(½ Mark for writing correct output, ignore the output heading)																																																																							
	(viii)	SELECT FNAME, SNAME FROM FURNITURE F, SUPPLIER S WHERE F.SUPID = S.SUPID AND QTY=300;																																																																							
	Ans	<u>FNAME</u> CLASSIC CHAIR <u>SNAME</u> SHINE N CUT DINING CHAIR                      WOOD FINISHERS																																																																							
		(½ Mark for writing correct output, ignore the output heading)																																																																							
6	(a)	State any one De Morgan’s Law of Boolean Algebra and verify it using truth table.	2																																																																						
	Ans	<p><math>(X+Y)' = X' . Y'</math></p> <p>Verification:</p> <table><tr><td>X</td><td>Y</td><td>X+Y</td><td>(X+Y) ’</td><td>X’</td><td>Y’</td><td>X’ . Y’</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> <p>OR</p> <p><math>(X . Y)' = X' + Y'</math></p> <p>Verification:</p> <table><tr><td>X</td><td>Y</td><td>X . Y</td><td>(X . Y) ’</td><td>X’</td><td>Y’</td><td>X’ +Y’</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>		X	Y	X+Y	(X+Y) ’	X’	Y’	X’ . Y’	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	X	Y	X . Y	(X . Y) ’	X’	Y’	X’ +Y’	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
X	Y	X+Y	(X+Y) ’	X’	Y’	X’ . Y’																																																																			
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		(2 Mark for correctly verifying the $(X+Y)' = X'.Y'$ using Truth Table) OR (2 Mark for correctly verifying the $(X.Y)' = X'+Y'$ using Truth Table)																																					
	(b)	Draw the Logic Circuit of the following Boolean Expression : $A' . (B' + C) + D'$	2																																				
	Ans																																						
		<i>( ½ Mark for interpretation of each of the NOT gates as per the expression)</i> <i>( ½ Mark for the first level OR gate as per the expression)</i> <i>( ½ Mark for the AND gate as per the expression)</i> <i>( ½ Mark for the second level OR gate as per the expression)</i>																																					
	(c)	Derive a Canonical POS expression for a Boolean function F, represented by the following truth table : <table border="1" data-bbox="295 1052 1008 1467"> <thead> <tr> <th>P</th><th>Q</th><th>R</th><th>F (P,Q,R)</th></tr> </thead> <tbody> <tr><td>0</td><td>0</td><td>0</td><td>1</td></tr> <tr><td>0</td><td>0</td><td>1</td><td>1</td></tr> <tr><td>0</td><td>1</td><td>0</td><td>0</td></tr> <tr><td>0</td><td>1</td><td>1</td><td>1</td></tr> <tr><td>1</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>1</td><td>0</td><td>1</td><td>0</td></tr> <tr><td>1</td><td>1</td><td>0</td><td>1</td></tr> <tr><td>1</td><td>1</td><td>1</td><td>0</td></tr> </tbody> </table>	P	Q	R	F (P,Q,R)	0	0	0	1	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	0	1
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	Ans	$F(P,Q,R) = (P+Q'+R).(P'+Q+R).(P'+Q+R').(P'+Q'+R')$ OR $F(P,Q,R) = \Pi(2,4,5,7)$																																					
		<i>(1 Mark for correctly writing the POS form)</i> OR <i>(½ Mark for any two correct terms)</i> <i>Note: Deduct ½ mark if wrong variable names are written in the expression</i>																																					
	(d)	Reduce the following Boolean Expression to its simplest form using K-Map :  $F(U,V,W,Z) = \sum (0,2,4,5,8,10,11,13,14,15)$	3																																				

Ans

	U' V'	U' V	UV	UV'
W' Z'	0 1	4 1	12	8 1
W' Z	1	5 1	13 1	9
WZ	3	7	15 1	11 1
WZ'	2 1	6	14 1	10 1

$$F(U,V,W,Z)=UW+V'Z'+U'VW'+VW'Z$$

	U' V'	U' V	UV	UV'
W' Z'	0 1	4 1	12	8 1
W' Z	1	5 1	13 1	9
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$$F(U,V,W,Z)=UW+V'Z'+U'W'Z'+VW'Z$$

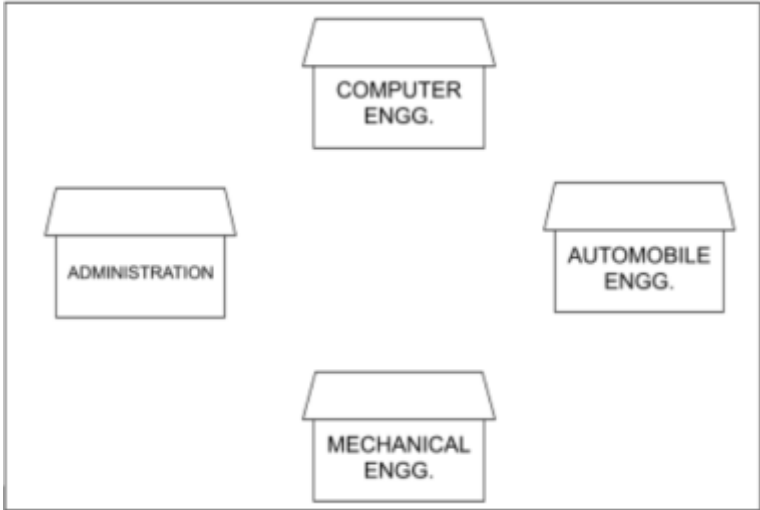
	U' V'	U' V	UV	UV'
W' Z'	0 1	4 1	12	8 1
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WZ	3	7	15 1	11 1
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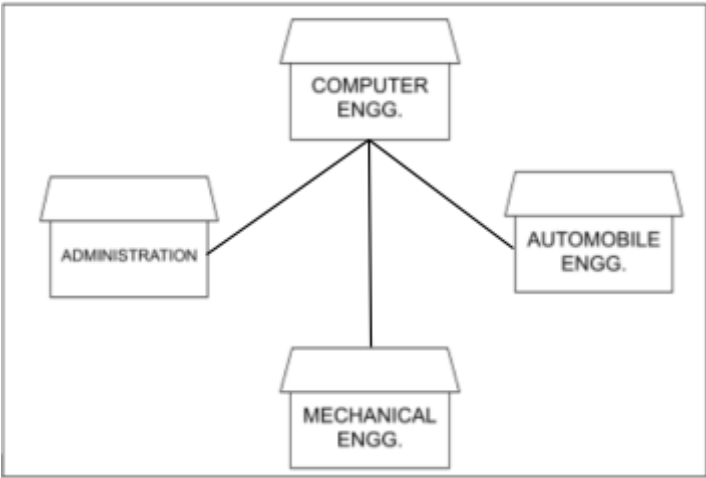
$$F(U,V,W,Z)=UW+V'Z'+U'VW'+UVZ$$

( ½ Mark for correctly representing K-Maps for the given expression)  
( ½ Mark for each grouping)



		( ½ Mark for final minimised form)							
7	(a)	Ms. Taruna Gehlot copied PEN DRIVE on to her Laptop and when she opened the file, her Laptop functions slowed down and other applications on the Laptop stopped working properly. Specifically, which of the following could have infected her Laptop files and Operating System out of the following ? Also, mention, what she should do to remove this infection from her Laptop ? 2 (i) Spam Email (ii) Worm (iii) Virus (iv) Trojan House	2						
	Ans	(iii) Virus OR (iv) Trojan Horse  Use an antivirus application to prompt her about threats and to disinfect the affected Laptop files and Operating System.							
		(1 Mark for writing any correct answer Virus OR Trojan Horse) (1 Mark for writing any correct measure to remove the infection from her Laptop)							
	(b)	Mr. Priyaver Desai was travelling from Mumbai to Delhi for his vacation along with his brand new Laptop (with no data and software installed in it) and one brand new portable hard drive. These items, he had bought for gifting to his nephew in Delhi. While travelling in the train, a co-traveller ran away with both these items. Do you think Mr. Desai should report this as a Cyber Crime or any other crime ? Write the reason for your answer.	1						
	Ans	Mr. Desai should report to local police as regular theft. Reason: Stealing of gadgets without any digital content is not considered a case of Cyber crime.							
		(½ Mark for writing correct answer) (½ Mark for writing correct reason)							
	(c)	Give two differences between Video Conferencing and Text Chat service.	1						
	Ans	<table><tr><td>Video Conferencing</td><td>Text Chat service</td></tr><tr><td>Video conferencing services allow real time communication between two or more people.</td><td>Text chat services allow you to receive and reply to text messages.</td></tr><tr><td>SIP ( Session Initiation Protocol) is required for Video Conferencing.</td><td>IRC (Internet Relay Protocol) is required for Text chat services.</td></tr></table>	Video Conferencing	Text Chat service	Video conferencing services allow real time communication between two or more people.	Text chat services allow you to receive and reply to text messages.	SIP ( Session Initiation Protocol) is required for Video Conferencing.	IRC (Internet Relay Protocol) is required for Text chat services.	
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SIP ( Session Initiation Protocol) is required for Video Conferencing.	IRC (Internet Relay Protocol) is required for Text chat services.								
		(½ mark each for any two valid differences)							
	(d)	Write the expanded names for the following abbreviated terms used in Networking and Communications : (i) SMTP (ii) GSM	2						

		(iii) TCP (iv) PPP																					
	Ans	(i) Simple Mail Transfer Protocol (ii) Global System for Mobile Communication (iii) Transmission Control Protocol (iv) Point to point Protocol																					
		(1/2 Mark for writing each correct expansion)																					
	(e)	<p>Case Study Based Question</p> <p>Global Knowledge Share Institute is planning to set up its centre in Hyderabad with four specialised blocks for Computer Engineering, Mechanical Engineering, Automobile Engineering along with Administration blocks in four separate buildings. The physical distances between these blocks and the number of computers to be installed in these blocks are given below. You as a network expert have to answer the queries (i) to (iv) as raised by the financial advisers of the institution.</p> <p>Shortest distances between various locations in metres are as follows :</p> <div></div> <table><tr><td>Computer Engg. to Mechanical Engg. Blocks</td><td>60</td></tr><tr><td>Computer Engg. to Automobile Engg. Blocks</td><td>40</td></tr><tr><td>Computer Engg. to Administration Blocks</td><td>60</td></tr><tr><td>Automobile Engg. to Mechanical Engg. Blocks</td><td>50</td></tr><tr><td>Automobile Engg. to Administration Blocks</td><td>110</td></tr><tr><td>Mechanical Engg. to Administration Blocks</td><td>40</td></tr></table> <p>Number of computers installed at various locations are as follows:</p> <table><tr><td>Administration Block</td><td>20</td></tr><tr><td>Computer Engg. Block</td><td>170</td></tr><tr><td>Mechanical Engg. Block</td><td>50</td></tr><tr><td>Automobile Engg. block</td><td>40</td></tr></table>	Computer Engg. to Mechanical Engg. Blocks	60	Computer Engg. to Automobile Engg. Blocks	40	Computer Engg. to Administration Blocks	60	Automobile Engg. to Mechanical Engg. Blocks	50	Automobile Engg. to Administration Blocks	110	Mechanical Engg. to Administration Blocks	40	Administration Block	20	Computer Engg. Block	170	Mechanical Engg. Block	50	Automobile Engg. block	40	
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	(i)	Suggest the most suitable location to install the main server of Global Knowledge Share Institute to get efficient connectivity with all the blocks.	1																				

	<b>Ans</b>	COMPUTER ENGG. BLOCK	
		<i>(1 Mark for writing correct location)</i>	
	<b>(ii)</b>	Suggest with the help of a drawing the best cable layout for effective network connectivity between all the blocks.	1
	<b>Ans</b>		
		<i>(1 Mark for drawing any valid cable layout)</i>	
	<b>(iii)</b>	Out of the following, suggest the most suitable device to be installed in each of these blocks for connecting all the computers installed within the centre : <ul style="list-style-type: none"> <li>• Modem, Switch, Gateway, Router</li> </ul>	1
	<b>Ans</b>	Switch	
		<i>(1 Mark for writing correct device)</i>	
	<b>(iv)</b>	Out of the following, suggest the most suitable wired medium for efficiently connecting the blocks : Network Cable: Optical Fiber, Ethernet Cable, Co-axial Cable, Single Pair Telephone Cable.  Also, mention which Topology of network, will be formed by connecting all the computer systems within each centre : <ul style="list-style-type: none"> <li>• Bus Topology or Star Topology</li> </ul>	1
	<b>Ans</b>	Optical Fiber Star Topology	
		<i>(½ Mark for writing the correct network cable)</i> <i>(½ Mark for writing the correct Topology)</i>	