



[4218] – 101

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| Seat No. | |
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S.Y. B.Sc. (Computer Science) (Semester – I) Examination, 2012
CS – 211 : DATA STRUCTURES USING ‘C’
(Paper – I) (New) (2008 Pattern)

Time : 2 Hours

Max. Marks : 40

Instructions : 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**

1. Attempt **all** of the following : **(1×10=10)**

- a) Define the term data object.
- b) What is the time complexity of the following piece of code ?

```
While (n > 0)  
    n = n/2 ;
```
- c) “A linked list can only be traversed sequentially”. State True/False.
- d) List the types of priority queue.
- e) Define left skewed binary tree.
- f) Which element would be the best choice for pivot element in Quick Sort ?
- g) Calculate the address of element A [2] [1] in a character array A [3] [4] in the row major representation. (Assume base address = 100).
- h) List any two methods of representing graphs.
- i) Write the node structure for a singly circular linked list.
- j) What is the result of evaluating the postfix expression $AB - CD^* /$ given $A = 2$, $B = 10$, $C = 4$, $D = 1$.

2. Attempt **any two** of the following : **(2×5=10)**

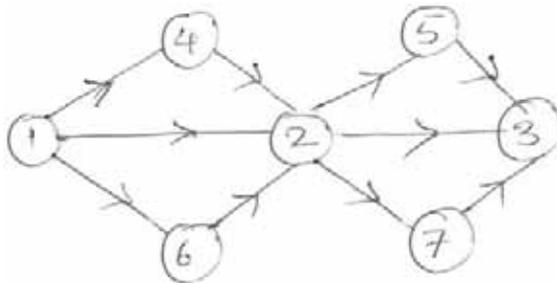
- a) Write a ‘C’ function to check whether two singly linked lists of integers are equal. (Use the following prototype)
`int is equal (NODE * list1, NODE * list2)`
- b) Write ‘C’ functions to ADD and REMOVE from a circular queue implemented using array.
- c) Write a recursive ‘C’ function to search an element in a Binary Search Tree of integers.

P.T.O.



3. Attempt **any two** of the following : **(2×5=10)**

- a) Construct an AVL tree for the following data :
SRI, IND, AUS, FRA, CAN, DEN.
- b) Show all the steps of sorting the following data using Quick Sort
25, 15, 5, 60, 10, 45
- c) Consider the following graph :



- i) Draw the adjacency list.
- ii) Write the BFS and DFS traversals.
- iii) Which vertices have maximum indegree ?

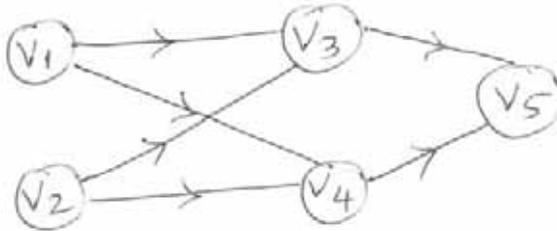
4. Attempt either A or B : **(1×10=10)**

- A) a) Using only the operations PUSH, POP, ISEMPY and STACKTOP, perform the following operations on a stack s. **4**
 - i) Set t to the topmost element leaving s unchanged.
 - ii) Set t to the third element from top leaving s without the top two elements.
 - iii) Set t to the nth element from top leaving s unchanged.
 - iv) Set t to the bottom element leaving s empty.
- b) Show the steps of creating a Binary search tree for the following data : **3**
15, 30, 20, 5, 10, 2, 7.
- c) Define the following terms : **3**
 - i) Big O notation
 - ii) Critical path
 - iii) Doubly ended queue.

OR



- B) a) What is a Generalized Linked List ? Draw the generalized list for the given polynomial $P(x, y) = 6x^2y^3 + 4x^3y^2 - 2xy^2 + 7xy^3 - 10xy$. **4**
- b) Define topological sorting. What will be the topological order of activities for the AOV network given below ? **3**



- c) Write a short note on space complexity. **3**



[4218] – 101

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CS – 211 : DATA STRUCTURES USING ‘C’
(Paper – I) (New) (2008 Pattern)

Time : 2 Hours

Max. Marks : 40

Instructions : 1) **All** questions are **compulsory**.
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1. Attempt **all** of the following : **(1×10=10)**

- a) Define the term data object.
- b) What is the time complexity of the following piece of code ?
While (n > 0)
 n = n/2 ;
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- d) List the types of priority queue.
- e) Define left skewed binary tree.
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- g) Calculate the address of element A [2] [1] in a character array A [3] [4] in the row major representation. (Assume base address = 100).
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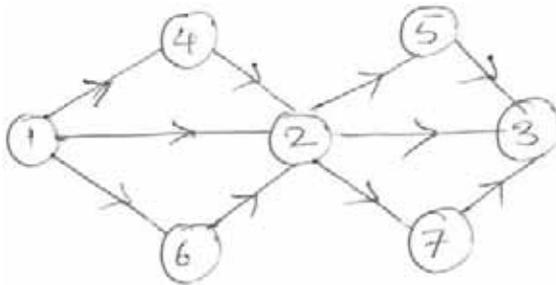
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- c) Write a recursive ‘C’ function to search an element in a Binary Search Tree of integers.

P.T.O.



3. Attempt **any two** of the following : **(2×5=10)**

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SRI, IND, AUS, FRA, CAN, DEN.
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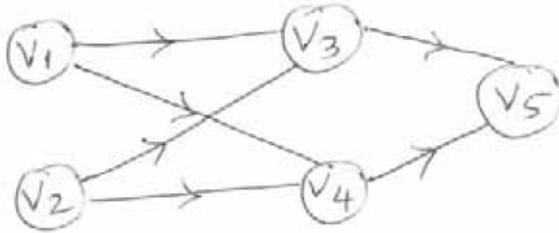
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15, 30, 20, 5, 10, 2, 7.
- c) Define the following terms : **3**
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OR



- B) a) What is a Generalized Linked List ? Draw the generalized list for the given polynomial $P(x, y) = 6x^2y^3 + 4x^3y^2 - 2xy^2 + 7xy^3 - 10xy$. **4**
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- c) Write a short note on space complexity. **3**



[4218] – 107

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| Seat No. | |
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S.Y. B.Sc. Computer Science (Semester – I) Examination, 2012
ELECTRONICS (Paper – II)
ELC 212 : Process Control Instrumentation
(Old Course)

Time : 2 Hours

Max. Marks : 40

Instructions: 1) *All questions are compulsory.*
2) *Figures to the right indicate full marks.*
3) *Neat diagrams must be drawn whenever necessary.*

1. Answer the following in **one** or **two** sentences. **(1×10=10)**
- a) Define sensor.
 - b) What is aperture time of sample and hold circuit ?
 - c) Whether thermocouple is active sensor or passive sensor ?
 - d) Draw single channel data acquisition system.
 - e) What is modeling in process control ?
 - f) Write an output equation of a controller in proportional mode.
 - g) What is neutral zone in ON-OFF controller ?
 - h) State working principle of mercurcy thermometer.
 - i) Mention any one application which uses optical sensor.
 - j) Name any two signal conditioning circuits used in process control.
2. Attempt **any two** of the following : **(5×2=10)**
- a) Write basic working principle of semiconductor strain guage.
 - b) Determine transfer function for RC circuit.
 - c) Draw block diagram of multi channel data acquisition system and explain.

P.T.O.



3. Attempt **any two** of the following : **(5×2=10)**

- a) A controller generates a pneumatic output signal. The controller's actual output ranges from 3 Psi to 15 Psi, corresponding to outputs of 0% and 100% respectively. Determine actual output corresponding to a 60% output signal.
- b) Draw differential instrumentation amplifier using three op-amps. Derive its output expression.
- c) Compare open loop and closed loop control system.

4. Attempt **any one**. **(10×1=10)**

- a) i) Explain working principle of DC motor.
- ii) Explain derivative control mode.

OR

- b) i) Explain working principle of sample and hold circuit.
- ii) How photoconductor is used as an optical sensor ? Explain in detail. Mention photoconductive materials used for this sensor.



3. Attempt **any two** of the following : **(2×5=10)**

- a) What is digital filter ? Give its advantages over analog filter.
- b) Explain Sigma Delta ADC with a neat block diagram.
- c) State sampling theorem. How aliasing can be minimised ? For a CT signal if the maximum frequency of a input signal is 2.7 kHz, what should be the minimum sampling frequency ?

4. Attempt **any one** of the following : **(1×10=10)**

- a) i) How pole-zero plots can be used to determine frequency response of filters ?
ii) With the help of block diagram explain ‘Echo Cancellation’ in telephone systems.

OR

b) i) Explain following blocks of DSP architecture :

- 1) MAC
- 2) Barrel Shifter

ii) 1) What is cross correlation and autocorrelation ?

2) Determine the convolution of the two discrete sequences given by

$$x(n) = \{4, -1, -1, 2\} \text{ and } h(n) = \{3, 1, 2\}$$



[4218] – 102

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| Seat No. | |
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**S.Y.B.Sc. (Computer Science) (Semester – I) Examination, 2012
(New) (2008 Pattern) (Paper – II)
CS-212: RELATIONAL DATABASE MANAGEMENT SYSTEM (RDBMS)**

Time : 2 Hours

Max. Marks : 40

N.B. : i) ***All questions are compulsory.***
ii) ***Figures to the right indicate full marks.***

1. Attempt **all** of the following : **(1×10=10)**

- a) Write any two Date-Time functions in MYSQL with example.
- b) What are triggers ?
- c) Give any two advantages of 3 tier Architecture.
- d) What is a shared lock ?
- e) What is a strict schedule ?
- f) What is the lost update problem ?
- g) What is the output of the following ?
Select Ceiling (18.62);
- h) What is a log record ?
 - i) What is starvation of a transaction ?
 - j) What is a non-recoverable schedule ?

2. Attempt **any two** of the following : **(2×5=10)**

- a) What is a stored procedure ? Explain how to create a stored procedure with suitable example.
- b) What are the problems associated with interleaved execution of transaction ?
- c) What is a Deadlock ? Explain the schemes for Deadlock prevention.

P.T.O.



3. Attempt **any two** of the following : **(2×5=10)**

a) State and explain Thomas Write Rule with example.

b) Consider the following classes of schedules :

Serializable, Conflict serializable, View serializable, Recoverable and strict.

For the following schedule, state which of the above classes it belongs to and why ?

| <u>T₁</u> | <u>T₂</u> | <u>T₃</u> |
|----------------------|----------------------|----------------------|
| R(X) | | |
| R(Y) | | |
| W(Y) | | |
| | R(Y) | |
| | | W(Y) |
| | | Commit |
| W(X) | | |
| Commit | | |
| | R(X) | |
| | Commit | |

c) What are the different types of clients ? Explain how client machine interacts with the server.

4. Attempt the following : **(2×5=10)**

a) Consider the execution of transactions shown bellow

- [check point]
- [write_item, T₁, P₁, 40]
- [write_item, T₂, P₂, 10]
- [write_item, T₃, P₃, 5]
- [T₂, commit]
- [write_item, T₃, P₂, 15]
- [write_item, T₁, P₅, 26]
- [T₃, Abort]

X CRASH Restart

If immediate update with check point is used, what will be the recovery procedure ?

b) Explain Discretionary access control and Mandatory access control for database security.

OR

b) Explain granting and revoking of privileges along with the Access Matrix Model.



[4218] – 201

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| Seat No. | |
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S.Y.B.Sc. (Computer Science) (Semester – II) Examination, 2012
CS-221 : OBJECT ORIENTED CONCEPTS AND PROGRAMMING IN C++
(2008 Pattern)

Time : 2 Hours

Max. Marks : 40

1. Attempt **all** of the following : **(10×1=10)**

- a) State the purpose of virtual base class.
- b) What is late binding ?
- c) What will be the output of the following ?
`cout << set w (10) << 15 << setbase (16) << 15;`
- d) 'A destructor can be declared virtual'. State True/False.
- e) List any two operator which should be overloaded as a member function.
- f) What is the purpose of reference variable ?
- g) Which flags should be used to open a binary file for writing only if the file doesnot exist ?
- h) List the different types of iterators.
- i) We can not prevent a function from throwing an exception state True/False and justify.
- j) Write a disadvantage of the inline function.

2. Attempt **any two** of the following : **(2×5=10)**

- a) Write a C++ program to define a class employee having members Emp-id, Emp-name, Basic-salary and functions accept () & display ().
Calculate DA = 25% of Basic-salary, HRA = 800
I-tax = 15% of Basic-salary.
Display the payslip using appropriate output format.
- b) Define constructor ? Explain any two types of constructor.
- c) What is a function Template ? Explain overloading of Template function.

P.T.O.



3. Attempt **any two** of the following : **(2×5=10)**

- a) What is an inheritance ? What ambiguity can arise in multiple inheritance ? How is it solved ?
- b) Write a program using operator overloading to overload the '<<' and '>>' operators for class 'TIME'. The data members of TIME class are HH, MM, SS. Write necessary constructors. Create 'n' objects of TIME class and display them in a suitable format.
- c) Write a program to display the contents of a text file in the reverse order (use pointer manipulation).

4. Attempt **any one (A or B)** : **10**

A) i) Write a short note on : **(5 marks)**

- a) This pointer b) New and delete operator

ii) What is the purpose of virtual function ? State the rules for virtual function. **(5 marks)**

B) i) Explain the concept of multiple catch using suitable example. **(4 marks)**

ii) Identify errors in the following : **(3 marks)**

```

class A
{int a, b;
public :
void A( )
{
    a = 0; b = 0;
}
void f1( );
friend void f2 ();
};
void f1()
{
    cout << a << b;
}
void f2()
{
    cout << a << b;
}
void main ()
{
    A obj;
    obj.f1();
    obj.f2 ();
}

```



iii) Identify the output of the following :

(3 marks)

```
class BASE
{
    public :
        BASE ()
        {
            cout << "constructor Base \n"; }
};
class DRV
{
    public :
        DRV ()
        {
            cout << " constructor Derive \n";
        }
};
class DRV1 : : public DRV, virtual BASE
{
    public :
        DRV1 ()
        {
            cout << "constructor Derive 1 \n";
        }
};
main ()
{
    DRV 1 obj;
}
```



[4218] – 204

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| Seat No. | |
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S.Y. B.Sc. Computer Science (Semester – II) Examination, 2012
MATHEMATICS (Paper – II)
MTC – 222 : Operations Research (2008 Pattern)

Time : 2 Hours

Max. Marks : 40

- Instructions :** 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Use of single memory, non programmable scientific calculator is allowed.**
4) **Graph papers will be supplied on demand.**

I. Attempt all questions :

10

i) Write the canonical form :

$$\begin{aligned} \text{Max } Z &= 3x + 5y \\ \text{subject to } x - 3y &= 4 \\ -x + y &\geq 1 \\ x, y &\geq 0 \end{aligned}$$

ii) Define unbounded solution of L.P.P.

iii) Draw a feasible region for the following constraints.

$$\begin{aligned} 4x_1 + x_2 &\leq 6 \\ x_1 + 3x_2 &\leq 9 \\ x_1, x_2 &\geq 0 \end{aligned}$$

iv) Write the following L.P.P. in its standard form

$$\begin{aligned} \text{Min } Z &= x_1 - 3x_2 + 2x_3 \\ \text{Subject to} \\ 3x_1 - x_2 + 3x_3 &\leq 7 \\ -2x_1 + 4x_2 &\leq 12 \\ -4x_1 + 3x_2 + 8x_3 &\geq -10 \\ x_1, x_2, x_3 &\geq 0 \end{aligned}$$

v) Convert the following transportation problem into L.P.P.

| | | | |
|----------------|----------------|----------------|----|
| | D ₁ | D ₂ | |
| O ₁ | 20 | 15 | 35 |
| O ₂ | 4 | 11 | 20 |
| | 15 | 40 | |

P.T.O.



vi) Solve the following assignment problem.

| | I | II | III |
|---|---|----|-----|
| A | 0 | 3 | 5 |
| B | 4 | 0 | 3 |
| C | 2 | 0 | 6 |

vii) Explain the term mixed strategy in the game theory.

viii) Find the saddle point of the following game.

| | B ₁ | B ₂ | B ₃ |
|----------------|----------------|----------------|----------------|
| A ₁ | 6 | 8 | 6 |
| A ₂ | 4 | 12 | 2 |

ix) How many solutions are there for the following assignment problem ?

| | I | II | III |
|---|---|----|-----|
| A | 2 | 6 | 4 |
| B | 6 | 2 | 6 |
| C | 4 | 6 | 2 |

x) Define non-degenerate basic feasible solution in transportation problem.

2. Attempt **any two** of the following :

10

i) Reddy Mikks produces both interior and exterior paints from two raw materials, M₁ and M₂. The following table provides the basic data of the problem.

| | Tons of raw material ton of | | Maximum daily availability (tons) |
|-----------------------------|-----------------------------|----------------|-----------------------------------|
| | Exterior paint | Interior paint | |
| Raw material M ₁ | 6 | 4 | 24 |
| Raw material M ₂ | 1 | 2 | 6 |
| Profit per tons | 5 | 4 | |

A market survey indicates that the daily demand for interior paint cannot exceed that of exterior paint by more than 1 ton. Also the maximum daily demand of exterior paint is 2 tons. Formulate the L.P.P.



ii) Solve the following L.P.P. by Big M method

$$\text{Min } (Z) = 4x_1 + x_2$$

Subject to

$$3x_1 + x_2 = 3$$

$$4x_1 + 3x_2 \geq 6$$

$$x_1 + 2x_2 \leq 4$$

$$x_1, x_2 \geq 0$$

iii) Solve the following assignment problem for minimization.

| | | | | | |
|-----|---|---|----|---|---|
| | A | B | C | D | E |
| I | 1 | 2 | 3 | 0 | 1 |
| II | 2 | 1 | 2 | 5 | 7 |
| III | 8 | 9 | 10 | 1 | 2 |
| IV | 3 | 4 | 5 | 1 | 2 |

3. Attempt **any two** of the following :

10

i) Solve the following transportation problem by North West corner rule.

| To → | W_1 | W_2 | W_3 | W_4 | Supply |
|---------------|-------|-------|-------|-------|--------|
| From ↓ | | | | | |
| F_1 | 30 | 25 | 40 | 20 | 100 |
| F_2 | 29 | 26 | 35 | 40 | 250 |
| F_3 | 31 | 33 | 37 | 30 | 150 |
| Demand | 90 | 160 | 200 | 50 | |

ii) Solve the following game by dominance principle.

| | | | | | | |
|-----------------|-----|-----------------|----|-----|----|---|
| | | Player B | | | | |
| | | I | II | III | IV | V |
| Player A | I | 3 | 5 | 4 | 9 | 6 |
| | II | 5 | 6 | 3 | 7 | 8 |
| | III | 8 | 7 | 9 | 8 | 7 |
| | IV | 4 | 4 | 8 | 5 | 3 |



iii) Write both the primal and dual L.P.P. for the following pay-off matrix

| | | | |
|---|---|---|-----|
| 2 | 1 | 0 | - 2 |
| 1 | 0 | 3 | 2 |

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

10

i) a) Solve the following game by algebraic method

Player B

| | | | |
|-----------------|----|-----|-----|
| | | I | II |
| Player A | I | 20 | - 6 |
| | II | - 4 | 3 |

b) Solve the following linear programming problem by graphical method

Minimize (Z) = $3x_1 + 5x_2$

Subject to

$- 3x_1 + 4x_2 \leq 12$

$2x_1 - x_2 \geq - 2$

$2x_1 + 3x_2 \geq 12$

$x_1 \leq 4$

$x_2 \geq 2$

$x_1, x_2 \geq 0$

ii) A company is spending Rs. 1,000 on transportation of its units from 3 plants to 4 distribution centres. The supply and demand of units with unity cost of transportation are give as below :

| | Distribution Centre | | | | Availability | |
|--------------|---------------------|----------------|----------------|----------------|--------------|----|
| | D ₁ | D ₂ | D ₃ | D ₄ | | |
| Plant | P ₁ | 19 | 30 | 50 | 12 | 7 |
| | P ₂ | 70 | 30 | 40 | 60 | 10 |
| | P ₃ | 40 | 10 | 60 | 20 | 18 |
| Requirements | | 5 | 8 | 7 | 15 | |

What can be the maximum saving by optimal scheduling ?



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| Seat No. | |
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S.Y. B.Sc. (Computer Science) (Semester – I) Examination, 2012
MATHEMATICS (Paper – I)
MTC : 211 : Linear Algebra
(2008 Pattern)

Time : 2 Hours

Max. Marks : 40

- N.B. :** 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Use of single memory, non-programmable, scientific calculator is allowed.**

1. Attempt the following : 10
- i) For which values of k , does the following system of linear equations has a unique solution ?
 $2x + y = 0$
 $x + ky = 0$
 - ii) Let $V = \mathbb{R}^3$ - be a vector space and
 $W = \{(x, y, z) \in V / x = 0 \text{ or } y = 0\}$ be a subset of V . Is W a subspace of V ? Why ?
 - iii) If A is a matrix of order 5×3 and B is a matrix of order 3×2 then what is the maximum possible value of Rank (AB) ?
 - iv) Find the solution space of the system of Linear equation $x = y - z + 2$.
 - v) For which value of ' α ' the vector $\bar{v} = (1, -2, \alpha)$ in \mathbb{R}^3 is a Linear combination of the vectors $\bar{u} = (3, 0, -2)$ and $\bar{w} = (2, -1, -5)$?
 - vi) A mapping $T: \mathbb{R}^2 \rightarrow \mathbb{R}^3$ is defined as $T(x, y) = (x, y, 1)$. Determine whether T is a linear transformation.
 - vii) Consider the linear transformation $T: \mathbb{R}^3 \rightarrow \mathbb{R}^2$ given by $T(x, y, z) = (x - y, x + y - z)$. Find the standard matrix of T .
 - viii) Let $B = \{(1, 0), (2, 1)\}$ be basis for \mathbb{R}^2 . If $\bar{u} = (1, 3)$ then find $[\bar{u}]_B$.



ix) Determine whether the matrix $A = \begin{bmatrix} 0 & -1 \\ -1 & 0 \end{bmatrix}$ is an orthogonal matrix.

x) Determine whether the following statement is true or false. Justify your answer.

“ If A and B are square matrices and $AB = 0$ then at least $A = 0$ or $B = 0$ ”.

2. Attempt **any two** of the following :

10

i) Let A be an $n \times n$ matrix and B be any $n \times 1$ matrix. Then prove that the following statements are equivalent.

a) A is invertible

b) $AX = B$ has a unique solution.

ii) Find the conditions that a, b, c must satisfy, so that the following system of linear equations is consistent :

$$x + y + 2z = a$$

$$x + y = b$$

$$2x + y + 3z = c$$

iii) Show that the vectors $\overline{v}_1 = (1, 2, 3)$, $\overline{v}_2 = (0, 0, 1)$, $\overline{v}_3 = (0, 1, 2)$ span \mathbb{R}^3 .

3. Attempt **any two** of the following :

10

i) Prove that, a set with exactly two vectors is linearly independent if and only if neither vector is a scalar multiple of the other.

ii) Find a basis for the column space and nullity of the matrix.

$$A = \begin{bmatrix} 1 & -1 & 2 & 3 & 1 \\ -4 & 4 & 8 & 6 & 2 \\ 5 & -5 & 10 & 15 & 5 \\ 1 & 2 & 3 & 4 & 5 \\ -1 & -2 & -3 & -4 & -5 \end{bmatrix}$$

iii) Find all eigen values of A and a basis for eigen space to the largest eigen value of A, where

$$[A] = \begin{bmatrix} 2 & 1 & 1 \\ 2 & 3 & 4 \\ -1 & -1 & -2 \end{bmatrix}$$



4. Attempt **any one** of the following : **10**

i) a) Let $V = \mathbb{R}^+$ be the set of all positive reals. Define addition of any two members \bar{x} and \bar{y} to be the usual multiplication of numbers that is $\bar{x} + \bar{y} = x \cdot y$, define scalar multiplication by a scalar k to any $\bar{x} \in \mathbb{R}^+$ to be x^k that is $k\bar{x} = x^k$ then determine whether V is a vector space. **8**

b) State : Cayley-Hamilton theorem. **2**

ii) a) If $T: \mathbb{R}^3 \rightarrow \mathbb{R}^3$ is a Linear transformation defined by $T(x, y, z) = (x + y - z, x - 2y + z, -2x - 2y + 2z)$ Find Rank (T) and Nullity (T). Also verify dimension theorem. **5**

b) Find a matrix P that diagonalizes A and determine $P^{-1}AP$. **5**

$$[A] = \begin{bmatrix} 1 & 0 \\ 6 & -1 \end{bmatrix}.$$



[4218] – 104

Seat
No.

S.Y. B.Sc. (Computer Science) (Semester – I) Examination, 2012
MATHEMATICS (Paper – II)
MTC – 212 : Numerical Analysis
(2008 Pattern)

Time : 2 Hours

Max. Marks : 40

- Instructions :** 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Use of single memory, non-programmable scientific calculator is allowed.**

1. Attempt **all** questions :

10

- i) If $y = \operatorname{cosec}^2 x$ then find the error in x .
- ii) Find the number of positive and negative roots of the equation
 $f(x) = x^4 + 4x^3 - 4x - 13 = 0$ (Use Descarte's rule).
- iii) Evaluate $\Delta (\tan^{-1}x)$.
- iv) Find the relative error of the number 1.53364.
- v) Using False position method, find the real root of the equation $x^2 - x - 2 = 0$ (Perform 1 Iteration).
- vi) Write the formula for $\frac{d^2y}{dx^2}$ using Newton's forward difference formula for tabular values of x .
- vii) Prove that $\delta^2 = \Delta - \nabla$.
- viii) Given $\frac{dy}{dx} = x^2 + y$; $y(0) = 1$, find $y(0.1)$ using Euler's method.
- ix) If $f(0) = 0$, $f(0.25) = 0.06153$, $f(0.50) = 0.222$, $f(0.75) = 0.3956$ and $f(1) = 0.5$,
find $\int_0^1 f(x) dx$ using Trapezoidal rule.
- x) Write Runge-Kutta formula of fourth order for ordinary differential equation.

P.T.O.



2. Attempt **any two** of the following :

10

- i) Find a real root of the equation $x \sin x + \cos x = 0$ correct to 3 decimal places using Newton Raphson method. (Take $x_0 = 2.5$)
- ii) Given $\log_{10} 654 = 2.8156$, $\log_{10} 658 = 2.8182$, $\log_{10} 659 = 2.8189$, $\log_{10} 661 = 2.8202$.

Find $\log_{10} 656$ using Lagrange's interpolation formula.

- iii) Explain Gauss-Seidel iterative method for solving system of linear equations.

3. Attempt **any two** of the following :

10

- i) State and prove Newton's backward interpolation formula for equally spaced points.
- ii) From the following table, find $\frac{dy}{dx}$ at $x = 1.1$

| | | | | | | | |
|----------|-------|-------|-------|-------|-------|-------|--------|
| x | 1.0 | 1.1 | 1.2 | 1.3 | 1.4 | 1.5 | 1.6 |
| y | 7.989 | 8.403 | 8.781 | 9.129 | 9.451 | 9.750 | 10.031 |

- iii) Given the following data, find the value of $f(8)$ and $f(15)$ using Newton's divided difference formula.

| | | | | | | |
|-------------|----|-----|-----|-----|------|------|
| x | 4 | 5 | 7 | 10 | 11 | 13 |
| f(x) | 48 | 100 | 294 | 900 | 1210 | 2028 |



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

10

i) a) The velocity 'v' of a particle at a distance 's' from a point on its path is given by the table below :

| | | | | | | | |
|------------------|----|----|----|----|----|----|----|
| S(meters) | 0 | 10 | 20 | 30 | 40 | 50 | 60 |
| V(m/sec.) | 47 | 58 | 64 | 65 | 61 | 52 | 38 |

Estimate the time taken to travel 60 meters by using Simpson's $\left(\frac{1}{3}\right)^{\text{rd}}$ rule.

b) State and derive Simpson's $\left(\frac{3}{8}\right)^{\text{th}}$ rule for numerical integration.

ii) a) Given that $\frac{dy}{dx} = 1 + y^2$, with $y(0) = 0$, find $y(0.2)$ using Runge-Kutta second order method. [Take $h = 0.2$].

b) Derive the formula for Euler's modified method. Hence use it to find the value of $y(0.1)$ correct upto 4 decimal places, where $\frac{dy}{dx} = 1 + xy$; $y(0) = 2$ [Take $h = 0.1$]



[4218] – 105

S.Y. B.Sc. (Computer Science) (Semester – I) Examination, 2012

Electronics (Paper – I)

ELC 211 : MICROPROCESSOR ARCHITECTURE AND PROGRAMMING
(New Course) (2008 Pattern)

Duration : 2 Hours

Max. Marks : 40

Instructions: 1) **All** questions are **compulsory**.
2) Figures to the **right** indicate **full** marks.
3) **Neat** diagrams must be drawn **wherever** necessary.

1. Answer the following questions in **one** or **two** sentences. **(1×10=10)**

- a) State one advantage and disadvantage of parallel communication over serial communication.
- b) State the use of T_xD and R_xD signal of RS 232.
- c) How much level 1 and level 2 cache is there in basic Pentium ?
- d) Which instructions are used to handle data transfer between the CPU and the I/O device ?
- e) Give any two features of NASM.
- f) What will be the result in AL after executing SHL AL, 8 ?
- g) What is device driver ?
- h) State the use of direction flag.
- i) State the difference between flowchart and algorithm.
- j) What is the use of IVT ?

2. Attempt **any two** of the following : **(5×2=10)**

- a) Define hit and miss with reference to cache memory. If $h = 0.8$, $t_c = 1 \mu \text{ sec}$ and $t_m = 100 \mu \text{ sec}$, calculate the average memory access time.
- b) Explain the general purpose registers in Pentium.
- c) Explain any five assembler directives of Pentium.

P.T.O.



3. Attempt **any two** of the following : **(5×2=10)**
- a) With the help of a neat schematic diagram, describe the process of DMA transfer.
 - b) Write an assembly language program to accept 5 single digit numbers from keyboard and add the numbers.
 - c) Explain the following addressing modes of Pentium.
 - i) Based-Indexed addressing
 - ii) Register Indirect addressing.

4. Attempt **any one** of the following : **(10×1=10)**
- a) Explain two way set associative mapping used in Cache.
 - b) Name the instruction type used in the following instructions.
 - i) PUSH C x
 - ii) SCASB
 - iii) RCL AL, 2
 - iv) JAE BACK
 - v) NOP.

OR

- a) State the features of real mode and protected mode operation of Pentium.
 - b) Write an assembly language program to find the smallest of 5 numbers stored in an array.
-



[4218] – 106

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S.Y. B.Sc. (Computer Science) (Semester – I) Examination, 2012
ELECTRONICS (Paper – II)
ELC – 212 : Communications Principles
(New Course) (2008 Pattern)

Time : 2 Hours

Max. Marks : 40

Instructions : 1) **All questions are compulsory.**
2) **Neat diagrams must be drawn wherever necessary.**

1. Answer the following in **one** or **two** sentences. **(1×10=10)**
- State Nyquist Sampling theorem.
 - Determine the modulation index for an AM signal if $V_c = 3.\sin 3\pi t$ and modulating signal $V_m = 2.\sin \pi t$.
 - State any two functions of NMS (Network Management Subsystem) under GSM.
 - How many voice channels exists in a Jumbo Group ?
 - Define the directivity of an antenna.
 - State the expression for Shannon's Theorem.
 - What is significance of a guard band ?
 - Give any two applications of RFID.
 - Comment on "16 QAM is combination of ASK and FSK".
 - How many characters are used in MMS services ?
2. Attempt **any two** of the following : **(2×5=10)**
- Define the following terms with suitable examples in communication.
 - Simplex
 - Half-duplex
 - Full duplex
 - Baseband
 - Broadband
 - Explain CDM system with suitable diagram.
 - Explain Bluetooth technology architectural layers with neat block diagram.

P.T.O.



3. Attempt **any two** of the following : **(2×5=10)**

- a) Differentiate between AM and FM systems.
- b) Explain the role of 'Data link layer' and 'Network access layer' in wireless system architecture.
- c) Explain spread spectrum digital communication system with suitable block diagram.

4. Attempt the following questions (**any one**) : **(10×1=10)**

- a) i) Explain Electronic Communication system with neat block diagram. **5**
- ii) Explain the cellular concept of mobile communication system. Also explain the concept of "Frequency Reuse". **5**

OR

- b) i) Differentiate between active and passive RFID. **5**
- ii) Explain QPSK modulator with neat block diagram. **5**



[4218] – 108

Seat
No.

S.Y.B.Sc. (Computer Science) (Semester – I) Examination, 2012
COMPULSORY ENGLISH
(2008 Pattern)

Time : 2 Hours

Max. Marks : 40

1. Answer **any two** of the following : **10**
- A) State whether the following situations are formal or informal. **5**
- 1) President's address on the eve of Independence Day.
 - 2) A girl explaining the recipe to her mother.
 - 3) Conversation among the three patients standing in the que at the hospital.
 - 4) A group of students discussing the plan of going to a movie.
 - 5) A lawyer pleading in the court.
- B) Write a brief talk on "Indian Education System". **5**
- C) Identify the message that each of the nonverbal signals below conveys. **5**
- 1) Crossed legs
 - 2) Tilting of head
 - 3) Restless hands
 - 4) Frown
 - 5) Lack of eye-contact.
2. Answer the following : **10**
- A) Use the following words in sentences to bring out their literal and figurative meanings. **3**
- 1) Boiling with
 - 2) Turn off
 - 3) Draw.

P.T.O.



- B) Make sentences from the collocations given below : 4
1) in the hope that 2) form a habit
3) resolve an issue 4) Take an exam

- C) Differentiate between the following pairs of words and use them in sentences. 3
1) ingenuous ; ingenious
2) Stationary ; stationery
3) affect ; effect

3. Answer the following :

- A) Prepare a lexical set 4
1) Temple 2) Hockey
3) Restaurant 4) Wedding ceremony

- B) Give 2 instances of compound words. 2

- C) Match the following with the antonyms. 4

| A | B |
|------------|----------|
| 1) smooth | dwarf |
| 2) loyal | familiar |
| 3) strange | rough |
| 4) giant | disloyal |

4. Answer **any two** of the following :

- A) Write the phonetic transcription of the following words :
1) scarf 2) gym
3) task 4) phrase
5) fun

- B) Prepare a presentation of 5 slides on the latest model of mobile.

- C) State 5 polite expressions for closing a conversation.



[4218] – 202

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| Seat No. | |
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**S.Y. B.Sc. (Computer Science) (Semester – II) Examination, 2012
CS – 222 : SOFTWARE ENGINEERING (2008 Pattern) (Paper – II)**

Time : 2 Hours

Max. Marks : 40

Instructions : i) *All questions are compulsory.*
ii) *All questions carry equal marks.*
iii) *Black figures to the right indicate full marks.*

1. Attempt **all** of the following : **(1×10=10)**

- a) What are the different evolutionary process models ?
- b) List any 4 tasks involved in Requirement Engineering.
- c) List the activities involved in Team Software Process.
- d) Define Data Attributes.
- e) Give any two objectives that analysis model must achieve.
- f) What is system software ?
- g) State any 4 factors on which crystal method focuses.
- h) Define Cohesion.
- i) Which factors the software engineer should take into consideration while constructing a system model.
- j) Which problems are faced during requirement elicitation ?

2. Attempt **any two** of the following : **(2×5=10)**

- a) Explain the different characteristics of software.
- b) Explain the spiral model.
- c) What is Extreme Programming ? Explain the activities involved in the XP process.

P.T.O.



3. Attempt **any two** of the following : **(2×5=10)**

- a) Explain any 5 core principles that guide the process.
- b) Describe the System Engineering Hierarchy.
- c) Write a note on myths a software practitioner could have.

4. Attempt the following : **(2×5=10)**

A) What are the different Requirement Analysis Modeling Approaches.

OR

A) Write a note on Domain Analysis.

B) Draw the Use Case diagram, Class diagram and State diagram for “Library Management System”.





[4218] – 202

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| Seat No. | |
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**S.Y. B.Sc. (Computer Science) (Semester – II) Examination, 2012
CS – 222 : SOFTWARE ENGINEERING (2008 Pattern) (Paper – II)**

Time : 2 Hours

Max. Marks : 40

Instructions : i) **All** questions are **compulsory**.
ii) **All** questions carry **equal** marks.
iii) **Black figures** to the **right** indicate **full** marks.

1. Attempt **all** of the following : **(1×10=10)**

- a) What are the different evolutionary process models ?
- b) List any 4 tasks involved in Requirement Engineering.
- c) List the activities involved in Team Software Process.
- d) Define Data Attributes.
- e) Give any two objectives that analysis model must achieve.
- f) What is system software ?
- g) State any 4 factors on which crystal method focuses.
- h) Define Cohesion.
- i) Which factors the software engineer should take into consideration while constructing a system model.
- j) Which problems are faced during requirement elicitation ?

2. Attempt **any two** of the following : **(2×5=10)**

- a) Explain the different characteristics of software.
- b) Explain the spiral model.
- c) What is Extreme Programming ? Explain the activities involved in the XP process.

P.T.O.



3. Attempt **any two** of the following : **(2×5=10)**

- a) Explain any 5 core principles that guide the process.
- b) Describe the System Engineering Hierarchy.
- c) Write a note on myths a software practitioner could have.

4. Attempt the following : **(2×5=10)**

A) What are the different Requirement Analysis Modeling Approaches.

OR

A) Write a note on Domain Analysis.

B) Draw the Use Case diagram, Class diagram and State diagram for “Library Management System”.





[4218] – 203

S.Y. B.Sc. (Computer Science) (Semester – II) Examination, 2012
MATHEMATICS (Paper – I)
MTC – 221 : COMPUTATIONAL GEOMETRY
(2008 Pattern)

Time : 2 Hours

Max. Marks : 40

Instructions : 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Use of single memory, non-programmable scientific calculator is allowed.**

1. Attempt **all** of the following. **10**

i) The line $L: 2x + 3y = 1$ is transformed to the line L^1 using the transformation

matrix, $[T] = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$. Find the slope of line L^1 .

ii) Write the transformation matrix for reflection through the line $y = x$.

iii) An unit square is transformed under a 2×2 transformation matrix,

$[T] = \begin{bmatrix} 3 & 1 \\ -2 & 2 \end{bmatrix}$. Find the area of transformed figure.

iv) Find the angle of rotation θ , so that the line $y = -x$ coincides with X-axis.

v) Write the transformation matrix for scaling in X, Y and Z coordinates by factors 2, -3 and 4 units respectively.

vi) Write the types of Axonometric projection.

vii) Write the transformation matrix for perspective projection onto the $Z = 0$ plane from the centre of projection at the point $[0 \ 0 \ 5]$.

P.T.O.



- viii) Find the value of $\delta\theta$ to generate equally spaced 4 points on the hyperbolic segment in the 1st quadrant for $3 \leq y \leq 6$, where equation of the hyperbola is :

$$\frac{x^2}{9} - \frac{y^2}{25} = 1.$$

ix) Define : Convex hull.

x) Write two properties of Be'zier curve.

2. Attempt **any two** of the following.

10

i) Prove that, midpoint of the line segment AB is transformed to the midpoint of segment A^1B^1 under 2×2 transformation matrix [T].

ii) Develop a single transformation matrix for the following sequence of transformations :

a) Reflection through line $y = 0$.

b) Shearing in X and Y direction by 3 and – 4 units respectively.

c) Translation in X direction by – 5 units.

iii) Find the point of intersection at infinity for the lines :

$$2x + y = 1,$$

$$2x + y = 2.$$

3. Attempt **any two** of the following.

10

i) Write an algorithm for reflection through an arbitrary plane in space.

ii) Develop the cavalier and cabinet projection for $\alpha = 120^\circ$, of the object,

$$[X] = \begin{bmatrix} 1 & 2 & 2 & 1 \\ 0 & 1 & 2 & 1 \end{bmatrix}.$$

iii) Determine the isometric projection for $\phi = -45^\circ$ and $\theta = 35.26^\circ$. Apply it on $P[1, 2, 1]$.



4. Attempt **any one** of the following.

10

i) a) Obtain the transformation matrix for reflection through $X = 5$ plane. Apply it on the object,

$$[X] = \begin{bmatrix} 0 & 0 & 0 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}.$$

b) Write an algorithm to generate uniformly spaced n points on the circle, $(x - h)^2 + (y - k)^2 = r^2$.

ii) a) Generate uniformly spaced three points on the parabolic segment, $y^2 = 8x$, in the 1st quadrant for $4 \leq y \leq 20$.

b) Find the parametric equation of a Be'zier curve determined by control points $B_0[0 \ 2]$, $B_1[2 \ 3]$, $B_2[3 \ 2]$ and $B_3[2 \ 0]$. Also, find position vectors of the points on the curve corresponding to parameter value, $t = 0.2, 0.4$.





[4218] – 205

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| Seat No. | |
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S.Y.B.Sc. Computer Science (Semester – II) Examination, 2012
ELC – 221 : ELECTRONICS (Paper – I)
Microcontroller and Embedded Systems
(2008 Pattern)

Time : 2 Hours

Max. Marks : 40

- Instructions :** 1) All questions are **compulsory**.
2) Figures to the **right** indicate **full** marks.
3) **Neat** diagrams must be drawn **wherever** necessary.

1. Answer the following in **one** or **two** sentences. **(1×10=10)**
- a) List the total number of lines used in Parallel Ports and Serial Port of 8051.
 - b) Give the capacity of on chip RAM and ROM of 8051.
 - c) How can parallel ports of 8051 be configured as input ports ?
 - d) What is the biggest count that can be stored in the timer register when operated in mode 1 and mode 2 ?
 - e) What is the source of clock pulse when Timer 0 is used as counter ?
 - f) What is the use of line driver in serial communication ?
 - g) Specify the timer and its mode of operation to carry out serial communication.
 - h) For ADC 0804, if $V_{ref}/2$ is 1.25V, what will be the maximum analog voltage that can be applied as input ?
 - i) What is the function of simulator ?
 - j) What is the function of loader ?
2. Attempt **any two** of the following : **(2×5=10)**
- a) Write an assembly language program to accept 8 bit number from port 1. Check whether the number is equal to 09H, if it is equal add 03H to it and send it to port 0 otherwise complement the number and send it to port 2.
 - b) Draw the bit format of TMOD register and explain the function of each bit.

P.T.O.



- c) In 8051 what is the priority of interrupts upon reset. If interrupt priority register is loaded with 18H, what will be the order in which interrupts will be serviced.

3. Attempt **any two** of the following : **(2×5=10)**

- a) Write an assembly language program to generate a pulse of 10 M.sec duration on P1.2 using Timer 1 in mode 1. (Crystal frequency = 12 MHz).
- b) Draw a schematic diagram to illustrate interfacing of LCD to the microcontroller. What should be the status of RS, R/W and enable Pin when microcontroller sends a command word and a data word ?
- c) Write an assembly language program to send 'Hello' on serial port of 8051 at 4800 baud without using interrupt. (Crystal frequency = 11.0592 MHz)

4. Attempt **any one** of the following : **(1×10=10)**

- a) i) Draw the block diagram of 8051 microcontroller. Write in brief about various registers of 8051.
- ii) What is an Embedded System ? How are Embedded systems classified ?

OR

- b) i) Write an assembly language program to find the largest number from an array of 10 numbers stored in RAM starting from address 60 H. **5**
- ii) Give the function of the following : **3**
 - a) Cross compiler
 - b) Cross assembler
 - c) Emulator.
- iii) Assuming $I_{ref} = 2 \text{ mA}$, what will be the output current of DAC 0808 if the digital input is FCH. **2**



[4218] – 207

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| Seat No. | |
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S.Y. B.Sc. (Computer Science) (Semester – II) Examination, 2012
COMPULSORY ENGLISH
(2008 Pattern)

Time : 2 Hours

Max. Marks : 40

1. Attempt **any two** of the following : **10**

- A) Imagine that you are a News Reporter of a famous News Channel. Frame five questions along with the probable responses that you would like to ask to the famous politician.
- B) Give any five features of the formal meeting.
- C) Rohit, Shyam and Harsha are asked to have a group discussion on the topic "Recent Performance of Indian Cricket Team". Write the transcript of the discussion.

2. Attempt **any two** of the following : **10**

- A) Write a paragraph on the topic of "A Meaningful Education".
- B) Write a Summary note of the passage given below.

Creative writing is very different from the regular writing you would do in a chemistry or geography class or in an official letter or report, the purpose of all of which is simply to convey information. When you write formal letters, informative articles or research proposals, there are certain rules of follow in with regard to format, language expressions and style. But when doing a piece of creative writing, such as a story or a description of a person, place or experience, you have the chance to say things in your own way and in a style and language that is yours alone and, in fact, it is best to avoid initiating someone else when doing creative writing. Creative writing allows you to experiment with style and use language in a novel way by adding metaphors, dialogues and colourful vocabulary to create the mood you want to in the mind of the reader. Your writing can mirror emotions such as humour, joy and sadness. It can have a tone that is sympathetic or critical, light-hearted or serious.

C) Write a book review of the book that you have read recently.

P.T.O.



3. Attempt **any two** of the following : **10**
- A) Punctuate the following :
- 1) I found the chapter administration in India very interesting.
 - 2) They said to Merry you must sing at the music festival.
 - 3) Manu whispered i cannot go back to the village.
 - 4) Sorry I missed that could you must repeat it please.
 - 5) Can you think of a way of dealing with this .
- B) Rearrange the jumbled sentences to make a meaningful paragraph.
- 1) They are chemistry, physics, philosophy or medicine, literature and peace.
 - 2) It is awarded from funds bequeathed by Alfred Nobel, a Swedish inventor and philanthropist.
 - 3) Nobel’s will designated six areas for which prizes could be awarded.
 - 4) The Nobel Prize is considered one of the most prestigious awards made to people whose work benefits humanity.
 - 5) In 1969 economics was added to the list.
- C) Narrate an unforgettable incident in your life.
4. Attempt **any two** of the following : **10**
- A) Write any five steps involved in making powerpoint presentation.
- B) Prepare 5 slides of about 10 words each for making a presentation on the topic of “E-learning”.
- C) You have to go to Singapore to work on a software project for your company in Hyderabad. Draft an e-mail message to Sandeep Travels E-mail Address : (Sandeeptours@sandee.com) asking them to make travel arrangements for you to go to Singapore by air and return after a week. Specify the airline you would prefer to travel by, the dates, the class by which you want to travel, the mode of payment, the delivery instructions and your food preferences in an attachment called “Travel Details”.
-