Total No. of Questions—4] [Total No. of Printed Pages—4

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[4718]-101

S.Y. B.Sc. (Semester I) EXAMINATION, 2015

COMPUTER SCIENCE

Paper I

CS–211 : Data Structures Using C

(2013 PATTERN)

Time : Two Hours **Maximum Marks : 40**

N.B. **:—** (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

(*iii*) Assume suitable data if necessary.

1. Attempt *all* of the following : [10×1=10]

(*a*) Define data structure.

(*b*) What is an advantage of a Binary search over linear search ?

(*c*) Define Omega Notation (Ω).

(*d*) Convert the following infix expression to prefix :

((A + B) * C – (D – E))

(*e*) List the types of Priority Queue.

(*f*) In binary tree construction which is the most efficient data structure used ?

P.T.O.

(*g*) State any *one* application of graph.

(*h*) Which traversal will be used to display elements of Binary Search tree in ascending order ?

(*i*) "The elements of a linked list are stored sequentially". State true or false.

(*j*) Name the data structure used for :

(*i*) BFS of graph

(*ii*) Reversing a string.

2. Attempt any *two* of the following : [2×5=10]

(*a*) Write a 'C' function to find minimum and maximum element from leaf nodes of a Binary tree.

(*b*) Write a 'C' function to add and delete an element from a Linear Queue (Dynamic Implementation).

(*c*) Write a 'C' function to delete an odd position element from a doubly linked list.

3. Attempt any *two* of the following : [2×5=10]

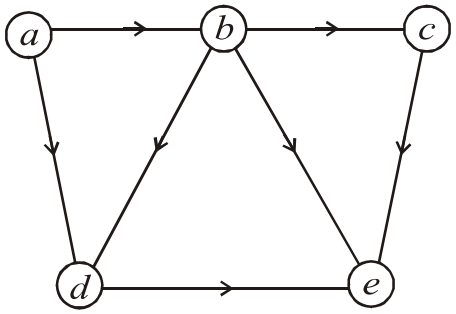
(*a*) Construct an AVL tree for the following data :

COMP, MATH, STAT, GEOG, ELEC, CHEM.

(*b*) Sort the following data using merge sort method :

22, 4, 6, 13, 12, 18, 27.

(*c*) Consider the following graph :



Write :

(*i*) Adjacency matrix

(*ii*) Adjacency list

(*iii*) DFS and BFS (source vertex *a*).

4. Attempt either A *or* B : [1×10=10]

(A) (*i*) Consider the given infix expression $u * v + z/w$. Write its postfix expression. Also show steps to evaluate the postfix expression using stack. [4]

Given : $u = 3$, $v = 1$, $z = 4$, $w = 2$.

(*ii*) Explain graph representation using adjacency multilist with example. [3]

(*iii*) Write an algorithm for Linear Search. Also state its best case and worst case time complexity. [3]

Or

(B) (1) Define the following terms : [4]

(*i*) AOV network

(*ii*) Dequeue

(*iii*) Skewed binary tree

(*iv*) Space complexity.

(2) Write a node structure for generalized linked list. Draw GLL for ((*a*, (*b*, *c*)), *d*, *e*). [3]

(3) Give the output of the following code segment :

```
Void fun (int n)
{
    struct stack s ; init (&s);
    while (n > 0)
    {
        push (&s, n%2);
        n = n/2;
    }
    while (! isempty (&s))
        printf ("%d", pop (&s));
}
```

The call to the function is fun (10), also explain the steps of the output. [3]

Total No. of Questions—**4**] [Total No. of Printed Pages—**3**

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[4718]-102

S.Y. B.Sc. (Computer Science) (First Semester)

EXAMINATION, 2015

CS–212 : RELATIONAL DATABASE MANAGEMENT SYSTEM

Paper II

(2013 PATTERN)

Time : Two Hours **Maximum Marks : 40**

N.B. **:—** (*i*) *All* questions are compulsory.

(*ii*) *All* questions carry equal marks.

(*iii*) Figures to the right indicate full marks.

1. Attempt *all* of the following : [10×1=10]

(*a*) State any *two* client components in client-server architecture.

(*b*) What is Database Security ?

(*c*) Define Serial Schedule.

(*d*) What is the output of the following command ?

Extract (YEAR_MONTH FROM '2014-05-20');

(*e*) State and explain any *two* types of log records.

(*f*) What is UNIQUE Modifier ?

(*g*) Define Cascading Rollback.

(*h*) Define Cipher Text.

(*i*) Define Super Key.

(*j*) What is Referential Integrity ?

P.T.O.

2. Attempt any *two* of the following : [2×5=10]

(*a*) Explain Discretionary Access Control Mechanism.

(*b*) State difference between two-tier and three-tier client-server architecture.

(*c*) Explain Time stamp based protocol with read-write conflicting conditions.

3. Attempt any *two* of the following : [2×5=10]

(*a*) The following is a list of events in an interleaved execution of set of transactions T_1, T_2, T_3, T_4 with two phase locking protocol.

Time	**Transaction**	**Code**
t_1	T_1	Lock (B, X)
t_2	T_2	Lock (A, X)
t_3	T_3	Lock (C, S)
t_4	T_4	Lock (B, X)
t_5	T_1	Lock (D, S)
t_6	T_2	Lock (C, X)
t_7	T_3	Lock (A, X)
t_8	T_4	Lock (C, S)

Check if there is a deadlock using wait-for graph. If yes, which transactions are involved in deadlock ?

(*b*) Consider the following tables :

Student (sno, sname)

Teacher (tno, tname, qualification)

Student and Teacher are related with many-many relationship.

Write a plpgsql function using cursor to list details of students who have not taken 'Data structure' as a subject.

(*c*) What is Trigger ? Explain with an example.

4. Attempt the following : [2×5=10]

(*a*) The following are log entries at the time of system crash :

[Start-transaction, T_1]

[Write-item, T_1, B, 10]

[Commit, T_1]

[Start-transaction, T_2]

[Write-item, T_2, D, 20]

[Write-item, T_2, A, 30]

[Commit, T_2]

[Checkpoint]

[Start-transaction, T_3]

[Write-item, T_3, B, 20]

[Start-transaction, T_4]

[Write-item, T_4, C, 10] $\rightarrow$ System Crash

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

(*b*) Explain two-phase locking protocol.

Or

(*c*) What is View ? Explain different statements in views.

Total No. of Questions—4] [Total No. of Printed Pages—4

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[4718]-103

S.Y. B.Sc. (Computer Science) (Semester I)

EXAMINATION, 2015

MATHEMATICS

Paper I

MTC–211 : Applied Algebra

(2013 PATTERN)

Time : Two Hours **Maximum Marks : 40**

N.B. **:—** (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

(*iii*) Use of single memory, non-programmable scientific calculator is allowed.

1. Attempt any *five* of the following : [5×2=10]

(*i*) Determine if the vector $\bar{X} = \begin{bmatrix} 3 \\ -3 \\ -3 \end{bmatrix}$ is an eigenvector of the matrix :

$$A = \begin{bmatrix} 4 & 0 & 1 \\ -2 & 1 & 0 \\ -2 & 0 & 1 \end{bmatrix}.$$

P.T.O.

(*ii*) State if the following statement is True *or* False and justify your answer :

The row-vectors of a matrix of order 20 × 10 are linearly independent.

(*iii*) Let $T : \mathbf{R}^2 \to \mathbf{R}^2$ be a linear transformation defined by :

$$T(x, y) = (4x + y, -x + 3y),$$

Find standard matrix of T.

(*iv*) Consider a basis $B = \{1 + x, -2 + x\}$ for a vector space $\mathbf{P}_2$. Find the vector whose coordinates with respect to basis B are 4 and 1.

(*v*) Find the symmetric matrix A such that the quadratic form :

$$x^2 + 2y^2 + 4z^2 + 6xz - 4yz$$

is expressed in the form $X^t A X$.

(*vi*) If $T : V \to W$ is a linear transformation, then write definitions of :

(*a*) range of T

(*b*) kernel of T.

(*vii*) Consider the (6, 7) parity check code. For both of the following received words, determine whether an error will be detected :

(*a*) 1010011

(*b*) 1010100.

2. Attempt any *two* of the following : [2×5=10]

(*i*) Find a basis of the column space of the following matrix :

$$A = \begin{bmatrix} 1 & 2 & 3 \\ -1 & 0 & 1 \\ 2 & 2 & 2 \\ 4 & 1 & -2 \end{bmatrix}$$

Hence find rank of A.

(*ii*) Let

$$S = \{\overline{u}_1, \overline{u}_2, \ldots\ldots, \overline{u}_r\}$$

be a set of vectors in $\mathbf{R}^n$. If $r > n$, then prove that S is linearly dependent.

(*iii*) Determine if the vector $\overline{p} = 1 + x + x^2$ belongs to the linear span of the set :

$$\{1 - x + x^2,\ 2 - x,\ x + x^2,\ 2 + x + x^2\}.$$

3. Attempt any *two* of the following : [2×5=10]

(*i*) If $T : V \to W$ is a linear transformation, then prove that :

(*a*) $T(-\overline{v}) = -T(\overline{v})$; for $\forall\ \overline{v} \in V$,

(*b*) If $\overline{u}, \overline{v} \in V$, then $T(\overline{u} - \overline{v}) = T(\overline{u}) - T(\overline{v})$.

(*ii*) Find all eigenvalues of the matrix :

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

Also find basis of the eigenspace of A corresponding to maximum eigenvalue of A.

(*iii*) Determine the values of 'a' for which the following set of vectors in $\mathbf{R}^3$ is linearly dependent :

$$\{(a, -2, -2), (-2, a, -2), (-2, -2, a)\}.$$

4. Attempt any *one* of the following : [1×10=10]

(*i*) Suppose T : $\mathbf{P}_2 \rightarrow \mathbf{R}^2$ be a linear transformation, defined by :

$$T(a + bx + cx^2) = (a + 2b + c,\ a - b - c).$$

(*a*) Find the matrix of T with respect to the bases $B = \{\overline{p}_1, \overline{p}_2, \overline{p}_3\}$ for $\mathbf{P}_2$ and $B' = \{\overline{e}_1, \overline{e}_2\}$ for $\mathbf{R}^2$; where

$$\overline{p}_1 = 1 - x - x^2,\ \ \overline{p}_2 = 2 + x^2,\ \ \overline{p}_3 = 1 \text{ and}$$

$$\overline{e}_1 = (1, 0),\ \ \overline{e}_2 = (0, 1).$$

(*b*) Use the matrix obtained to compute $T(\overline{p})$, where $\overline{p} = 7 - 2x + x^2$.

(*ii*) (*a*) Let

$$H = \begin{bmatrix} 1 & 1 & 0 \\ 0 & 1 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

be a parity check matrix. Determine (2, 5) group code function :

$$e_H : B^2 \rightarrow B^5.$$

(*b*) Find minimum value of the quadratic form :

$$3x_1^2 + 3x_2^2 + 2x_1.x_2$$

subject to the constraint $x_1^2 + x_2^2 = 1$ and determine the values of x_1 and x_2 at which minimum occurs.

Total No. of Questions—4] [Total No. of Printed Pages—4

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S.Y. B.Sc. (Comp. Sci.) (I Semester) EXAMINATION, 2015

MATHEMATICS

Paper II

(MTC-212 : Numerical Analysis)

(2013 PATTERN)

Time : Two Hours **Maximum Marks : 40**

N.B. **:—** (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

(*iii*) Use of single memory, non-programmable, scientific calculator is allowed.

1. Attempt any *five* of the following : [5×2=10]

(*i*) Round off the number 0.005998 to three decimal digits, find its relative and percentage error.

(*ii*) Find the real root correct upto 2 decimal places of the equation $x^3 - 9x + 1 = 0$ by Regula-Falsi method.

(Perform 2 iterations, by considering the interval [2, 3])

P.T.O.

(*iii*) Given :

$$U_0 + U_8 = 1.9243$$

$$U_1 + U_7 = 1.9590$$

$$U_2 + U_6 = 1.9823$$

$$U_3 + U_5 = 1.9956$$

find U_4.

(*iv*) Use Lagrange's interpolation formula to obtain polynomial P(x) which satisfies P(–1) = –1, P(1) = 1, P(2) = 5.

(*v*) Evaluate :

$$\int_0^1 x^2 \, dx$$

by trapezoidal rule. Take $h = 0.5$

(*vi*) Write Bessel's interpolation formula.

(*vii*) Given :

$$\frac{dy}{dx} + 1 = x + y$$

with $y(1) = 0$.

Find $y(1.1)$

using Euler's method.

2. Attempt any *two* of the following : [2×5=10]

(*i*) Derive Gauss forward difference formula for central difference.

(*ii*) The population of a town in the decimal census is given below. Estimate the population for the year 1895 :

Year x	**Population y** (in thousand)
1891	46
1901	66
1911	81
1921	93
1931	101

(*iii*) Use Newton's divided difference formula to obtain $f(8)$ if $f(1) = 3$, $f(3) = 31$, $f(6) = 223$, $f(10) = 1011$ and $f(11) = 1343$.

3. Attempt any *two* of the following : [2×5=10]

(*i*) Derive Euler's Maclaurin's formula for numerical integration.

(*ii*) Apply Hermite interpolation formula to obtain cubic polynomial which meets the following specification :

x : 0 1

y : 0 1

y' : 0 1

(*iii*) Evaluate :

$$\int_0^1 \frac{1}{1 + x} dx,$$

by dividing [0, 1] into 6 equal parts by using Simpson's $\left(\frac{3}{8}\right)^{th}$ rule.

4. Attempt any *one* of the following : [1×10=10]

(*i*) (*a*) Evaluate :

$$\int_0^1 e^x \, dx$$

by dividing [0, 1] into 10 equal parts by using Simpson's $\left(\frac{1}{3}\right)^{rd}$ rule.

(*b*) Given :

$$\frac{dy}{dx} = x + y$$

with initial $y(0) = 1$. Find $y(0.05)$ by Euler's modified method, take $h = 0.05$.

(*ii*) Given that $y' = x + y$ with $y(0) = 1$. Find $y(0.1)$ and $y(0.2)$ by using Runge-Kutta method of fourth order.

Total No. of Questions—4] [Total No. of Printed Pages—4

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S.Y. B.Sc. (Computer Science) (I Semester) EXAMINATION, 2015

ELECTRONICS

Paper I

ELC-211 : Digital System Hardware

(2013 PATTERN)

Time : Two Hours **Maximum Marks : 40**

N.B. **:—** (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

(*iii*) Neat diagram must be drawn whenever necessary.

1. Answer the following questions in *one or two* sentences : [10×1=10]

(*a*) Give the functions of control bus.

(*b*) Mention types of serial data communication.

(*c*) Define polling.

(*d*) List general purpose registers of pentium.

(*e*) Define super scalar architecture.

P.T.O.

(*f*) Convert $(11101)_{gray}$ into Binary equivalent.

(*g*) What is a state diagram ?

(*h*) Define memory access time.

(*i*) What is virtual memory ?

(*j*) Mention any *two* mapping techniques used with cache memory.

2. Attempt any *two* of the following : [2×5=10]

(*a*) Design a combinational logic circuit to convert 4-bit binary number into Gray Code.

(*b*) A machine makes 1000 references to memory and 850 time the information is found in the cache. If the cache access time is 100 μs and the main memory access time is 800 μs, find the average access time. What will happen if hit ratio is 100% ?

(*c*) Compare 8086 and pentium on the basis of address lines, data lines, availability of cache, clock speed and pipelines.

3. Attempt any *two* of the following : [2×5=10]

(*a*) What is an interface ? Mention important reasons for using an interface.

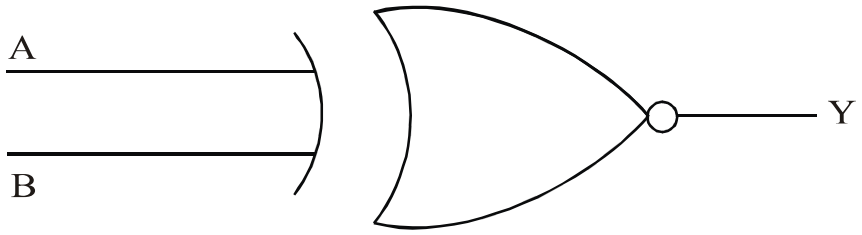
(*b*) Explain virtual memory mapping using paging. What is its disadvantages.

(*c*) Design 3-bit synchronous up counter using J-K Flip-flops.

4. Attempt any *one* of the following : [1×10=10]

(I) (*a*) If we have to build 16 k × 32 memory using 4k × 4 memory how many memory chips of 4k × 4 memory required. Find number of address lines required for final memory. [2]

(*b*) Using rules of Boolean algebra find out put expression for,



What is meant by diagonal and offset adjacencies. [4]

(*c*) Mention important specifications of RS232. [4]

Or

(II) (*a*) Give functions of the following blocks of pentium : [5]

(*i*) Pipelines

(*ii*) TLB

(*iii*) FPU

(*iv*) Prefetch buffer

(*v*) Bus unit.

(*b*) Explain how push and pop are implemented in memory stack. Where do you think the stack pointer has to be initialised in memory stack ? [5]

Total No. of Questions—4] [Total No. of Printed Pages—**2**

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[4718]-106

S.Y. B.Sc. (Comp. Sc.) (I Semester) EXAMINATION, 2015

ELECTRONICS

Paper II

ELC-212 : Analog Systems

(2013 PATTERN)

Time : Two Hours **Maximum Marks : 40**

N.B. **:—** (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

(*iii*) Neat diagrams must be drawn wherever necessary.

1. Attempt the following questions in *one or two* sentences : [10×1=10]

(*a*) List any *two* light intensity sensors.

(*b*) State *two* advantages of R-2R ladder network over binary weighted network.

(*c*) Which type of filter is preferred in ECG system : LPF/HPF ?

(*d*) Define active transducer.

(*e*) State any *two* applications of ADC.

(*f*) What will be the output of LM35 at 55ºC ?

(*g*) What is the principle of LVDT ?

(*h*) What is the use of Fresnel lens in PIR based intruder detector system ?

(*i*) Draw the circuit diagram of inverting amplifier using OPAMP.

(*j*) What is the use of Wheatstone's bridge ?

P.T.O.

2. Attempt any *two* of the following : [2×5=10]

(*a*) Explain the function of different blocks of an analog electronic system.

(*b*) Draw the diagram of level shifter circuit and explain its working.

(*c*) Explain the working of water level indicator system using float switch.

3. Attempt any *two* of the following : [2×5=10]

(*a*) Differentiate between active and passive filters.

(*b*) Draw the circuit diagram for R-2R ladder network. Determine the full scale output voltage and output voltage for input 1100 if the reference voltage is 12 V.

(*c*) Explain the working of piezoelectric humidity sensor with help of a neat diagram.

4. Attempt any *one* of the following : [1×10=10]

(*a*) (*i*) Draw the circuit diagram of OP-AMP based voltage to frequency converter and explain its working.

(*ii*) Explain the working of temperature monitoring system using LM-35.

Or

(*b*) (*i*) Define the following with respect to a sensor :

(*a*) Accuracy

(*b*) Range

(*c*) Linearity

(*d*) Sensitivity

(*e*) Resolution

(*ii*) Explain working of a 4-bit dual slope ADC with appropriate diagrams.

Total No. of Questions—4] [Total No. of Printed Pages—4

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S.Y. B.Sc. (Computer Science) (I Semester) EXAMINATION, 2015

ENGLISH

Paper I

(EN-211 : Technical English)

(2013 PATTERN)

Time : Two Hours **Maximum Marks : 40**

N.B. **:—** (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

1. (A) Attempt any *one* of the following in about **100** words each : [5]

(*i*) What is the difference between a planet and a star ?

(*ii*) Explain why Haldane thinks that the scientific point of view has definite advantages for civilization.

(B) Attempt any *one* of the following in about **100** words each : [5]

(*i*) Why is Saturn said to be a world in the making ?

(*ii*) What are the important causes which help civilized humans to live longer than uncivilized ones ?

2. (A) Attempt any *one* of the following in about **100** words each : [5]

(*i*) Why is the television a 'unique medium' ?

(*ii*) What is the significance of the little box that Rosemary wanted to buy ?

P.T.O.

(B) Attempt any *one* of the following in about **100** words each : [5]

(*i*) What is Rosemary's reaction when Philip refers to the lady as 'astonishingly pretty' ?

(*ii*) How did the narrator react to the changes made to his features in the photograph ?

3. (A) Complete the sentences with an appropriate word chosen from the bracket (any *five*) : [5]

(*i*) Nothing can.....the fact that she is my best friend. (altar/alter)

(*ii*) The little child is frightened of thunder and..... . (lightning/lightening)

(*iii*) This is a.....point, so we have to discuss it. (moot/mute)

(*iv*) He was busy.....over the costs. (pouring/poring)

(*v*) We were taken round the company's..... . (premises/premise)

(*vi*) Have you seen the new..... shop ? (stationary/stationery)

(*vii*) India is.....for its classical forms of dance and music. (popular/famous)

(B) Match the items in columns 'A' and 'B' below to form compound words (any *five*) : [5]

A	B
Organic	Line
Shopping	Minded
Crash	Screw
Dairy	Course
Pig	Farming
Open	List
Bottom	Sty
Cork	Farm

4. (A) Do as directed (any *five*) : [5]

(*i*) Although the curry was too salty, Amit did not complain. (Change into a simple sentence)

(*ii*) If you don't like the pink sari, you can take the white one. (Change into a compound sentence).

(*iii*) They are doing the work. (Change the voice)

(*iv*) The house looks beautiful. (Change into an exclamatory sentence).

(*v*) Hasan said, "I am returning to Nagpur next Saturday. (Change into reported speech).

(*vi*) What an exciting trip we had ! (Change into a declarative sentence).

(*vii*) Hamid cycles to college everyday. (Change into an interrogative sentence).

(B) Fill in the blanks with the most appropriate tense forms of verbs, given in the brackets (any *five*) : [5]

(*i*) They.....(leave) tomorrow morning.

(Simple future tense)

(*ii*) He had told me that he.....(try) to contact me for the past two days.

(Past perfect progressive tense)

(*iii*) I.....(read) the newspaper.

(Present progressive tense)

(*iv*) When I called Rajat yesterday, he.....(go) shopping. (Past perfect tense)

(*v*) She.....(do) her work.

(Present perfect tense)

(*vi*) They.....(play) cards.

(Past progressive tense)

(*vii*) She.....(drive) to Mumbai last week.

(Simple past tense)

Total No. of Questions—**4**] [Total No. of Printed Pages—**3**

Seat No.	

[4718]-11

S.Y. B.Sc. (Computer Science)

(First Semester) EXAMINATION, 2015

COMPUTER SCIENCE

Paper I

CS–211 : Data Structures Using 'C'

(2008 PATTERN)

Time : Two Hours **Maximum Marks : 40**

N.B. **:—** (*i*) *All* questions are compulsory.

(*ii*) *All* questions carry equal marks.

(*iii*) Figures to the right indicate full marks.

1. Attempt *all* of the following : [10×1=10]

(*a*) Define data object.

(*b*) Write the node structure of doubly circular linked list.

(*c*) State the components of space complexity.

(*d*) Give the queueful condition for circular queue implemented using array.

(*e*) Define balance factor.

(*f*) What is the height of a complete binary tree having '*n*' nodes ?

(*g*) Write any *two* applications of stack.

(*h*) State the limitation of merge sort.

(*i*) 'The adjacency matrix of a directed graph is always symmetric'. State True/False.

(*j*) Write the prefix expression for A – B * C + D $ E.

P.T.O.

2. Attempt any *two* of the following : [2×5=10]

(*a*) Write a 'C' function of delete a specific element from a doubly linked list.

(*b*) Write a 'C' function to find the largest element in a binary tree.

(*c*) Write a 'C' function to check if a string is a palindrome using stack. (Do not write stack functions).

3. Attempt any *two* of the following : [2×5=10]

(*a*) Show the steps of evaluating a postfix expression ABC * + DE/– using stack. Given A = 2, B = 4, C = –5, D = 9, E = 2.

(*b*) Construct an AVL tree for the following data :
JAN, FEB, AUG, MAY, OCT, JUL.

(*c*) Sort the following data using Merge Sort :
10, 5, 15, 30, 45, 20, 25.

4. Attempt either A *or* B : [1×10=10]

(A) (1) Consider the matrix given below : [4]

	1	2	3	4	5
1	0	0	1	1	0
2	0	0	0	1	0
3	0	1	0	0	1
4	0	0	0	0	1
5	0	0	0	0	0

(*i*) Draw the graph.

(*ii*) Draw its adjacency list.

(*iii*) Give the BFS and DFS traversal (starting vertex is 1).

(2) Write a short note on priority queue. [3]

(3) Define generalized linked list. Represent the polynomial using generalized linked list

$$P_{(x,\ y)} = 7x^3y^2 + 3x^2y - 10y - 6xy^2.$$ [3]

Or

(B) (1) Consider a stack and queue of size 5. Five elements A, B, C, D, E are added to the queue. Show the contents of the stack and queue for each of the following :

(*i*) Three elements are removed from queue and pushed into the stack.

(*ii*) Two elements are popped and added to the queue.

(*iii*) One element is removed from the queue.

(*iv*) All elements are popped from the stack and added to the queue. [4]

(2) Define the following terms : [3]

(*i*) Critical path

(*ii*) Big-O Notation

(*iii*) Doubly ended queue.

(3) Show the steps in creating a Binary Search Tree for the data : [3]

40, 70, 60, 50, 65, 20, 25.

Total No. of Questions—4] [Total No. of Printed Pages—4

Seat No.	

[4718]-12

S.Y. B.Sc. (First Sem.) EXAMINATION, 2015

COMPUTER SCIENCE

Paper II

[CS-212 : Relational Database Management System (RDBMS)]

(2008 PATTERN)

Time : Two Hours **Maximum Marks : 40**

N.B. **:—** (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

1. Attempt *all* of the following : [10×1=10]

(*a*) List any *four* server components.

(*b*) What is meant by database security ?

(*c*) Write the output of the following :

SELECT ADDDATE ('2008–01–02', 31);

(*d*) Define Network Translator.

(*e*) What is meant by Cursor ?

(*f*) State deadlock prevention schemes.

(*g*) Define the term commit point.

(*h*) State ACID properties of transaction.

(*i*) Define time stamp.

(*j*) Define Rollback.

P.T.O.

2. Attempt any *two* of the following : [2×5=10]

(*a*) What is a schedule ? Explain types of schedule in short.

(*b*) Explain mandatory access control method in detail.

(*c*) Explain the role of middle tier in three tier client-server architecture.

3. Attempt any *two* of the following : [2×5=10]

(*a*) Consider the following transactions :

T_1	T_2	T_3
Read(A)		
A=A+20;		
		Read(B);
	Read(C);	
Write(A);		
		Read(C);
		C=C+B;
	Read(B);	
	B=B+50;	
Read(B);		
B=B–20;		
		Write(B);
	Write(B);	
	C=C+B;	
Write(B);		
		Read(A);
		A=A–C;
	Write(B);	
		Write(A);

Find out two schedules which are serializable to serial schedule $<T_1, T_2, T_3>$.

(*b*) Consider the following schedule with two transactions T_1 and T_2.

T_1	T_2	T_3
lock_X(A);		lock_X(B);
read(A);		Read(B);
A=A–50;		B=B+100;
Write(A);		Write(B)
	lock_S(C);	
	read(C);	
	lock_S(A);	
lock_X(C);		

Is the system in a deadlock state ? If yes, what is the solution ? Justify. (Draw wait-for-graph)

(*c*) What are the benefits of client-server architecture ?

4. Attempt the following : [2×5=10]

(*a*) Consider the following log record obtained after a system crash :

<To start>

<To, X, 0, 20>

<To commit>

<T_1 start>

<T_1, Y, 0, 10>

<T_2 start>

<T_2, Z, 0, 30>

<T_3 start>

<T_3, X, 20, 10>

<Checkpoint>

<T_4 start>

<T_4, D, 0, 30>

<T_4 commit>

System crash.....

State the transactions that will be Redone/Undone, if immediate update recovery scheme is used. Also specify the values of data items X, Y, Z, D after undo/redo operations.

(*b*) State and explain good properties of encryption. What is meant by public and private key ?

Or

What is deadlock ? Explain deadlock detection in detail.

Total No. of Questions—4] [Total No. of Printed Pages—4

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[4718]-13

S.Y. B.Sc. (Computer Science)

(First Semester) EXAMINATION, 2015

MATHEMATICS

MTC–211 : Linear Algebra

(2008 PATTERN)

Time : Two Hours **Maximum Marks : 40**

N.B. **:—** (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

(*iii*) Use of single memory non-programmable scientific calculator is allowed.

1. Attempt the following : [10]

(*i*) Find the basis for the solution space of the system of linear equation $x - 2y + z = 4$.

(*ii*) If A is a matrix of order 4×3 and B is matrix of order 3×5, then what is the maximum possible value of rank of matrix AB.

P.T.O.

(*iii*) For which values of k, the vector $\bar{v} = (1, -2, k)$ in $\mathbf{R}^3$ is a linear combination of the vectors $\bar{u} = (3, 0, -2)$ and $\bar{w} = (2, -1, -5)$?

(*iv*) Determine whether the vectors $\bar{u} = (1, 0, 1)$ and $\bar{v} = (1, 1, 1)$ are linearly independent in $\mathbf{R}^3$.

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

(*vi*) If the linear transformation $T : \mathbf{R}^3 \to \mathbf{R}^6$ has nullity 1, then find rank of T.

(*vii*) Determine whether a map $T : \mathbf{R}^2 \to \mathbf{R}^2$ defined by $T(x, y) = (-y, x + 1)$ is a linear transformation.

(*viii*) For what values of 'α' the following system of linear equations has a unique solution ?

$$2x + y = 0$$

$$x + \alpha y = 0.$$

(*ix*) Why the matrix $A = \begin{bmatrix} 1 & 2 \\ 0 & 3 \end{bmatrix}$ is a diagonalizable matrix ?

(*x*) The set W is a subspace of real vector space $\mathbf{R}^3$ write all possible values of dim(W).

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

(*i*) If A is any $n \times n$ matrix and B is any $n \times 1$ matrix, then prove that A is invertible if and only if $Ax = B$ has a unique solution.

(*ii*) Solve the following system of linear equations by Gauss-Jordan method :

$$x + 2y - 4z = -4$$
$$2x + 5y - 9z = -10$$
$$3x - 2y + 3z = 11$$

(*iii*) Show that the vectors $V_1 = (1, 1, 1)$, $V_2 = (0, 1, 1)$ and $V_3 = (0, 1, -1)$ span $\mathbf{R}^3$.

3. Attempt any *two* of the following : [10]

(*i*) If $S = \{\bar{V}_1, \bar{V}_2, ..., \bar{V}_n\}$ is a set of vectors in a vector space V, then prove that :

(*a*) The set L(S) of all linear combinations of vectors in S is a subspace of V.

(*b*) L(S) is the smallest subspace of V that contains S.

(*ii*) Find the basis for row space of matrix A,

where :

$$A = \begin{bmatrix} 1 & 2 & -1 \\ 4 & 1 & 3 \\ 5 & 3 & 2 \\ 2 & 0 & 2 \end{bmatrix}.$$

Also find the rank (A) and the nullity (A).

(*iii*) Define orthogonal vectors. Using Gram-Schmidt process transform the basis B = $\{u_1, u_2\}$ of $\mathbf{R}^2$ into an orthonormal basis, where $u_1 = (1, 2)$, $u_2 = (3, 4)$.

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

(*i*) (*a*) If T : $\mathbf{R}^n \to \mathbf{R}^m$ is a linear transformation, then prove that there exist an $m \times n$ matrix A such that $T(\bar{X}) = A\bar{X}$ for all $\bar{X}$ in $\mathbf{R}^n$.

(*b*) Find all eigenvalues of A and find eigenspace corresponding to the largest eigenvalue of the matrix A, where

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

(*ii*) (*a*) If A is an $n \times n$ matrix and λ is a real number, then prove that λ is an eigenvalue of A if and only if det $(\lambda I - A) = 0$.

(*b*) If $\mathbf{R}_2 = \{a_0 + a_1x + a_2x^2 \mid a_0, a_1, a_2 \in \mathbf{R}\}$ and T : $\mathbf{R}_2 \to \mathbf{R}^2$ is a linear transformation defined by $T(a_0 + a_1x + a_2x^2) = (a_0 - a_1, 2a_1 + a_2)$. Find dimension of kernel of T and range of T.

Total No. of Questions—4] [Total No. of Printed Pages—3

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[4718]-14

S.Y. B.Sc. (Computer Science)

(First Semester) EXAMINATION, 2015

MATHEMATICS

MTC–212 : Numerical Analysis

(2008 PATTERN)

Time : Two Hours **Maximum Marks : 40**

N.B. :— (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

(*iii*) Use of single memory non-programmable scientific calculator is allowed.

1. Attempt *all* of the following : [10]

(*i*) Round off 0.848586 correct to four significant figures and find absolute error.

(*ii*) Evaluate $\Delta^2(e^{4x})$. Take $h = 1$.

(*iii*) Show that :

$$\delta E^{1/2} = \Delta.$$

(*iv*) Write the formula for $\frac{dy}{dx}$ using Newton's backward interpolation formula.

P.T.O.

(*v*) State the fundamental theorem for difference of polynomial.

(*vi*) Compute square root of 57 by using Newton-Raphson method. Take $x_0 = 7.5$. (Perform 2 iteration).

(*vii*) Write Lagrange's interpolation formula for unequal intervals.

(*viii*) Define averaging operator μ.

(*ix*) Write general quadrature formula for numerical integration.

(*x*) Given that $\frac{dy}{dx} = 1 + x.y$, with $y(0) = 1$. Find $y(0.1)$ by Euler's method.

2. Attempt any *two* of the following : [2×5=10]

(*i*) Use Regula-Falsi method to obtain an approximate real root of equation $x^3 - 2x - 5 = 0$, correct upto 2-decimal places.

(*ii*) Find the cubic polynomial which takes the following values :

x	$f(x)$
0	1
1	2
2	1
3	10

(*iii*) Solve the following system of equations by Gauss-Seidel iterative method :

$$8x - 3y + 2z = 20$$
$$6x + 3y + 12z = 35$$
$$4x + 11y - z = 33$$

3. Attempt any *two* of the following : [2×5=10]

(*i*) State and prove Newton's backward interpolation formula for equally spaced points.

(*ii*) Find $\frac{dy}{dx}$ at $x = 0.17$ from the following data :

x	y
0.1	0.9975
0.2	0.9900
0.3	0.9776
0.4	0.9604

(*iii*) Use Newton's divided difference formula to find $f(6)$ from the following data :

x	$f(x)$
1	1
2	5
7	5
8	4

4. Attempt any *one* of the following : [1×10=10]

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

(*b*) Evaluate

$$\int_0^6 \frac{1}{(1+x)^2}$$

using Simpson's $\left(\frac{1}{3}\right)^{\text{rd}}$ rule (Take $h = 1$).

(*ii*) (*a*) Solve

$$\frac{dy}{dx} = -2xy^2$$

with $y(0) = 1$ using Runge-Kutta fourth order method to find $y(0.2)$ (Take $h = 0.2$).

(*b*) Determine the values of y when $x = 2.1$ by Euler's modified method, given $y' = -xy^2$ with $y(2) = 1$.

Total No. of Questions—4] [Total No. of Printed Pages—4

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[4718]-15

S.Y. B.Sc. (Computer Science) (Semester I)

EXAMINATION, 2015

ELECTRONICS

ELC–211 : Microprocessor Architecture and Programming

(2008 PATTERN)

Time : Two Hours **Maximum Marks : 40**

N.B. **:—** (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

(*iii*) Neat diagram must be drawn wherever necessary.

1. Answer the following in one *or* two sentences each : [10×1=10]

(*a*) Define Hit-ratio of cache memory.

(*b*) Give pin configuration of USB.

(*c*) Define cycle stealing of DMA transfer.

P.T.O.

(*d*) Give the function of EAX register of pentium.

(*e*) What is the function of address bus ?

(*f*) What is the size of IVT (Interrupt Vector Table) ?

(*g*) If NMI and single step interrupts are received at the same time, which interrupt is serviced first ?

(*h*) Comment "MOV [BX], [DI] is invalid instruction".

(*i*) What are assembler directives ?

(*j*) What is device driver ?

2. Answer any *two* of the following : [2×5=10]

(*a*) With neat block diagram explain I/O interface unit.

(*b*) Explain any *five* function of DOS interrupt INT 21 H.

(*c*) Write assembly language program to search the character in a string of six elements.

3. Answer any *two* of the following : [2×5=10]

(*a*) Write the functions of the following flags in pentium :

(*i*) Direction Flag (DF)

(*ii*) Trap Flag (TF)

(*iii*) Carry Flag (CF)

(*iv*) Interrupt Flag (IF)

(*v*) Overflow Flag (OF).

(*b*) Write assembly language program to read five numbers from keyboard and display them on console.

(*c*) (*i*) Explain the functions of the following instructions : [3]

(I) MOV AX, [2000H]

(II) ADD AX, BX

(III) JZ NEXT.

(*ii*) Differentiate between assembly level language (ALL) and machine level language (MLL). [2]

4. Attempt any *one* of the following : [1×10=10]

(1) (*a*) With neat block diagram explain DMA controller.

(*b*) (*i*) Explain the functions of the following blocks of pentium architecture :

(I) U-V Pipeline

(II) Cache Memories. [3]

(*ii*) Give comparison between asynchronous and synchronous serial data transfer. [2]

Or

(2) (*a*) Explain any *five* addressing modes of pentium.

(*b*) Write assembly language program to find the largest number from an array of 10 elements.

Total No. of Questions—4] [Total No. of Printed Pages—3

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S.Y. B.Sc. (Computer Science) (Semester I)

EXAMINATION, 2015

ELECTRONICS

Paper II

ELC–212 : Communication Principles

(2008 PATTERN)

Time : Two Hours **Maximum Marks : 40**

N.B. **:—** (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

(*iii*) Neat diagram must be drawn wherever necessary.

1. Answer the following questions in *one* or *two* sentences each : [10×1=10]

(*a*) State any *two* advantages of digital communication over analog communication.

(*b*) What is the role of an antenna ?

(*c*) Draw the output waveform of FSK for the data 10001110.

(*d*) State the function of a BSS in GSM technology.

(*e*) How many channels are present in a supergroup ?

P.T.O.

(*f*) What is need of modulation process ?

(*g*) Define Half Duplex Communication System. Give *one* example.

(*h*) State any *two* features of FHMA.

(*i*) State any *two* applications of RFID.

(*j*) What is the role of MTSO in mobile communication ?

2. Attempt any *two* of the following : [2×5=10]

(*a*) Explain the following parameters in brief :

(*i*) Baud Rate

(*ii*) Companding

(*iii*) Channel Capacity.

For a communication channel if the bandwidth is 5 kHz and the S/N ratio is 1000, determine the channel capacity.

(*b*) State the important features of FDMA.

(*c*) Compare Wired and Wireless Communication techniques.

3. Attempt any *two* of the following : [2×5=10]

(*a*) Explain GPRS architecture with a neat block diagram.

(*b*) Explain QPSK modulation with a neat block diagram.

(*c*) Explain in brief the concept of FHMA. A cellular operator is allotted a 14.5 MHz for each simplex band and B_{guard} is 10 kHz and B_c is 30 kHz. Find the number of channels available in FDMA system.

4. Attempt any *one* of the following : [1×10=10]

(*a*) (*i*) Explain Microstrip Patch antenna and state any *two* applications of this antenna.

(*ii*) Differentiate between AM and FM.

Or

(*b*) (*i*) State the main functions of Network Switching Subsystems (NSS) in GSM.

(*ii*) Explain elements of Electronic Communication System with a neat diagram.

Total No. of Questions—**4**] [Total No. of Printed Pages—**2**

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S.Y. B.Sc. (Computer Science) (Semester I)

EXAMINATION, 2015

ELECTRONICS

Paper II

ELC–212 : Process Control Instrumentation

(OLD PATTERN)

Time : Two Hours **Maximum Marks : 40**

N.B. **:—** (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

(*iii*) Neat diagram must be drawn wherever necessary.

1. Answer the following in *one* or *two* sentences each : [10×1=10]

(*a*) Name the blocks of open loop control system.

(*b*) State whether the photoconductor is active or passive sensor ?

(*c*) What is digital multiplexer ?

(*d*) Write an output equation of a controller in integral mode.

(*e*) Name any *two* types of analysis possible with PSPICE.

(*f*) State the blocks of single channel data acquisition system.

(*g*) What is the meaning of PID controller ?

(*h*) Optocoupler consists of which two basic blocks ?

(*i*) What is sensor ?

(*j*) Can Linear Variable Differential Transformer (LVDT) be used as a displacement sensor ?

P.T.O.

2. Attempt any *two* of the following : [2×5=10]

(*a*) Explain working of RTD (Resistance Temperature Detector).

(*b*) Why is process modelling and simulation required ? Name any software useful for this purpose.

(*c*) With the help of a neat block diagram explain process control system.

3. Attempt any *two* of the following : [2×5=10]

(*a*) Draw and explain sample and hold circuit.

(*b*) Explain ON-OFF controller with an example.

(*c*) Explain any *one* optical sensor.

4. Attempt any *one* : [1×10=10]

(*a*) (*i*) Draw differential instrumentation amplifier using three op-amps. Derive its output equation.

(*ii*) Discuss the need of data converter, ADC and DAC in DAS.

Or

(*b*) (*i*) Explain derivative control mode.

(*ii*) Which type of signal conditioning is required for the following sensors ?

RTD, Thermocouple, Semiconductor Strain, Gauge, Photoconductor, LVDT.

Total No. of Questions—**4**] [Total No. of Printed Pages—**3**

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[4718]-18

S.Y. B.Sc. (Semester I) EXAMINATION, 2015

COMPUTER SCIENCE : COMPULSORY ENGLISH

(2008 PATTERN)

Time : Two Hours **Maximum Marks : 40**

1. Answer the following (any *two*) : [10]

(*a*) What is Downward Communication ? What are the advantages of effective Downward Communication ?

(*b*) Write down few guidelines to be followed for effective communication when you are the listener of a message.

(*c*) Explain the term 'Body Language' as a non-verbal communication. How does "Body Language" support verbal communication ?

2. Answer the following :

(*a*) Use the following words in sentences to bring out their literal and figurative meanings (any *two*) : [4]

(*i*) Drove

(*ii*) Lame

(*iii*) Cold.

P.T.O.

(*b*) Differentiate between the following pairs of words and make sentences (any *two*) : [4]

(*i*) hair — heir

(*ii*) ship — sheep

(*iii*) felicitate — facilitate.

(*c*) Choose the correct spelling : [2]

(*i*) conscinse, consciense, conscience

(*ii*) quarelsome, quarrelsome, quaralsome.

3. Answer the following :

(*a*) Match the antonyms in the two columns : [4]

	'A'		**'B'**
(*i*)	lucky	(*i*)	destruct
(*ii*)	useful	(*ii*)	dejection
(*iii*)	construct	(*iii*)	futile
(*iv*)	pleasure	(*iv*)	unfortunate

(*b*) Reorder the jumbled words with the help of the hints given in the brackets : [4]

(*i*) mogylo (sad, unhappy)

(*ii*) setaiht (one who does not believe in God)

(*iii*) ratripo (a place where aircrafts land and take off)

(*iv*) ytbaorroal (a building or a room where scientific experiments are carried out).

(*c*) Transcribe the following (any *two*) : [2]

(*i*) faith

(*ii*) teacher

(*iii*) bridge.

4. Answer the following (any *two*) : [10]

(*a*) Write a brief talk on "Natural Calamity in Jammu and Kashmir".

(*b*) Write a dialogue for the following situation :

Asking a businessman to donate money to charitable trust which runs orphanage.

(*c*) Choose the correct collacations from the following :

(*i*) make amends/do amends

(*ii*) warm favourite/hot favourite

(*iii*) click on an icon/press an icon

(*iv*) glare at/glare towards

(*v*) re-sign a contract/renew a contract.

Total No. of Questions—**4**] [Total No. of Printed Pages—**3**

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[4718]-201

S.Y. B.Sc. (Computer Science) (II Sem.) EXAMINATION, 2015

CS-221 : OBJECT ORIENTED CONCEPTS USING C++

Paper I

(2013 PATTERN)

Time : Two Hours **Maximum Marks : 40**

N.B. **:—** (*i*) *All* questions are compulsory.

(*ii*) *All* questions carry equal marks.

1. Attempt *all* of the following : [10×1=10]

(*a*) Define class and object.

(*b*) Why can't a static member function access non-static members of a class ?

(*c*) State the advantage of inline functions.

(*d*) "A destructor can be overloaded." State True/False.

(*e*) List the operators which cannot be overloaded in C++.

(*f*) "An abstract class cannot be instantiated." State True/False.

(*g*) What is the difference between using get( ) and getline( ) for reading a string of characters ?

(*h*) Write the C++ statements to open output file "a.txt" for appending.

(*i*) Give *one* advantage of class template.

(*j*) What is the purpose of generic catch block ?

2. Attempt any *two* of the following : [2×5=10]

(*a*) Define constructor. Explain any *two* types of constructors.

P.T.O.

(*b*) Explain the concept of function overloading with suitable examples. Also state the difference between function overloading and function template.

(*c*) Define class Integer having one int data member. Overload the following operators :
++ (pre and post), – (unary and binary).

3. Attempt any *two* of the following : [2×5=10]

(*a*) What is a virtual function ? State the difference between virtual and pure virtual function.

(*b*) Write a C++ program to copy the contents of one text file to another by changing the case of every alphabet.

(*c*) Define classes TwoDPoint(x, y) and ThreeDPoint (x, y, z). Write a friend function "add" which adds an object of TwoDPoint and ThreeDPoint and returns a ThreeDPoint object.

4. Attempt any *one* of the following (A *or* B) : [1×10=10]

(A) (*i*) Explain the syntax of derived class constructor with an example. [4]

(*ii*) Write a short note on "this" pointer. [3]

(*iii*) Identify errors in the following C++ code segment and correct them : [3]

```
template<class X>
class X
{
   X data;
  public :
     void accept( );
};
void accept( )
{
   cin>>data;
}
```

Or

(B) (*i*) Explain the exception handling mechanism in C++. [4]

(*ii*) Explain new and delete with suitable examples. [3]

(*iii*) Trace the output of the following C++ code. Assume there are no syntax errors. Justify : [3]

```
ostream & format1(ostream & out)
{
    out.width(10);  out.precision(3);
    out.fill('*');
    return out;
}
ostream & format2(ostream & out)
{
    out.fill('#');
    out<<setbase(16);
    return out;
}
void main( )
{
    int n = 15; float f = 2.3456;
    cout<<format1<<f<<format2<<n;
}
```

Total No. of Questions—**4**] [Total No. of Printed Pages—**2**

Seat No.	

[4718]-202

S.Y. B.Sc. (Computer Science) (II Sem.) EXAMINATION, 2015

CS-222 : SOFTWARE ENGINEERING

Paper II

(2013 PATTERN)

Time : Two Hours **Maximum Marks : 40**

N.B. **:—** (*i*) *All* questions are compulsory.

(*ii*) *All* questions carry equal marks.

(*iii*) Figures to the right indicate full marks.

1. Attempt the following : [10×1=10]

(*a*) Define decision support system.

(*b*) What are the types of Interview techniques ?

(*c*) Define Agility.

(*d*) Comment and justify your answer "Software Engineering will make us create voluminuous and unnecessary documentation and will invariably slow us down".

(*e*) What do you mean by operational feasibility ?

(*f*) List any *two* components of structured analysis.

(*g*) What is Software requirements specification ?

(*h*) State any *two* framework activities in Software Engineering.

(*i*) What is request clarification ?

(*j*) How to represent an iteration in Data Dictionary ?

P.T.O.

2. Attempt any *two* of the following : [2×5=10]

(*a*) What are the different tasks involved in requirements engineering ? Discuss any *four* in detail.

(*b*) What is a Data Dictionary ? Explain the importance of Data Dictionary.

(*c*) Define a Software. Explain the essence of Software Engineering Practice.

3. Attempt any *two* of the following : [2×5=10]

(*a*) Write a note on Extreme Programming Values.

(*b*) What is System Design ? Explain its types.

(*c*) Explain spiral model in detail.

4. Attempt the following : [2×5=10]

(*a*) Define system. Explain different types of system.

Or

What is system testing ? Explain its types.

(*b*) Draw context level DFD, first level DFD for the "Online Examination System for internal evaluation of Students".

Total No. of Questions—4] [Total No. of Printed Pages—4

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[4718]-203

S.Y. B.Sc. (Computer Science) (II Sem.) EXAMINATION, 2015

MATHEMATICS

Paper I

MTC-221 : Computational Geometry

(2013 PATTERN)

Time : Two Hours **Maximum Marks : 40**

N.B. **:—** (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

(*iii*) Use of single memory, non-programmable, scientific calculator is allowed.

1. Attempt any *five* of the following : [10]

(*i*) Write the transformation matrix for shearing in x and y directions by -2 and 5 units respectively. Apply it on the point P[3, 4].

(*ii*) A circle with circumference 8π cm is uniformly scaled by 3 units. Find the area of transformed figure.

(*iii*) Explain the term : 'point at infinity'. Also find the point at infinity on the line $2x + 3y = 5$.

P.T.O.

(*iv*) If the line passing through the two points A[2, 3] and B[–4, 7] is transformed under :

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

then find the slope of the resulting line.

(*v*) What are the types of axonometric projection ?

(*vi*) If the parametric equation of Bezier curve is :

$$P(t) = (1 - t)^2 B_0 + 2t(1 - t) B_1 + t^2 B_2$$

then represent $P(t)$ in matrix form.

(*vii*) Determine increment factor $\delta\theta$ to generate 5 points on the parabola $y^2 = 16x$ for $4 \leq y \leq 8$ in the first quadrant.

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

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

(2) Reflect a Δ ABC through the line $y = 2x$, where A[2, 4], B[0, 5] and C[–1, 1].

(3) Determine the dimetric projection matrix if the foreshortening factor along z-axis is $\frac{2}{3}$ with $\phi > 0$, $\theta < 0$, where ϕ is the angle of rotation about y-axis and θ is the angle of rotation about x-axis.

3. Attempt any *two* of the following : [10]

(1) Find the combined transformation matrix [T] for the following sequence of transformations :

(*i*) Rotation about x-axis through 75°.

(*ii*) Translation in x, y and z directions by 3, 4 and 5 units respectively.

(*iii*) Perspective transformation with centre of projection at $Z_C = 10$ on z-axis.

(2) Find the angles of rotation about x-axis and about y-axis so that the plane $x + 2y + 3z = 0$ coincides with the $z = 0$ plane.

(3) Obtain the Cabinet and Cavalier projections of the object :

$$[X] = \begin{bmatrix} 2 & 1 & -3 \\ -4 & 2 & 6 \end{bmatrix}$$

with the horizontal inclination angle $\alpha = 20°$.

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

(1) (*i*) If $B_0[1, 1]$, $B_1[2, 3]$, $B_2[4, 3]$ and $B_3[3, 1]$ are the vertices of a Bezier polygon, determine the point P[0.25] of the Bezier curve. Also compute P[0.5].

(*ii*) Develop the bottom and rear view of the object :

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

(2) Generate uniformly spaced 5 points on the hyperbolic segment in the first quadrant for $4 \leq x \leq 8$, where equation of hyperbola is :

$$\frac{x^2}{9} - \frac{y^2}{16} = 1.$$

Total No. of Questions—**4**] [Total No. of Printed Pages—**4+2**

Seat No.	

[4718]-204

S.Y. B.Sc. (Computer Science) (II Sem.) EXAMINATION, 2015

MATHEMATICS

Paper II

MTC-222 : Operations Research

(2013 PATTERN)

Time : Two Hours **Maximum Marks : 40**

N.B. **:—** (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

(*iii*) Use of single memory, non-programmable, scientific calculator is allowed.

1. Attempt any *five* of the following : [10]

(*i*) Draw the graph and highlight the feasible region for the following constraints :

$$x + 2y \geq 6$$

$$3x + y \geq 9$$

$$x + y = 7$$

$$x, \ y \geq 0.$$

P.T.O.

(*ii*) Write the dual of the following L.P.P. :

Maximize : $Z = 5x_1 + 12x_2 + 4x_3$

Subject to :

$$x_1 + 2x_2 + x_3 \leq 10$$

$$2x_1 - x_2 + 3x_3 = 8$$

$$x_1, \; x_2, \; x_3 \geq 0.$$

(*iii*) A company produces two types of products A and B with raw materials M_1 and M_2. The following table provides the basic information :

Raw Material	**Requirement of Raw Material**		**Daily Availability**
	A	**B**	
M_1	6	4	24
M_2	1	2	6
Profit	5	4	

Formulate the L.P.P. to maximize the daily profit.

(*iv*) Solve the following assignment problem :

	M_1	**M_2**	**M_3**
A	15	10	9
B	9	15	10
C	10	12	8

(*v*) How is degeneracy resolved in a transportation problem ?

(*vi*) Find the saddle point of the game :

Player B

$$\textbf{Player A} \quad \begin{bmatrix} 8 & -2 & 9 & -3 \\ 6 & 5 & 6 & 8 \\ -2 & 4 & -9 & 5 \end{bmatrix}$$

(*vii*) Two players A and B play the coin tossing game. Each player chooses head (H) or tail (T) unknown to each other simultaneously. If the choices match (HH or TT), player A receives ₹ 1, otherwise A pays B ₹ 1. Write the payoff matrix for player A.

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

(*i*) Solve the L.P.P. by graphical method :

Minimize : $Z = 3x_1 + 9x_2$

Subject to :

$$x_1 + x_2 \geq 5$$

$$2x_1 - 3x_2 \leq 0$$

$$3x_1 - x_2 \geq 0$$

$$x_1, \; x_2, \geq 0.$$

(*ii*) Consider the L.P.P :

Maximize : $Z = 2x_1 + 4x_2 + 4x_3 - 3x_4$

Subject to :

$$x_1 + x_2 + x_3 = 4$$
$$x_1 + 4x_2 + x_4 = 8$$
$$x_1,\ x_2,\ x_3,\ x_4 \geq 0.$$

Solve the above L.P.P. with x_3 and x_4 as the starting basic variables and without using any artificial variable. (x_3 and x_4 are the slack variables with non-zero objective coefficients.)

(*iii*) Compare the I.B.F.S. obtained by north-west corner method, least cost method and Vogel's method for the following transportation problem :

5	1	8	12
2	4	0	14
3	6	7	4
9	10	11	

3. Attempt any *two* of the following : [10]

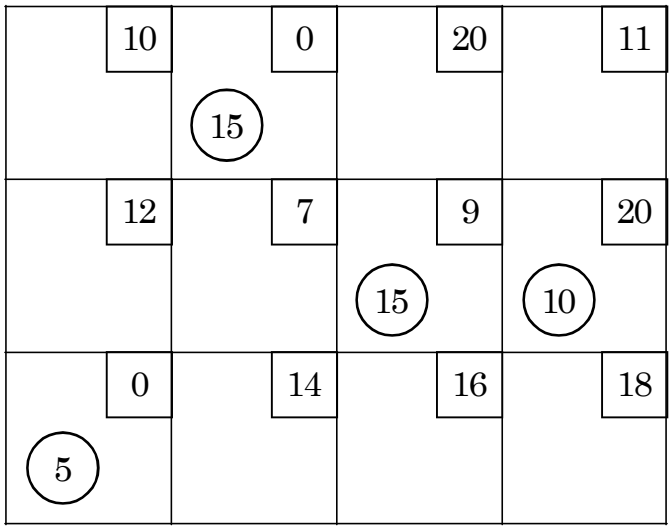
(*i*) Solve the following assignment problem for maximization :

		Machine				
		A	**B**	**C**	**D**	**E**
	I	32	38	40	28	40
	II	40	24	28	21	36
Job	**III**	41	27	33	30	37
	IV	22	38	41	36	36
	V	29	33	40	35	39

(*ii*) Solve the following game by using graphical method :

		Player B			
		B_1	**B_2**	**B_3**	**B_4**
Player A	**A_1**	2	2	3	–1
	A_2	4	3	2	6

(*iii*) Using given I.B.F.S. find the optimal solution of the following transportation problem :



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

(1) (*i*) 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	9	2	8	5	3

(*ii*) A company produces two products A and B. The sale volume for A is at least 80% of the total sales of A and B. However, the company cannot sell more than 100 units of A per day. Both products use one raw material whose maximum availability is limited to 300 kg a day. The usage rates of the raw material are 3 kg per unit of A and 5 kg per unit of B. The unit profits of A and B are ₹ 200 and ₹ 500 respectively.

Formulate this problem as L.P.P. to maximize the total profit.

(2) Write the dual of the following L.P.P. :

Maximize : $Z = 5x_1 - 2x_2 + 3x_3$

Subject to :

$$2x_1 + 2x_2 - x_3 \geq 2$$

$$3x_1 - 4x_2 \leq 3$$

$$x_2 + 3x_3 \leq 5$$

$$x_1,\ x_2,\ x_3 \geq 0.$$

Solve the dual problem using simplex method, hence or otherwise find the solution of the primal problem.

Total No. of Questions—4] [Total No. of Printed Pages—**2**

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[4718]-205

S.Y. B.Sc. (Computer Science) (II Sem.) EXAMINATION, 2015
ELECTRONICS SCIENCE
Paper I
ELC-221 : The 8051 Architecture, Interfacing and Programming
(2013 PATTERN)

Time : Two Hours **Maximum Marks : 40**

N.B. **:—** (*i*) *All* questions are compulsory.
(*ii*) Figures to the right indicate full marks.
(*iii*) Neat diagrams must be drawn wherever necessary.

1. Answer the following in *one* or *two* sentences : [10×1=10]

(*a*) What are alternate functions of port 0 and port 2 ?

(*b*) Differentiate between the following instructions :

MOV A, R0
MOV A, @R0.

(*c*) What is the function of SMOD bit of PCON register ?

(*d*) If digital input is FCh, then find the output voltage if I_{ref} = 2 mA and R = 10 kΩ.

(*e*) Which are the mathematical registers in 8051 ?

(*f*) Give the function of 'sbit' data type in 'C' program.

(*g*) If crystal frequency is 11.0592 MHz, find the time required to execute one machine cycle.

(*h*) Which pin of LCD is used for controlling contrast ?

(*i*) What is the default value of SP after 8051 is reset ?

(*j*) Write the function of assembler directive ORG.

2. Attempt any *two* of the following : [2×5=10]

(*a*) Draw the internal structure of port pin and explain how read and write operation is carried out.

(*b*) Write assembly language program to convert Hex number to its decimal equivalent.

(*c*) Write a 'C' program to generate a square waveform of 2 kHz on port P1.2 with duty cycle of 60% using mode 1, timer 1. (XTAL = 12 MHz).

P.T.O.

3. Attempt any *two* of the following : [2×5=10]

(*a*) Identify the addressing modes of the following instructions :

(*i*) MOVC A, @A+DPTR

(*ii*) MUL AB

(*iii*) MOV a, @R0

(*iv*) SETB P1.3

(*v*) MOV P1, #47h

(*b*) Draw bit format of IP register and give function of each bit.

(*c*) Draw an interfacing diagram to show how stepper motor is connected to 8051. Write a 'C' program to make the interface work.

4. Attempt any *one* of the following : [1×10=10]

(A) (*a*) Explain with neat diagram how a 4k × 8 program ROM can be connected to 8051. [5]

(*b*) (*i*) Mention important features of PIC microcontroller. [3]

(*ii*) Write a 'C' program to toggle all bits of port1 continuously. [2]

Or

(B) (*a*) Draw pin configuration of ADC0804 and explain the function of each pin. [5]

(*b*) (*i*) Write 'C' program to send array of 5 elements serially, use baud rate 9600 bps. (XTAL = 11.0592 MHz). [3]

(*ii*) Draw bit format of PSW register and explain the function AC and OV bit. [2]

Total No. of Questions—**4**] [Total No. of Printed Pages—**2**

Seat No.	

[4718]-206

S.Y. B.Sc. (Computer Science) (II Sem.) EXAMINATION, 2015

ELECTRONICS SCIENCE

Paper II

ELC-222 : Communication Principles

(2013 PATTERN)

Time : Two Hours **Maximum Marks : 40**

N.B. **:—** (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

(*iii*) Neat diagrams must be drawn wherever necessary.

1. Answer *All* of the following in *one* or *two* sentences : [10×1=10]

(*a*) Define simplex communication system.

(*b*) State any *one* limitation of delta modulation.

(*c*) Define beam width of antenna.

(*d*) What is FDMA ?

(*e*) State Nyquist sampling theorem.

(*f*) Draw Ask waveform for data signal 11010.

(*g*) The modulating signal $v_m = 10 \sin(2\pi \times 100t)$ is used to modulate carrier signal of $v_c = 20 \sin(2\pi\ 2000t)$ in AM system. Calculate modulation index.

(*h*) Which are typical components of RFID ?

(*i*) Draw constellation diagram of QPSK.

(*j*) Define 'dwell time'.

P.T.O.

2. Attempt any *two* of the following : [2×5=10]

(*a*) Explain with neat circuit diagram transistorised AM modulator.

(*b*) Differentiate between asynchronous and synchronous serial communication.

(*c*) State any *five* important features of TDMA i.e. time division multiple access.

3. Attempt any *two* of the following : [2×5=10]

(*a*) Explain working of GSM.

(*b*) Draw and explain block diagram of PCM transmitter.

(*c*) What are the different types of noise signals ? Describe them.

4. Attempt any *one* of the following : [1×10=10]

(*i*) (*a*) Explain Code Division Multiplexing with appropriate diagram. [5]

(*b*) Describe cellular concept in mobile system and explain Handoff. [5]

Or

(*ii*) (*a*) Explain need of modulation. [4]

(*b*) Draw block diagram for 12-channel FDM. [3]

(*c*) Calculate SNR in dB if a receiver has an input signal power of 1.2 mW and noise power of 0.4 mW. State which of the modulations, AM or FM, is more sensitive to noise. [3]

Total No. of Questions—4] [Total No. of Printed Pages—**2**

Seat No.	

[4718]-207

S.Y. B.Sc. (Computer Science) (II Sem.) EXAMINATION, 2015

ENGLISH

Paper II

(EN-221 : Technical English)

(2013 PATTERN)

Time : Two Hours **Maximum Marks : 40**

N.B. :— (*i*) *All* questions are compulsory.
(*ii*) *All* questions carry equal marks.
(*iii*) Figures to the right indicate full marks.

1. (A) Attempt any *one* of the following in about **100** words : [5]
(*i*) What message has been conveyed in the poem "A Psalm of Life" ?
(*ii*) The poem "Purdah (1)" is about every woman. Do you agree ? Give reasons.

(B) Attempt any *one* of the following in about **100** words : [5]
(*i*) How does the poem "Purdah(1)" bring out the loss of self and 'objectification' of women ?
(*ii*) How will life become meaningful according to H.W. Longfellow in 'A Psalm of Life' ?

2. (A) Attempt any *one* of the following in about **100** words : [5]
(*i*) How does the poem 'Ozymandias' portray the idea that human life and power is temporary ?
(*ii*) Explain the significance of the title 'If'.

(B) Attempt any *one* of the following in about **100** words : [5]
(*i*) Analyse Wordsworth's attitude to nature, memory and imagination.
(*ii*) What according to the poet are some of the challenges we have to face in life in the poem 'If' ?

P.T.O.

3. Attempt any *two* of the following : [10]

(*i*) Write *five* tips on techniques you could use to perform well in an interview.

(*ii*) What is a Group Discussion ? Explain in brief.

(*iii*) Prepare *five* slides to promote a health drink for children.

(*iv*) You have applied for a bank loan to study abroad. Write down *five* questions along with possible responses that could be asked to you during an interview with the Manager of the bank.

4. Attempt any *two* of the following : [10]

(*i*) Write a report on the 'Tree Plantation Week' in your college.

(*ii*) Write a review on the new shopping mall in your town.

(*iii*) Write a paragraph on 'The Menace of Social Networking'.

(*iv*) Write a short descriptive essay describing city life as seen through the eyes of an 'Alien' who has just arrived in your city.

Total No. of Questions—4] [Total No. of Printed Pages—**3**

Seat No.	

[4718]-21

S.Y. B.Sc. (II Semester) EXAMINATION, 2015

COMPUTER SCIENCE

Paper II

[CS221 : Object Oriented Concepts and Programming in C++]

(2008 PATTERN)

Time : Two Hours **Maximum Marks : 40**

N.B. **:—** (*i*) *All* questions are compulsory.

(*ii*) *All* questions carry equal marks.

(*iii*) Figures to the right indicate full marks.

(*iv*) Assume suitable data if necessary.

1. Attempt *all* of the following questions : [10×1=10]

(*a*) Define object.

(*b*) Write any *one* difference between pointer and reference variable.

(*c*) All arguments of an overloaded function can be default. State true/false.

(*d*) What is default constructor ?

(*e*) Write syntax for overloading unary operator as a member function.

(*f*) How to achieve runtime polymorphism in C++ ?

(*g*) What is the use of setw manipulator ?

(*h*) What is the meaning of following C++ statement ?

Ostream fout;

fout . seekg (m_1 ios : : cur);

(*i*) What is an exception ?

P.T.O.

(*j*) State whether the following definition is correct or not ?

template <class P_1 R_1 classs>

class city

{.....};

2. Attempt any *two* of the following : [2×5=10]

(*a*) Explain the concept of multiple inheritance with suitable example.

(*b*) Write short note on constructors in derived class. Illustrate with suitable example.

(*c*) Consider the following class string

```
class string
{
        private : char str[10];
};
```

Write functions for accepting and displaying strings. Overload the following operators :

(1) = = equality

(2) ! change case

3. Attempt any *two* of the following : [2×5=10]

(*a*) A file "Employee.txt" contains empno & empname. Write a C++ program to read contents of this file and search for employee having name "xyz".

(*b*) State the rules for virtual functions.

(*c*) What is friend function ? What are its advantages and disadvantages ?

4. Attempt any *one* of the following (A *or* B) : [1×10=10]

(A) (*a*) Explain concept of try, catch, block. [4]

(*b*) Write short note on 'This' pointer. [3]

(*c*) Write the output of the following code and Justify. (Assume there are no syntax errors) [3]

```
Class A
{
        public : A( )
                {cout << "A's constructor" << end/;}
}
class B
{
        public : B( )
                { cout << "A's and B's constructor" << end/;}
}
        class C : public B, public A
{
        public : C( )
        {
        cout < <"A's and B's and C's constructor" << end/;}
        };
int main( )
{
        C      Cl;
        return O;
}
```

Or

(B) (*a*) State the advantages of templates. [4]

(*b*) What are different ways to open a file in C++ ? [3]

(*c*) Explain memory management operators in C++. [3]

Total No. of Questions—4] [Total No. of Printed Pages—**2**

Seat No.	

[4718]-22

S.Y. B.Sc. (Comp. Sci.) (II Semester) EXAMINATION, 2015

CS-222 : SOFTWARE ENGINEERING

Paper II

(2008 PATTERN)

Time : Two Hours **Maximum Marks : 40**

N.B. **:—** (*i*) *All* questions are compulsory.

(*ii*) *All* questions carry equal marks.

(*iii*) Figures to the right indicate full marks.

1. Attempt all of the following questions : [10×1=10]

(*a*) State any *two* characteristics of software.

(*b*) Define Software Engineering.

(*c*) List *two* advantages of waterfall model.

(*d*) What is agile software ?

(*e*) Write any *two* analysis modelling principles.

(*f*) Describe system simulation tools.

(*g*) What is inception ?

(*h*) List any *two* rule of thumb that should be followed when creating the analysis model.

(*i*) Write any *two* differences between physical and logical DED.

(*j*) What do you mean by Cardinality ?

P.T.O.

2. Attempt any *two* of the following : [2×5=10]

(*a*) Explain the framework activities of a process framework.

(*b*) What is QFD ? Write types of requirement identified by QFD.

(*c*) How ER model helps in system analysis and design ?

3. Attempt any *two* of the following : [2×5=10]

(*a*) Write and explain any *five* core principles of Software Engineering.

(*b*) With a suitable diagram explain prototyping model also state its advantages.

(*c*) List the tasks of object oriented analysis.

4. Attempt any *two* of the following : [2×10=10]

(*a*) Explain life cycle of Feature Driven Development (FDD).

Or

Write any *five* tasks of Requirement Engineering.

(*b*) Draw context level DFD, First level DED and ER diagram for Airline reservation system.

Total No. of Questions—4] [Total No. of Printed Pages—4

Seat No.	

[4718]-23

S.Y. B.Sc. (Comp. Sci.) (II Semester) EXAMINATION, 2015

MATHEMATICS

Paper I

(MTC-221 : Computational Geometry)

(2008 PATTERN)

Time : Two Hours **Maximum Marks : 40**

N.B. **:—** (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

(*iii*) Use of single memory, non-programmable, scientific calculator is allowed.

1. Attempt each of the following : [10]

(*i*) Write a 2×2 transformation matrix for rotation about the origin through 45^{o}.

(*ii*) Write the transformation matrix to create the right side view of an object.

P.T.O.

(*iii*) What are the types of an oblique projection ?

(*iv*) Write the transformation matrix for reflection through $y = 0$ plane.

(*v*) If we apply 2×2 transformation matrix $[T] = \begin{bmatrix} 1 & 3 \\ 2 & 4 \end{bmatrix}$ on the line $X - 5Y = 10$, then find the slope of resulting line.

(*vi*) True or False : "Reflection is a solid body transformation." Justify.

(*vii*) Reflect the point P[1, 2] through the line $X = 0$.

(*viii*) Find the increment factor $\delta\theta$ to generate four points on the parabola $y^2 = 8x$ with $2 \leq x \leq 5$.

(*ix*) Explain the term control points for Bezier curve.

(*x*) Write the transformation matrix for translation in x and z directions by -4 and 5 units respectively.

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

(1) Develop a combined transformation matrix [T] for the following sequence of transformations.

(*i*) Scaling in x and y co-ordinates by 2.5 and 3.5 units respectively.

(*ii*) Shearing in x direction by 5 units.

(*iii*) Reflection through x-axis.

Apply it on the point P[20, 15].

(2) Prove that under a 2×2 transformation matrix a pair of parallel lines is transformed to a pair of parallel lines.

(3) Obtain the perspective projection of the object [X] with the centre of projection at $x_c = 20$ on x-axis where :

$$[X] = \begin{bmatrix} 1 & 2 & 1 \\ 2 & 1 & 3 \\ -1 & 5 & 6 \\ 2 & 3 & -5 \end{bmatrix}$$

3. Attempt any *two* of the following : [10]

(1) Consider the line with direction ratios 2, 3, 2 and passing through the origin. Determine the angles through which the line should be retated about x-axis then about y-axis so that it coincides with z-axis.

(2) Obtain the Cavalier projection of the object :

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

with the horizontal inclination angle $\alpha = 35^{\circ}$.

(3) Find the concatenated transformation matrix [T] for the following sequence of transformations :

(*i*) Rotation about *y*-axis through 60°.

(*ii*) Rotation about *x*-axis through 30°.

(*iii*) Orthographic projection onto $z = 0$ plane.

Apply it on the segment PQ, where P[–1 3, 2] and Q[5, 2, 1].

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

(1) Generate uniformly spaced 8 points on the circle $(x - 2)^2 + (y + 1)^2 = 25$.

(2) (*i*) Compute uniformly spaced 4 points on the arc of the ellipse :

$$\frac{x^2}{25} + \frac{y^2}{16} = 1$$

in the second quadrant.

(*ii*) Find the parametric equation of the Bezier curve with control points $B_0[2, 1]$, $B_1[1, 3]$, $B_2[3, 3]$ and $B_3[3, 2]$. Hence find P[0.8]

Total No. of Questions—**4**] [Total No. of Printed Pages—**7**

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[4718]-24

S.Y. B.Sc. (Computer Science) (II Semester) EXAMINATION, 2015

MATHEMATICS

Paper II

(MTC-222 : Operations Research)

(2008 PATTERN)

Time : Two Hours **Maximum Marks : 40**

N.B. **:—** (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

(*iii*) Use of single memory, non-programmable, scientific calculator is allowed.

(*iv*) Graph papers will be supplied on demand.

1. Attempt each of the following : [10]

(*i*) Give any *two* application areas of operations research.

(*ii*) Draw feasible region for the following constraints :

$$x_1 + 2x_2 \geq 10$$

$$x_1 + x_2 \geq 7$$

$$x_1,\ x_2 \geq 0$$

P.T.O.

(*iii*) Write the dual of the following L.P.P.

Minimize $z = 3x_1 + 2x_2$,

Subject to :

$$5x_1 + x_2 \geq 10$$

$$x_1 + x_2 \geq 6$$

$$x_1 + 4x_2 \geq 12$$

$$x_1,\ x_2 \geq 0$$

(*iv*) Define Slack variable in L.P.P.

(*v*) Use North-West corner method to find an initial basic feasible solution to the following transportation problem :

	$\mathbf{D_1}$	$\mathbf{D_2}$	**Supply**
$\mathbf{O_1}$	6	7	19
$\mathbf{O_2}$	10	12	14
Demand	18	15	

(*vi*) Solve the following assignment problem :

	$\mathbf{M_1}$	$\mathbf{M_2}$	$\mathbf{M_3}$
$\mathbf{J_1}$	5	10	2
$\mathbf{J_2}$	7	0	6
$\mathbf{J_3}$	6	8	12

(*vii*) When is the solution of a transportation problem degenerate ?

(*viii*) How do we make an unbalanced assignment problem balanced ?

(*ix*) Find the saddle point of the game with the following pay of matrix. Write the value of game :

$$\begin{array}{c} \\ \textbf{Player A} \end{array} \begin{array}{c} \textbf{Player B} \\ \begin{bmatrix} 10 & 2 & 3 \\ 6 & 5 & 7 \\ -7 & 4 & 0 \end{bmatrix} \end{array}$$

(*x*) Define 'Two person zero sum game'.

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

(*i*) Solve the following L.P.P. graphically :

Maximize $z = 30x + 20y$

Subject to :

$$x + 2x \leq 6$$

$$y \leq 2$$

$$x - y \geq -1$$

$$x \geq 0,\ y \geq 0$$

(*ii*) Solve the following L.P.P. using Simplex method :

Maximize $z = 2x_1 + 5x_2$

Subject to :

$$x_1 + x_2 \leq 600$$

$$x_1 \leq 400$$

$$x_2 \leq 300$$

$$x_1, x_2 \geq 0$$

(*iii*) Find an initial basic feasible solution to the following transportation problem by Least Cost Method :

TO

		D_1	D_2	D_3	**Supply**
From	O_1	5	1	7	10
	O_2	6	4	6	80
	O_3	3	2	5	15
	O_4	5	3	1	40
	Demand	75	20	50	

3. Attempt any *two* of the following : [10]

(*i*) Solve the following assignment problem to minimize the total cost :

Machines

Jobs	**A**	**B**	**C**	**D**	**E**
I	160	130	175	190	200
II	135	120	130	160	175
III	140	110	155	170	185
IV	50	50	80	80	110
V	55	35	70	80	105

(*ii*) Solve the following game by principle of dominance :

Player B

$$\textbf{Player A} \begin{bmatrix} 4 & 3 & 1 & 8 & 8 \\ 6 & 5 & 4 & 6 & 7 \\ 2 & 4 & 3 & 3 & 8 \\ 5 & 6 & 2 & 2 & 4 \end{bmatrix}.$$

(*iii*) Solve the given L.P.P. by Simplex method :

Maximize : $z = 2x_1 + 3x_2 + 4x_3$

Subject to :

$$3x_1 - 2x_3 \leq 41$$

$$2x_1 + x_2 + x_3 \leq 35$$

$$2x_1 + 3x_3 \leq 30$$

$$x_1,\ x_2,\ x_3 \geq 0$$

4. Attempt any *one* of the following : [1×10=10]

(*i*) Find an initial basic feasible solution to the following transportation problem by Vogel's Approximation method. Find the optimal solution by MODI method. Also find an alternate solution if it exists.

Warehouses

		W_1	W_2	W_3	W_4	**Supply**
Origin	O_1	1	2	–2	3	70
	O_2	2	4	0	1	38
	O_3	1	2	–2	5	32
	Demand	40	28	30	42	

(*ii*) Solve the following Game graphically :

$$\begin{array}{cc} & \begin{array}{cc} \textbf{Player B} & \\ \textbf{I} & \textbf{II} \end{array} \\ \begin{array}{c} \\ \textbf{I} \\ \textbf{Player A} \quad \textbf{II} \\ \textbf{III} \end{array} & \begin{bmatrix} 2 & 7 \\ 3 & 5 \\ 11 & 2 \end{bmatrix} \end{array}.$$

(*iii*) A firm manufactures products A, B and C for which the profits are ₹ 3, ₹ 2, and ₹ 4 respectively. The firm has 2 machines and the processing time in minutes for each machine is as below :

Product / Machine	**A**	**B**	**C**
I	4	3	5
II	2	2	4

Machines I and II have 2000 and 2500 minutes respectively. The firm must manufacture minimum 100 A's, 200 B's and 50 C's; but not more than 150 A's. Formulate the above problem as L.P.P. to maximize the profit.

Total No. of Questions—**4**] [Total No. of Printed Pages—**3**

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[4718]-25

S.Y. B.Sc. (Comp. Sci.) (II Semester) EXAMINATION, 2015

ELECTRONICS

Paper I

(ELC-221 : Microcontroller and Embedded Systems)

(2008 PATTERN)

Time : Two Hours **Maximum Marks : 40**

N.B. **:—** (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

(*iii*) Neat diagrams must be drawn wherever necessary.

1. Attempt the following questions in *one or two* sentences : [10×1=10]

(*a*) What is the size of on chip RAM and ROM in 8051 microcontroller ?

(*b*) How many interrupts are available in 8051 microcontroller excluding RESET ?

(*c*) Which register does not have an internal address ?

(*d*) Name the *four* ports used in 8051 microcontroller.

(*e*) What is the function of GATE in the TMOD register ?

(*f*) Which register is used to transfer the character byte serially ?

(*g*) Name the pin used for controlling LCD contrast.

(*h*) What is a cross compiler ?

(*i*) Define simulator.

(*j*) Define Linker.

P.T.O.

2. Attempt any *two* of the following : [2×5=10]

(*a*) Explain the function of the following registers of 8051 microcontroller :

(*i*) SP

(*ii*) DPTR

(*iii*) SBUF

(*iv*) PSW

(*v*) PC.

(*b*) Write an assembly language program in which the 8051 reads data from P1 and write it to P2 continuously while giving a copy of it to the serial COM port to be transferred serially. Assume that XTAL = 11.0592 MHz. Set baud rate at 9600.

(*c*) How are embedded systems classified with respect to their size.

3. Attempt any *two* of the following : [2×5=10]

(*a*) Write an assembly language program to display number from 0 through 9 on seven segment display.

(*b*) With a neat diagram show how LCD is interfaced to 8051. Write an assembly language program to display 'GOD' on LCD.

(*c*) Explain the components (any *four*) of an embedded system with a neat block diagram.

4. Attempt any *one* of the following : [1×10=10]

(A) (*a*) (*i*) In which register is the remainder held and in which the quotient, after the execution of the instruction DIV AB. [2]

(*ii*) Draw the format of IE register and explain EA and ES bit of IE register. [3]

(*b*) Write an assembly language program to generate a square wave of 10 kHz and 50% duty cycle on P1.3. Use timer 0 in mode 2 [Crystal frequency = 11.0592 MHz] [5]

(B) (*a*) Explain internal RAM organization of 8051. [5]

(*b*) (*i*) Draw the format of TCON register which bit of TCON register is set when Timer 0 overflows. [2]

(*ii*) If the digital input is FFH, calculate the output voltage if I_{ref} is 2 mA and resistance is 5 kΩ. [3]

Total No. of Questions—**4**] [Total No. of Printed Pages—**2**

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S.Y. B.Sc. (Comp. Sci.) (II Semester) EXAMINATION, 2015

ELECTRONICS

Paper II

(ELC-222 : Digital Signal Processing)

(2008 PATTERN)

Time : Two Hours **Maximum Marks : 40**

N.B. **:—** (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

(*iii*) Neat diagram must be drawn wherever necessary.

1. Answer the following questions in *one or two* sentences : [10×1=10]

(*a*) Define Z-transform.

(*b*) What is deterministic signal ?

(*c*) What is timber of sound signal ?

(*d*) Mention any *two* design considerations of DSP processor.

(*e*) Name *two* the windowing techniques used for designing of FIR filter.

(*f*) Represent the following discrete signal in sequential form :

n	–2	–1	0	1	2	3
X(n)	0	4	–4	–2	2	0.....

(*g*) What is Laplace transform for unit impulse ?

(*h*) What is use of D-cache ?

(*i*) Why echoes are generated in telephones ?

(*j*) Mention the blocks used in DSP system.

P.T.O.

2. Attempt any *two* of the following : [2×5=10]

(*a*) Explain concept of digital filter using a block diagram.

(*b*) Describe barrel shifter and memory block of DSP processor.

(*c*) Explain sigma delta ADC.

3. Attempt any *two* of the following : [2×5=10]

(*a*) Give advantages of digital signal processing over analog signal processing.

(*b*) What is transfer function ? Define pole and zero of transfer function. How poles and zeroes are helpful in frequency analysis ?

(*c*) How does digital signal processor differ from traditional microprocessor ? (any *five* points).

4. Attempt any *one* of the following : [1×10=10]

(*a*) (*i*) Draw and explain block diagram of SONAR system.

(*ii*) What is convolution ? Explain its significance. Find convoluted output for X(n) = [1, –2, 2] & $h(n)$ = {–2, 2}.

Or

(*b*) (*i*) Explain how DSP techniques help in seismography.

(*ii*) Explain multichannel, multidimensional, even, odd continuous signal.

Total No. of Questions—4] [Total No. of Printed Pages—3

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S.Y. B.Sc. (II Semester) EXAMINATION, 2015

COMPUTER SCIENCE

(Compulsory English)

(2008 PATTERN)

Time : Two Hours **Maximum Marks : 40**

N.B. **:—** (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

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

(*a*) Ramesh, Vijaya, Anil and Prakash are asked to have a group discussion on 'Disaster Management and Flood in Kashmir. Write a transcript of discussion in a dialogue form.

(*b*) You are attending an interview for the post of Assistant Professor in Computer Science. Write down *five* questions that would be asked along with their responses.

(*c*) Write a note on 'Group Discussion'.

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

(*a*) Write a paragraph on 'Indian Democracy'.

(*b*) Write a review of a film which you have seen recently.

(*c*) Rearrange the jumbled sentences below to form a well written paragraph :

(1) Well, not quite that long, for our sleep habits have changed over the last century or so.

P.T.O.

(2) A newborn baby appears to be sleeping almost all the time.

(3) But as it grows up, its pattern changes.

(4) By adulthood, the pattern is well established; people sleep eight or nine hours a day.

(5) It sleeps less and less and stays awake longer, playing or crying or babbling.

3. Attempt any *two* of the following : [10]

(*a*) Write a summary note of the passage given below :

Millions of people today travel by air across time zones and suffer jet lag in the process. The world has become one big market, and business people have to be constantly travelling; this robs them of their sleep. Even at other times, these men and women have to stay awake keeping track of market developments in the business capitals of the world, like New York, London and Tokyo. If they fail to monitor the movements of prices in the foreign markets, they will be the losers. Radio and television must bear their share of responsibility for depriving people of sleep. Even after local TV transmissions have closed by midnight, satellite transmission brings programmes from other transmitting stations across the world throughout the night. Many people get addicted to television and consider themselves compensated for the loss of sleep by being able to watch interesting programmes of entertainment or live telecasts of sports or political events from foreign countries.

(*b*) Punctuate the following sentences :

(1) what a wonderful time i had at the party

(2) why does this always happen to me

(3) they said to rose you must sing at the music festival

(4) akash says is it going to rain

(5) i asked what is the arrival time of the train from mumbai

(*c*) Write a description of a person who sat opposite you on a train journey.

4. Attempt any *two* of the following : [10]

(1) You are the librarian of the college. Write an email to the Sales Manager, Oxford University Press, asking for a book catalogue.

(2) Prepare a presentation of 5 slides on 'the climate change'.

(3) Explain the important features of Telephone Communication.