(c) Find the value of $\int_0^6 y \, dx$, using the following table :

x	y
0	0.146
1	0.161
2	0.176
3	0.190
4	0.204
5	0.217
6	0.230

Unit—V

5. (a) Use Picard's method to approximate y when $x = 0.2$ given that $y = 1$ when $x = 0$ and
$$\frac{dy}{dx} = x - y.$$

(b) Use Euler's method to find $y(0.4)$ from the differential equation $\frac{dy}{dx} = xy$, $y(0) = 1$. Take for each step $h = 0.1$.

(c) Apply Runge's method to approximate y when $x = 1.6$ given that $y = 0.4$ at $x = 1$ and
$$\frac{dy}{dx} = x - y.$$

Roll No. ....

Y–2091

B. C. A. (Part II) EXAMINATION, 2015

Paper First

NUMERICAL ANALYSIS

Time : Three Hours]   [*Maximum Marks : 50*

Note : Attempt any *two* parts from each question. All questions carry equal marks. Non-programmable calculators are allowed.

Unit—I

1. (a) Find a real root of the equation $f(x) \equiv x^3 - 4x - 9 = 0$, using bisection method in four stages.

(b) Apply Newton-Raphson method to solve :
$$3x - \cos x - 1 = 0$$

(c) Solve the equation :
$$2x^4 - 4x^3 + 11x^2 - 9x - 26 = 0$$
one root being $\frac{1}{2} + \frac{5}{2}i$.

Unit—II

2. (a) Apply Gauss-Jordan method to solve :

$$2x - 6y + 8z = 24$$

$$5x + 4y - 3z = 2$$

$$3x + y + 2z = 16$$

(b) Solve the system of linear equations :

$$4x_1 - x_2 = 1$$

$$-x_1 + 4x_2 - x_3 = 0$$

$$-x_2 + 4x_3 - x_4 = 0$$

$$-x_3 + 4x_4 = 0$$

using the Cholesky method.

(c) Use Power method to find the largest eigen value of the matrix :

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

Unit—III

3. (a) Estimate the missing term in the following :

x	y
1	2
2	4
3	8
4	?
5	32
6	64
7	128

(b) Find a polynomial satisfied by $(-4, 1245), (-1, 33), (0, 5), (2, 9)$ and $(5, 1335)$, by the use of Newton's interpolation formula with divided differences.

(c) From the following data compute x corresponding to $y = 7$ using Lagrange's formula :

x	y
1	4
3	12
4	19

Unit—IV

4. (a) Show that :

$$\sum_{k=0}^{n} C_k^n = 1$$

where C_k^n is Cote's number.

(b) A curve is drawn to pass through the points given by the following table :

x	y
1	2
1.5	2.4
2	2.7
2.5	2.8
3	3
3.5	2.6
4	2.1

Estimate the area bounded by the curve, the x-axis and the lines $x = 1$ to $x = 4$.
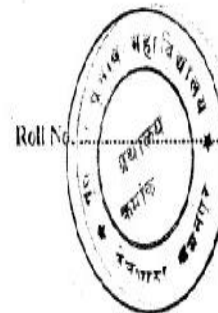
Y–2092

B. C. A. (Part II) EXAMINATION, 2015

Paper Second

DIFFERENTIATION AND INTEGRATION

Time : Three Hours]　　　　[*Maximum Marks : 50*

Note : Attempt any *two* parts from each question. All questions carry equal marks.

Unit—I

1. (a) If :

$$y^{1/m} + y^{-1/m} = 2x$$

then prove that :

$$\left(x^2 - 1\right)y_{n+2} + (2n+1)xy_{n+1} + \left(n^2 - m^2\right)y_n = 0.$$

(b) Expand $\cos x$ in powers of $\left(x - \pi/4\right)$ by Taylor's theorem.

(c) Verify the function $f(x) = 2x^2 - 7x - 10$, for mean value theorem where $a = 2, b = 5$.

Unit—II

2. (a) Trace the curve $xy^2 = 4a^2(2a - x)$.

A-30　　　　　　　　　　　　　　　　　　P. T. O.

(b) Find the asymptotes of the following curve :

$$y^3 - 2xy^2 - x^2y + 2x^3 - 7xy + 3y^2$$

$$+2x^2 + 2x + 2y + 1 = 0$$

(c) Find the points of inflexion of the following curve :

$$y = 3x^4 - 4x^3 + 1$$

Unit—III

3. (a) If :

$$u = e^{xyz}$$

then prove that :

$$\frac{\partial^3 u}{\partial x \partial y \partial z} = \left[1 + 3xyz + x^2 y^2 z^2\right] e^{xyz}$$

(b) Find the directional derivative of $f(x, y, z) = x^2 + y^2 + 2z^2$ at the point P (1, 2, 3) along the line PQ, where co-ordinates of the point Q are (5, 0, 4).

(c) If :

$$x = r \sin\theta \cos\phi$$

$$y = r \sin\theta \sin\phi$$

$$z = r \cos\theta$$

then show that :

$$\frac{\partial(x, y, z)}{\partial(r, \theta, \phi)} = r^2 \sin\theta$$

A-30

Unit—IV

4. (a) Evaluate :

$$\int x^3 \cos x^2 \, dx$$

(b) Evaluate :

$$\int \frac{e^{m \sin^{-1} x}}{\sqrt{1 - x^2}} \, dx$$

(c) Prove that :

$$\int_0^{\pi/2} \frac{d\theta}{5 + 3\cos\theta} = \frac{\pi}{4}$$

Unit—V

5. (a) Evaluate :

$$\int_1^e \int_0^{\log y} \int_1^{e^x} \log z \, dz \, dx \, dy$$

(b) Change the order of integration of :

$$\int_0^{2a} \int_{x^2/4a}^{3a-x} f(x, y) \, dx \, dy$$

(c) Find the length of the arc of the curve :

$$y = \log \frac{e^x - 1}{e^x + 1}$$

from $x = 1$ to $x = 2$.

1300

Y–2093

B. C. A. (Part II) EXAMINATION, 2015

Paper Third

DATA STRUCTURE

Time : Three Hours]   [*Maximum Marks : 50*

Note : Attempt any *two* parts from each question. All questions carry equal marks.

1. (a) What do you mean by complexity of an algorithm ? Explain various notations used to denote complexity.

   (b) Write different operations of data structure and the data structure in which they can be performed.

   (c) Define algorithm. Write the features of an efficient algorithm.

2. (a) What is an array ? Write an algorithm to insert an element in a linear array.

   (b) Write algorithm for binary search. Give its advantages and limitations.

   (c) What is pointer array ? What is the purpose of using pointer array ?

3. (a) What is Linked List ? Explain various types of linked list.

A-20   P. T. O.

(b) Write algorithm to insert and delete an element from a queue.

(c) Translate, by inspection and hand, each infix expression into its equivalent postfix expression :

   (i) $(A + B \uparrow D)/(E - F) + G$

   (ii) $A * (B + D)/E - F * (G + H/K)$

4. (a) What is Binary Tree ? With reference to binary tree explain the following terms :

   (i) Level

   (ii) Depth of a node

   (iii) Degree of a node

   (iv) Edge

   (v) Terminal node

(b) Suppose the following list of letters is inserted in order into an empty binary search tree :

   J, R, D, G, T, E, M, H, P, A, F, Q

Find the final tree T and inorder traversal of T.

(c) Write and explain the algorithm for preorder traversal of a binary tree.

5. (a) Write algorithm to sort a list of elements using selection sort.

(b) What is merging ? Explain merge sort with the help of an example.

(c) Arrange D, A, T, A, S, T, R, U, C, T, U, R, E in alphabetical order through insertion sort. Give steps.
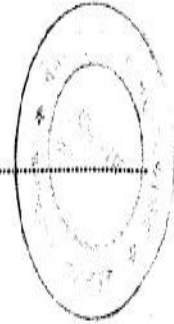
Y–2094

B. C. A. (Part II) EXAMINATION, 2015

Paper Fourth

DBMS (ORACLE, SQL)

Time : Three Hours]   [*Maximum Marks : 100*

[*Minimum Pass Marks : 40*

Note : Attempt any *two* parts from each question. All questions carry equal marks.

1. (a) What are the different data administration roles ?

   (b) What are the access methods for data ?

   (c) Explain data dictionary.

2. (a) Draw an E-R diagram for inventory information system to maintain information for items, order and customers.

   (b) Explain the concepts of keys.

   (c) Explain the following :

      (i) aggregation

      (ii) generalization

3. (a) Explain the following relational algebra operations :

      (i) Select

(i) Project

(iii) Cross product

(iv) Set difference

(b) What are database integrity constraints ?

(c) Consider the following relation :

Employee (eid, ename, eaddress)

Works (eid, salary, branch_id)

Branch (branch_id, branch_name)

Given a relational algebra expression for each of the following queries :

(i) Select all employee name of branch name is "XYZ".

(ii) Find employee id whose salary is greater than 10,000.

(iii) Find the total salary of branch_id = '100'.

(iv) Find the employee name and its branch name.

4. (a) Explain functional dependencies.

(b) What are the different forms of normalization ?

(c) What do you mean by multi-valued dependencies ? Explain with example.

5. (a) What are the commands used to manipute data ?

(b) Explain the following :

(i) Group by clause

(ii) Nested queries

(c) Consider the following schema :

Student (rollno, name, age, college_name)

College (rollno, college_id, college_name, location)

Seats (college_id, no_of_seats_filled, seats_left, total_seats)

Write SQL command for the following query :
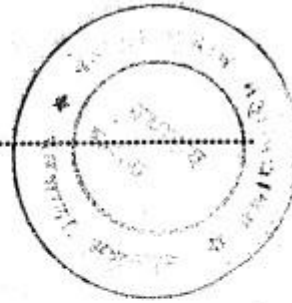
(i) Find college name where no seats are filled.

(ii) Find student name of college name "XYZ".

(iii) Find the total no. of left seats of each college.

(iv) Update the name of student with "Sita" where college name is "XYZ".

1300

Y–2095

B. C. A. (Part II) EXAMINATION, 2015

Paper Fifth

PROGRAMMING IN C++ AND VISUAL C++

Time : Three Hours] [*Maximum Marks : 100*

[*Minimum Pass Marks : 40*

Note : (i) Attempt any *two* parts from each question. All questions carry equal marks.

(ii) Only simple calculator is allowed not scientific calculator.

1. (a) What are the features of object-oriented programming ?

   (b) What is Class ? Describe it with example.

   (c) Write down the difference between procedure oriented programming and object oriented programming.

2. (a) What is inheritance ? How many types of inheritance are there ? Describe it.

   (b) What is constructor and destructor ? How many types to assign values into constructor ?

   (c) What is operator overloading ? Explain it with example.

A-59 P. T. O.

3. (a) What is virtual function ? Explain it.

(b) Write down the features of inline function.

(c) Write a program in C ++ for display the student details with class.

4. (a) What are the methodology for object oriented design ?

(b) Describe the following terms :

(i) Relationship type

(ii) Attribute types

(c) Describe the architecture of object-oriented databases.

5. (a) How many types creating source code file in VC ++ ?

(b) What is device context ?

(c) Describe the following terms :

(i) View object

(ii) Document object

(iii) Application object
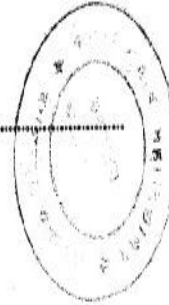
Y–2096

B. C. A. (Part II) EXAMINATION, 2015

Paper Sixth

COMPUTER NETWORK AND INTERNET TECHNOLOGY

Time : Three Hours]   [*Maximum Marks : 100*

Note : Attempt any *two* parts from each question. All questions carry equal marks.

Unit—I

1. (a) What do you mean by computer topology ? Describe all types of topologies.

   (b) Differentiate LAN, MAN and WAN in brief.

   (c) Explain point to point and multipoint line configuration in brief.

Unit—II

2. (a) Write the function of each layer of TCP/IP model.

   (b) Differentiate OSI model and TCP/IP reference model.

(c) Write short notes on the following :

(i) Arpanet

(ii) NSFNET

Unit—III

3. (a) Explain parallel transmission and series transmission in brief.

(b) Explain DTE-DCE interface with example.

(c) What is Modem ? Explain their types. Why are modem standards necessary ?

Unit—IV

4. (a) Differentiate internet and intranet. Explain client server model of internet with diagram.

(b) Explain CGI scripting with suitable example.

(c) Write codes for the following :

```
| User Name    [        ]
|
| Password     [        ]
|
|
| Login     [ ] Admin
|
|           [ ] General
|
|
| [OK]          [Cancel]
```

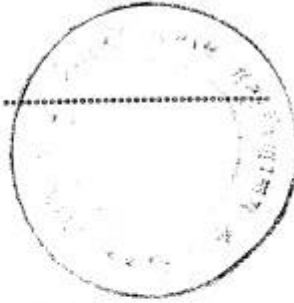## Unit—V

5. (a) What is Java applet ? Write Java source code to design an applet to show some text in a applet window.

(b) Describe the structure of Java script and explain all commands of Java script.

(c) Write short notes on the following :

(i) Web server

(ii) Style sheet

Y–2097

B. C. A. (Part II) EXAMINATION, 2015

Paper Seventh

LINUX

Time : Three Hours] [*Maximum Marks : 50*

Note : Attempt all the *five* questions. Attempt any *two* parts from each question. All questions carry equal marks.

1. (a) Throw light on the architecture of LINUX.

   (b) Discuss about the need and origin of LINUX.

   (c) Explain the following commands with suitable example :

      (i) cd

      (ii) Cat

      (iii) df

      (iv) whoami

      (v) bc

2. (a) Explain the various features of Emac-editor ?

   (b) How can you create shell command ? Explain.

   (c) Discuss any *five* Vi commands.

3. (a) Write a shell program for multiplying two numbers.

A-59   P. T. O.

(b) Write any shell program using for loop.

(c) Explain the stepwise procedure :

    (i) To change password

    (i) Terminate process

4. (a) Explain different models of X-windows.

    (b) Write the steps to manage file with the GNOME.

    (c) Explain the features of window manager.

5. (a) What is the role of inittab file ?

    (b) Point out highlight of security file access permission.

    (c) Explain the steps to generate user and group in Linux.

Y–2098

B. C. A. (Part II) EXAMINATION, 2015

Paper Eighth

PRINCIPLES OF MANAGEMENT

Time : Three Hours]　　　　　[*Maximum Marks : 50*

Note : Attempt all questions. All questions carry equal marks.

Unit—I

1. "Management contains both elements, those of science and those of an art." Comment.

Or

Describe the main functions of management. Explain their comparative importance.

Unit—II

2. What do you understand by planning ? Discuss its nature, objectives and importance in business management.

Or

Enumerate the principal steps in the process of planning. Describe them briefly.

Unit—III

3. What is Organization Structure ? Discuss the factors determining organization structure.

Or

What do you understand by Departmentation ? Discuss the various bases of departmentation.

Unit—IV

4. Critically examine the different theories of Leadership.

Or

What is Communication ? What are the various barriers to communication ? How can these barriers be removed ?

Unit—V

5. What do you mean by control ? Describe the essential steps of effective control system.

Or

Explain the concept of bounded rationality in decision-making.

Y–2099

B. C. A. (Part II) EXAMINATION, 2015

Paper Ninth

(Foundation Course)

ENGLISH LANGUAGE

Time : Three Hours]   [*Maximum Marks : 50*

[*Minimum Pass Marks : 20*

Note : Attempt all questions.

Unit—I

1. Answer any *five* of the following questions :   10

   (a) Who is the true daughter of Old Time ?

   (b) Which epoch making discoveries were made in the field of Mathematics in Ancient India ?

   (c) What role do the satellites play in Communication ?

   (d) What is Information Technology ?

   (e) Why does the agony of plant leave us indifferent ?

   (f) When was Ramanujan's curiosity about the "highest truth' in mathematics aroused ?

   (g) What does Peter Laurie say about job prospects in the computer sector ?

(h) How can a plastic surgeon be compared to a sculptor ?

Unit—II

2. (a) Read the passage carefully and answer the questions that follow :   5

Discipline must be enforced right from the child's birth. Discipline at home makes for future greatness of a child. It forms his character and makes him a fit citizen. The child who is allowed to have his own way, becomes wayward. The child who is allowed all sorts of excesses like running about in the sun, expositing himself to cold, eating unwholesome things will fall ill frequently. A child whose habits have been disciplined and who has been taught to rise early attend to his lessons and avoid things that are injurious will grow to be a useful member of the society. The spoilt child who has been allowed to run his course, will show vice contracted in younger days. His parents would wish that he had not been born at all.

Questions :

(i) When should discipline be enforced ?

(ii) What does discipline do for a child ?

(iii) If a child is allowed to do what he likes, what will happen to him ?

(iv) What wishes does a child pick up when he disallowed to do what he likes ?

(v) Give a suitable title to the passage.

(b) Give synonyms of the following (any *five*) :   5

(i) outstanding

(ii) concept

(iii) copy

(iv) glorious

(v) substance

(vi) holy

(c) Give antonyms of any *five* of the following words :   5

(i) modern

(ii) senior

(ii) large

(iv) first

(v) quiet

(vi) sweet

Unit—III

3. Write a report in 150-200 words on any *one* of the following :   5

(i) Sirpur festival

(ii) Rajim Kumbh

(iii) Floods in Chhattisgarh

(iv) Oath-taking ceremony in your college

Unit—IV

4. Expand any *one* of the following in about 150 words :   5

(i) Rome was not built in a day.

(ii) A bird in hand is better than two in the bush.

(iii) Never a borrower nor a lender be.

(iv) Science is a good servant but a bad master.

Unit—V

5. Do as directed (any *twenty*) :   15

(1) She is .... little Hitler.   (Insert an article)

(2) Calcutta is .... largest city in India.

                         (Insert an article)

(3) He usually .... (spend) his vacation here.

            (Use correct tense of the verb)

(4) .... you Mr. Kumar ?

            (Use proper form of 'be')

(5) If you took less exercise, you .... (feel) better.

      (Put the given verb in the correct form)

(6) We .... aim at noble goals.

    (Use a model auxiliary expressing desirability)

(7) Who did this ?   (Change the voice)

(8) Please shut the door.   (Change the voice)

(9) wave you heard about ujjain

              (Punctuate the Sentence)

(10) what a marvellous idea (Punctuate the sentence)

(11) You do the work ....

           (Use the correct self form)

(12) Kalidas lived .... the reign of king Vikramaditya.   (Insert a suitable preposition)

(13) You teach. Do you enjoy it ?

  (Combine into a simple sentence using a gerund form)

(14) I gave her my address. I wanted her to contact me.

        (Combine making necessary changes)

(15) I was tired. I went to bed early.

        (Combine using 'as' or 'because')

(16) I'll try to be on time but do not worry ...., I am late.   (Insert 'if' or 'when')

(17) I had asked everybody .... only three people came. (Complete using a conjunction/connector)

(18) They listened the music.   (Correct the sentence)

(19) You should abstain strong drinks.

               (Correct the sentence)

(20) You should apply the secretary.

               (Correct the sentence)

Change the voice.

(21) Who killed the Tiger ?

(22) The cat drank all the milk.

(23) Put this picture on the wall.

(24) The auditors are checking the accounts.

(25) Mother has cooked the food.