

(3 Hours)

[Total Marks : 100

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

(OLD COURSE)

(03 Hours)

April - 2015

(Total Marks: 100)

Foundation Course
(Paper-II)

[N.B.: All questions are Compulsory]

Section I

1. Write note on **Any Three** of the following: (6x3)
 - a) The National Security Act 1980.
 - b) The Narmada Bachao Andolan.
 - c) Non – Government Organizations.
 - d) Right to Equality.
 - e) Contributions of C.V.Raman.
2. Attempt **Any Two** of the following: (8x2)
 - a) Discuss the role of National Commission for Women in detail.
 - b) What is The Chipko Movement? State the Human Rights that are protected by the Chipko Movement.
 - c) Why is Newton known as the father of theoretical physics?
3. Attempt **Any Two** of the following: (8x2)
 - a) State the protective rights made for the Scheduled Castes and Scheduled Tribes.
 - b) Discuss the powers and functions of National Human Rights Commission.
 - c) State the relationship between Science and Technology.

Section II

4. Write note on **Any Three** of the following: (6x3)
 - a) Environmental Degradation.
 - b) Air born diseases.
 - c) Cyber Crime.
 - d) Disaster Management.
 - e) Nanotechnology.
5. Attempt **Any Two** of the following: (8x2)
 - a) Discuss briefly some of the Water related health problems.
 - b) Define 'Environmental Ethics' and discuss its scope and importance.
 - c) Explain the meaning of 'Carbon Trading'. How does it help in protecting the environment.
6. Attempt **Any Two** of the following: (8x2)
 - a) Define Nuclear power and state its disadvantages.
 - b) Discuss briefly the various aspects of Information Technology and its applications.
 - c) What is 'Waste Management' and what are the ways of proper disposal of waste.

S.Y.B.Sc
Comp. Scien

(REVISED COURSE)

(03 Hours)

(Total Marks: 100)

[N.B.: All questions are Compulsory]

Section I

1. Write note on **Any Three** of the following: (6x3)
 - a) National Commission for Scheduled Castes and Scheduled Tribes.
 - b) Climate Change.
 - c) Effects of Hybrid Disasters.
 - d) Age of Enlightenment.
 - e) Importance of Effective Listening.

2. Attempt **Any Two** of the following: (8x2)
 - a) What are the main functions of the National Human Rights Commission of India?
 - b) What is disaster mitigation? State the goals of disaster mitigation.
 - c) What role does technology play in everyday life of man?

3. Attempt **Any Two** of the following: (8x2)
 - a) Discuss the psychological barriers to effective communication.
 - b) Explain the extinction and state the threats to environment from extinction of plants.
 - c) Write a letter to the Vice Chancellor of Mumbai University requesting him to give an opportunity to the students to take up the campaign of The Prime Minister i.e. 'Swachh Bharat Yojna' within the campus.

Section II

4. Write note on **Any Three** of the following: (6x3)
 - a) Team Building.
 - b) Consumer Protection Act.
 - c) Abraham Maslow's Theory of Motivation.
 - d) Nanotechnology.
 - e) Eco - Centrisism.

5. Attempt **Any Two** of the following: (8x2)
 - a) Discuss the features of Right to Information Act 2005.
 - b) Write a detailed note on urbanization in India?.
 - c) How is eco-feminism connected to feminist approach?

6. Attempt **Any Two** of the following: (8x2)
 - a) Explain the consequences of Privatization of Education.
 - b) Technology plays a very important role in life of modern man. Comment.
 - c) What is an outcome of Bio-centrisism approach?

Con. 221-15.

Note : 1) All questions are compulsory.

2) From Q.2 to Q.7 subquestion (a) is compulsory . Attempt only one from subquestion (b) and (c).

Q.1 Attempt any Two of the following.

(10)

a) For any non zero reals a and b prove that $(ab)^{-1} = b^{-1}a^{-1}$.

b) Solve $x(1+y^2)^{1/2} dx + y(1+x^2)^{1/2} dy = 0$.

c) Draw the sketch of region R and interchange the order of integration $\int_0^1 \int_{x^2}^x f(x,y) dy dx$.

Q.2

a) Prove that intersection of any finite collection of open sets in \mathbb{R} (set of real number) is open. (8)

b) Prove that a subset of \mathbb{R} is closed if and only if it contains all its limit point. (7)

OR

c) State and prove Nested interval theorem. (7)

Q.3

a) State and prove sandwich theorem of sequence in \mathbb{R} . (8)

b) If $\langle x_n \rangle$ in \mathbb{R} is monotonically increasing and bounded above then prove that it is convergent. (7)

OR

c) If $f : [a, b] \rightarrow \mathbb{R}$ is continuous on $[a, b]$ then show that f is bounded on $[a, b]$. (7)

Q.4

a) State the Ratio test of convergence of series , using it discuss the convergence of $\sum_{n=1}^{\infty} \frac{x^n}{3^n n^2}$. (8)

b) Using comparison test show that the series $1 + \frac{1}{2^2} + \frac{1}{3^3} + \frac{1}{4^4} + \dots + \frac{1}{n^n} + \dots$ is convergent. (7)

OR

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- C) Find the fourier series for periodic function $f(x) = -\pi \quad -\pi < x < 0$ (7)
 $= x \quad 0 < x < \pi$

Q.5

- a) Solve the differential equation $(4y + 3x)dy + (y - 2x)dx = 0$. (8)
 b) Solve $y'' + 4y = x^2$ using UDC method. (7)

OR

- C) If $y_1 = x^2$ is one of the solution of given differential equation $x^2 y'' + xy' - 4y = 0$ then find general solution. (7)

Q.6

- a) Calculate $\iint_R f(x,y) dA$ and verify Fubini's theorem, where $f(x,y) = 1 - 6x^2y$ and $R = \{(x,y) / 0 \leq x \leq 2, -1 \leq y \leq 1\}$ (8)

- b) Evaluate the $\int_0^{\sqrt{2}} \int_0^{\sqrt{4-y^2}} \frac{dx dy}{1+x^2+y^2}$ by converting it into polar co-ordinates. (7)

OR

- c) Find volume of solid bounded by $2 \leq x \leq 4, 3 \leq y \leq 5, -1 \leq z \leq 1$. (7)

Q.7

- a) Evaluate $\int_C x^4 dx + xy dy$ where C is triangular curve consisting of line segments from (0,0) to (1,0) and from (1,0) to (0, 1) and from (0, 1) to (0, 0) using green's theorem. (8)

- b) Evaluate $\int_C (2 + x^2 y) ds$ where C is the upper half an unit circle $x^2 + y^2 = 1$ (7)

- c) Find the work done by force F from (0, 0, 0) to (1, 1, 1) over the path $c_1 \cup c_2$ consisting of the line segment from (0, 0, 0) to (1, 1, 0) followed by the segment (1, 1, 0) to (1, 1, 1). Where

$$F = x^2 \hat{i} - xy \hat{j} + \hat{k}$$

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Con. 222-15.

- N.B.: 1. All questions are compulsory.
 2. In each question, from question Nos. 2 to 7 part 'a' is compulsory. Attempt any one question from part 'b' and part 'c'.
 3. Figures to right indicate full marks.

Q.1]

a) Show that $B = \{v_1, v_2, \dots, v_n\}$ is a basis of a vector space V if and only if B is maximal linearly independent set in V . [10]

OR

b) Show that the dimension of the solution of the system $AX = 0$ is $n - \text{rank } A$. [10]

Q.2]

a) Show that elementary matrices are invertible and invertible matrix is product of elementary matrices using one example. [08]

b) Show that the only solution of the following system is the trivial solution. [07]

$$4x - 7y + 3z = 0$$

$$x + y = 0$$

$$y - 6z = 0$$

c) Reduce the matrix $\begin{bmatrix} 0 & 1 & 3 & 2 \\ 2 & 1 & -4 & 3 \\ 2 & 3 & 2 & -1 \end{bmatrix}$ to row echelon form. [07]

Q.3]

a) If S is a convex set in a vector space V and $w \in V$. Then show that $w + S = \{w + x/x \in S\}$ is convex set. [08]

b) Show that every non zero singleton set is linearly independent. [07]

c) If $W = \{(x, y, z)/ x + y + z = 4; x, y, z \in \mathbb{R}\}$ show that W is not a subspace of \mathbb{R}^3 . [07]

Q.4]

a) Explain gram-schmidt method to construct a orthogonal basis from given bases. [08]

b) Show that $\langle x, y \rangle = 2x_1y_1 + x_1y_2 + x_2y_1 + x_2y_2$ is inner product space over \mathbb{R}^2 . [08]

c) Find the cosine of angle between $(1, -3, 2)$ and $(2, 1, 5)$ in \mathbb{R}^3 with respect to usual inner product. [07]

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[TURN OVER

Q.5]

a) Let $T: U \rightarrow V$ be a linear transformation, then show that T is injective map if and only

if $\ker T = \{0\}$.

[08]

b) State and prove Rank Nullity theorem.

[07]

c) Let $T: \mathbb{R}^3 \rightarrow \mathbb{R}^3$ be a linear transformation defined by

$T(x, y, z) = (x - y + 2z, 2xy, -x - 2y + 2z)$. Find $\ker T$, $\text{Im } T$. Also find a basis

for each of them and their dimensions.

[07]

Q.6]

a) Prove that the area of the triangle in the plane with vertices $(x_1, y_1), (x_2, y_2), (x_3, y_3)$

is the absolute value of $\frac{1}{2} \begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix}$.

[08]

b) Let A, B be two $n \times n$ matrices, then show that $\det(AB) = \det A \cdot \det B$.

[07]

c) Use adjoint method to find the inverse of $\begin{bmatrix} 1 & 2 & 0 \\ 1 & -1 & 1 \\ 1 & 2 & 1 \end{bmatrix}$.

[07]

Q.7]

a) Let λ be an eigen value of a linear T. Prove that λ^2 is an eigen value of T^2 . Also show

that in generally λ^k is an eigen value of T^k .

[08]

b) Show that the equation $x + 2y - z = 3, 3x - y + 2z = 1, 2x - 2y + 3z = 2,$

$x - y + z = -1$ are consistent and solve them.

[07]

c) Find the Characteristic polynomial of AB, where $A = \begin{bmatrix} 1 & 0 & 3 \\ 0 & 2 & 3 \\ 3 & 1 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & 1 & 0 \\ 1 & 4 & 0 \\ 0 & 0 & 1 \end{bmatrix}$.

[07]

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N.B. : (1) All Questions are Compulsory.

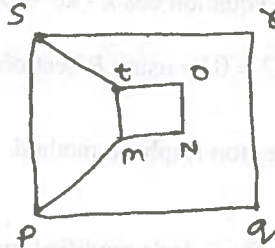
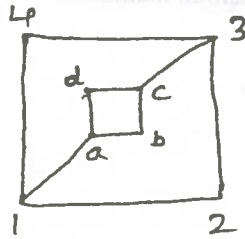
(2) All Questions carry equal marks.

(3) Figures to the right indicate full marks.

(4) Use of Non-Programmable Scientific Calculator is Allowed.

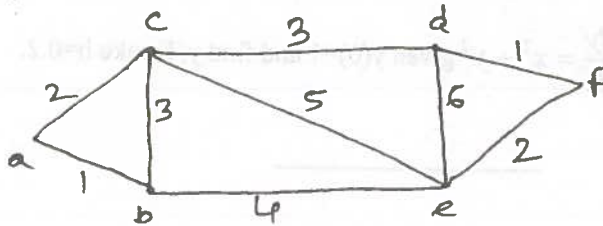
- Q.1 (a) Design an algorithm to find factorial of positive integer and trace it for $n=5$. (7)
 (b) Attempt any two:
 (i) Design an algorithm to find whether an input number is Prime or not. (4)
 (ii) Write an Algorithm for Depth first Search. (4)
 (iii) Design an algorithm to find sum of first five positive integer. (4)

- Q.2 (a) State and Prove Handshaking Lemma. (7)
 (b) Attempt any two:
 (i) Draw all Possible Subgraphs of K_3 . (4)
 (ii) Check whether the following graphs are Isomorphic or Not. (4)



- (iii) Check whether the following graphs are Planar or Not. (4)
 (p) $K_{3,3}$ (q) K_4

- Q.3 (a) Write Steps in Krushkal's Algorithm for weighted graph and find minimum Spanning Tree by using Krushkal's Algorithm for following graph. (7)



- (b) Attempt any two:
 (i) Define Complete and Regular Graph and explain the difference between them. (4)
 (ii) Show that the number of Odd Vertices in a graph is even. (4)
 (iii) Define Eulerian and Hamilton Graph with Examples. (4)

[TURN OVER

Q.4 (a) Find the Volume of Solid revolving around X-axis and Surface of revolution of Ellipse $x=3\cos t$ and $y=4\sin t$ where $0 \leq t \leq \pi$. (7)

(b) Attempt any two:

(i) Evaluate $\int_0^{\infty} 5^{-x^2} dx$ (4)

(ii) Evaluate $\int_0^{\infty} \frac{1}{1+x^2} dx$ (4)

(iii) Find the Area of $y=x^2$ about X-axis from 0 to 2. (4)

Q.5 (a) Solve $2x + y + z = 12$, $3x + 2y + 2z = 8$ and $5x + 10y - 8z = 10$ by using DoLittle's Decomposition method. (7)

(b) Attempt any two:

(i) Find the root of the equation $\cos x - xe^x = 0$ by False position method. (4)

(ii) Solve $x^2 + 2x - 2 = 0$ by using Bisection method. (4)

(iii) Find $\sqrt{7}$ by Newton Raphson method. (4)

Q.6 (a) Derive the formula for Euler's modified method. (7)

(b) Attempt any two:

(i) By Milne Simpsons predictor-corrector method to solve $\frac{dy}{dx} = xy$ given $y(0)=1$ and $h=0.1$ find $y(0.2)$. (4)

(ii) By Taylor's Method solve $\frac{dy}{dx} = x + y$ find $y(0.1)$ given $y(0)=1$ and $h=0.5$ (4)

(iii) By Euler's Method solve $\frac{dy}{dx} = x^2 + y^2$ given $y(0)=1$ and find $y(1)$ take $h=0.2$. (4)

Con. 224-15.

(2 Hours)

[Total Marks : 60]

- N.B. :** (1) All questions are compulsory.
(2) Figures to the right indicate marks.
(3) Mixing of sub-questions is not allowed.

Section I

1. Attempt the following (any two) :—
 - (a) Solve the recurrence relation : $a_{r+2} - 2a_{r+1} + a_r = 2r$. 5
 - (b) Consider the set $A = \{4, 5, 6, 7\}$. Let R be the relation \leq on A . Draw the directed graph and the Hasse diagram of R . 5
 - (c) With $a_0 = 1$ and $a_1 = 2$. Find first 5 terms in sequence $\{a_n\}$ whose recurrence relation is $a_n = 5a_{n-1} - 3a_{n-2}$. 5

2. Attempt the following (any two) :—
 - (a) State the Depth First Algorithm. 5
 - (b) Let E denote the following algebraic expression : 5
 $[a + (b+c)] * [(d-e) / (f+g-h)]$.
 Represent E with a binary tree T . Also state the preorder traversal of E .
 - (c) State the Breadth First Algorithm. 5

3. Attempt the following (any two) :—
 - (a) Suppose a department contains 13 professors. Show that at least 2 of them have their birthday in the same month. 5
 - (b) Find number of permutation for the letter EXPRESSION and LAMINATION. 5
 - (c) How many 4 digit numbers can be formed by using the digits 2, 4, 6, 8 when repetition of digit is allowed. 5

Section II

4. Attempt the following (any two) :—
 - (a) State the DDA Line Drawing Algorithm. 5
 - (b) Derive an expression for rotation about the origin. 5
 - (c) What are the applications of Computer Graphics ? 5

5. Attempt the following (any two) :—
 - (a) Write the properties of Bazier Curves. 5
 - (b) Write a short note on Workstation transformation. 5
 - (c) Write a short note on Point Clipping. 5

6. Attempt the following (any two) :—
 - (a) Discuss the steps in Animation. 5
 - (b) Write short note on Texture Mapping. 5
 - (c) Differentiate between Diffuse and Point Source Illumination. 5

- N.B: (1) All questions are compulsory.
(2) Figures to the right indicate full marks.
(3) Mixing of sub-questions is not allowed.

SECTION I

Q1 Attempt the following (any TWO):

- i) Explain the benefits of Object Oriented Programming. 05
- ii) Explain the term Method Overloading with an example. 05
- iii) Write a C++ program to print the sum of all odd numbers between 1 to 50. 05

Q2 Attempt the following (any TWO):

- i) What is a Constructor? Explain its different types with an example. 05
- ii) Explain how to Overload Unary and Binary Operators using friend function. 05
- iii) What is inheritance? Explain its different types. 05

Q3 Attempt the following (any TWO):

- i) Explain the terms try, catch and throw with respect to exception handling in C++. 05
- ii) What are the components of Standard Template Library? 05
- iii) Explain with an example, how to open and close a file in C++. 05

SECTION II

Q4 Attempt the following (any TWO):

- i) Explain the difference between Object Oriented Programming and Procedural Programming. 05
- ii) Write short note on Branching Statements of Java. 05
- iii) Write a Java program to find the sum of all integers greater than 50 and less than 100. 05

Q5 Attempt the following (any TWO):

- i) Write a short note on Abstract class. 05
- ii) Explain Exception Handling in Java. Define an exception "NoMatchFound" that is thrown when a string is not equal to "SYBSC". Write a program that uses this exception. 05
- iii) Write a program with an interface Shape which has a method draw(). Write two classes Circle and Triangle which implement the interface. Test the classes created. 05

Q6 Attempt the following (any TWO):

- i) Explain with an example InputStream and OutputStream. 05
- ii) List the advantages and disadvantages of Applets. 05
- iii) Write a program to design a simple calculator application. 05

- Note: 1) All Questions are compulsory.
2) All Questions carry equal marks.
3) Draw diagrams wherever necessary.

SECTION I

Q1) Attempt any two of the following .

- a) Discuss the advantages and disadvantages of DBMS. [5]
- b) Define the following terms : [5]
- i) Tuple
 - ii) Attribute
 - iii) Weak Entity
 - iv) Candidate key
 - v) Domain
- c) Discuss entity integrity and referential integrity. [5]

Q2) Attempt any two of the following .

- a) Write the syntax for the following with example. [5]
- i) View
 - ii) Create
- b) What are Aggregate functions ? Explain with example . [5]
- c) Consider the following relations. [5]
- Customer (Cust_id, Cust_name, Cust_add, Cust_city, Cust_phone)
Item (Item_id, Item_name, Item_desc, Item_price)
Item_Sold_details (Cust_id, Item_id, Date)
- i) Display details of customer staying at 'Mumbai', 'Pune', 'Thane'.
 - ii) Which items were sold on 19th April 2015 .
 - iii) Calculate the overall price of the items .
 - iv) Display all items whose initial begins with 'P' .
 - v) Display Customer name , Item Description , Item Price in reverse order of Item Price.

Q3) Attempt any two of the following .

- a) State advantages and disadvantages of triggers. [5]
- b) Explain types of joins . [5]
- c) What are stored procedures. [5]

[TURN OVER

SECTION II

Q4) Attempt any two of the following .

- a) Discuss the Fact Finding methods in Software Engineering. [5]
- b) Explain any five phases of SDLC. [5]
- c) Compare Waterfall Model and Spiral Model . [5]

Q5) Attempt any two of the following .

- a) Define Feasibility study. List all & explain any two types feasibility study. [5]
- b) Draw a DFD diagram for Online Shopping. State the names and use of the symbols used in designing a DFD diagram. [5]
- c) Differentiate between (three points) [5]
 - i) Black Box and White Box testing .
 - ii) Alpha testing and Beta testing.

Q6) Attempt any two of the following .

- a) Compare OODBMS and RDBMS. [5]
- b) Draw an ERD for Online Shopping. [5]
- c) Explain the types of Cohesion and Coupling . [5]

S.Y. B.Sc (Comp.Sc.)

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