S.Y. B.Sc (Comp. Science) June 2019

Con. : 296-19. Foundation Course (II) **BQ-7018**

(3 Hours) Total Marks : 80

N.B. :- 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Section I

Q. 1 Answer any four questions from the following: (20).
a) Forms of violation of rights
b) The Child Labour Act, 1986
c) Threat to environment from extinction of plants
d) Types of disaster
e) Meaning of scientific method
f) Role of technology

Q. 2 Answer any four questions from the following: (20)
a) Barriers to effective communication
b) Leadership skills and self improvement
c) Explain the term food security
d) Right to Health
e) Right to Education
f) Consequences of privatization of education

Section II

Q. 1 Answer any four questions from the following: (20)
a) Provisions to check black marketing of essential commodities
b) Right to Information Act, 2005
c) Features of Eco-centrism
d) Meaning of environmental ethics
e) Nanotechnology
f) Control of misuse of technology

Q. 2 Answer any four questions from the following: (20)
a) Soft skills required for Competitive exams
b) Concept of motivation
c) SMART Goals
d) Meaning of urbanization
e) Reasons for changing land use in India
f) Issues related to housing in urban areas.

TURN OVER

(3 Hours) Total Marks : 100

N.B. 1. All questions are compulsory.

Section I

1. Write notes on any three of the following: (18)
   a) Violation of the Rights of Children
   b) General effects of disaster on human life
   c) Nature of science
   d) Barriers to effective communication
   e) Right to education

2. Attempt any two of the following: (16)
   a) Main functions of National Human Rights Commission of India
   b) Climate change
   c) Meaning and features of technology

3. Attempt any two of the following: (16)
   a) Advantages and disadvantages of non verbal communication
   b) Concept and determinants of health
   c) Contemporary challenges to education

Section II

4. Write notes on any three of the following: (18)
   a) Important provisions of the Consumer Protection Act, 1986
   b) Environmental ethics
   c) Satellite technology
   d) Effective strategies for time management
   e) Impact of changing land-use on rural life

5. Attempt any two of the following: (16)
   a) Right to Information Act, 2005
   b) Important features of Eco-centrism
   c) Issues of control, access and misuse of technology

6. Attempt any two of the following: (16)
   a) Concept of motivation
   b) SMART goals
   c) Mega cities in India

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

Mathematics - (P-I)

June 2019

Con. : 297-19. **BQ-7022**

(3 Hours) **[Total Marks: 80**

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

(2) Each question carries 16 marks.

(3) Internal choices are there in each question.

(4) Figures to the Right indicate Full marks.

Q.1 Attempt any **four** questions from the following. 16

(a) Show that f is discontinuous everywhere in R if:

$$f(x) = 1 \quad when \quad x \in Q$$
$$= 0 \quad when \quad x \in R \backslash Q$$

(b) State Hausdroff's property & find disjoint neighbourhoods of 0.2 & 0.3.

(c) Find the sum of the $\sum_{n=1}^{\infty} \frac{5}{10^n}$ by using partial sum.

(d) Prove that [0, 1] is Compact.

(e) Give an example of

i. A bounded sequence that is not convergent.

ii. A monotonic sequence that is not bounded.

(f) Prove that the sequence $\left(\frac{n+1}{n}\right)$ is a Cauchy sequence.

Q.2 Attempt any **four** questions from the following. 16

(a) State and Prove the Sandwich Theorem for limit of a sequence.

(b) Examine the convergence of $\sum \frac{5^n n!}{n^n}$

[TURN OVER

(c) Prove that a convergent sequence has a unique limit.

(d) Check if the following sequences converge by using Sandwich Theorem.

i. $(x_n) = \left(\frac{\sin n}{n}\right)$ ii. $(x_n) = \left(\frac{2n}{n^3+1}\right)$

(e) Find limit point/s of following sets:

i. $\left\{\frac{1}{3^n} / n \in \mathbb{N}\right\}$ ii. $\left\{1 + \frac{(-1)^{n+1}}{n} / n \in \mathbb{N}\right\}$

(f) Prove that if $\sum a_n$ is a convergent then $\lim_{n\to\infty} a_n = 0$

Q.3 Attempt any **four** questions from the following. 16

(a) Find Particular solution of $(2D^2 + 5D + 3)y = 0$,y(0)=3 ,$y'(0) = -4$

(b) Solve $(D^2 - 2D - 3)y = e^{4x}$ by using Undetermined Coefficients.

(c)Solve $Cos^2 x \frac{dy}{dx} + y = \tan x$

(d) Solve $(D^2 + 9)y = Sec3x$ by using Variation of Parameters.

(e)Solve $(x + 2)Siny\, dx + x\, Cos\, y\, dy = 0$

(f)Show that $y_1(x) = e^{\frac{-x}{2}} Sin(\frac{\sqrt{3}}{2}x)$ & $y_2(x) = e^{\frac{-x}{2}} Cos(\frac{\sqrt{3}}{2}x)$ are Linearly Independent.

Q.4 Attempt any **four** questions from the following. 16

(a)Find the Volume of Solid Bounded by $Z = x^2 + y^2$ & Z=4

(b) Solve the Double integral $\int_0^1 \int_0^x x^2 y\, dydx$

(c) Evaluate $\oint ydx - xdy$ over a Triangle bounded by y=0, x+y=1 & x=0

(d) Solve the Triple integral $\int_0^1 \int_0^2 \int_0^3 xyz\, dxdydz$

(e) Find the Area bounded by $y = x^2$ & x = y.

(f) Evaluate $\oint y^2 dx + 3xydy$ over a Curve $x^2 + y^2 = 1$.

Q.5 Attempt any **four** questions from the following. 16

(a) Check if the sequence $(x_n) = \left(\frac{1}{4+3} + \frac{1}{4^2+3} + \cdots + \frac{1}{4^n+3}\right)$ is monotonic and bounded.

(b)Solve the Double integral $\int_0^1 \int_0^2 (x + y)\, dy\, dx$

(c)Let F be the vector field $2xyi + (x^2 + 2yz)j + (y^2 + 2z)k$. Find a Scalar potential function for F.

(d) Find the Area bounded by $x^2 + y^2 = 9$ by Green's theorem

(e) Discuss the convergence of $\sum \frac{4^n}{4^n + k^n}$, where $k \in \mathbb{R}^+$

(f) Find Particular solution of $(D^2 + 16)y = 0$ if $y(\frac{\pi}{4}) = -3$, $y'\left(\frac{\pi}{4}\right) = 4$

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(3 Hours) [Total Marks : 100

N.B. (1) ALL QUESTIONS ARE COMPULSORY
(2)FROM QUESTION 2 TO 7, SUBQUESTION (a) IS COMPULSORY AND ATTEMPT ANY ONE FROM REMAINING

Q.1 Attempt any one: - [10]

(a) State & Prove Bolzano Weistrass Theorem of R.

(b) State & Prove Leibnitz Test for Convergence of Infinite Series.

Q.2 (a) State and Prove Hausdroff Property of Real numbers. [8]

(b)Find limit point/s of following sets: [7]

$$1.\left\{\frac{1}{2^n}/n \in \mathbb{N}\right\} \quad 2.\left\{1+\frac{(-1)^n}{n}/n \in \mathbb{N}\right\} \quad 3.\{(-1)^{n+1}/n \in \mathbb{N}\}$$

OR

(b)Is Arbitrary union of Open sets is Open? Justify Your Answer. [7]

Q.3 (a) Define monotonic sequence. Prove that the sequence $(a_n)=\left(\frac{1}{n+1}+\frac{1}{n+2}+\cdots+\frac{1}{n+n}\right)$ is monotonic and bounded. [8]

(b) Check if the following sequences converge. Justify. [7]

$$1.\ (x_n)=\left(\frac{\cos n}{n^3}\right) \qquad 2.\ (x_n)=\left(\frac{n}{n^3+1}\right)$$

OR

(b)Prove that every convergent sequence in $\mathbb{R}$ is Cauchy. [7]

Q.4 (a) Find the sum of the infinite series

$$\frac{1}{1.3}+\frac{1}{3.5}+\cdots+\frac{1}{(2n-1).(2n+1)}+\cdots$$ [8]

(b)Prove that if $\sum a_n$ is a convergent then $\lim_{n\to\infty} a_n = 0$. [7]

OR

(b)Define convergence of a series and examine the convergence of $\sum \frac{n!}{n^n}$ [7]

Q.5 (a) Define Linear differential equation & hence derive the formula for General solution of linear differential equation. [8]

(b) *Solve* $(Cos\, y - Sin\, y + x)\frac{dy}{dx} + 1 = 0$ [7]

OR

(b)*Solve* $\left(xtan\frac{y}{x} - ysec^2\frac{y}{x}\right)dx + xsec^2\frac{y}{x}dy = 0$ [7]

Q.6 (a) Sketch and find the Volume of Solid Bounded by $Z = x^2 + y^2$ & Z=4. [8]

(b) Solve the Double integral $\int_0^1 \int_x^{x^2} x^3\, y\, dydx$ [7]

OR

(b)Find the Area bounded by $y = x^2$ & x + y =2. [7]

Q.7 (a) Evaluate $\oint y^2dx + 3xydy$ over a Curve $x^2 + y^2 = 1$ by Green's Theorem. [8]

(b) Let F be the vector field 2xyi + (x^2 + 2yz)j + (y^2 + 2z)k. Find a Scalar potential function for F. [7]

OR

(b) Evaluate $\oint ydx - xdy$ over a Triangle bounded by y=x, y=1 & x=0. [7]

S.Y.B.Sc(Comp. Science) June 2019

Con. : 298-19. Mathematics – (P-II) **BQ-7026**

(3 Hours) **[Total Marks : 100**

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) State and prove Rank Nullity theorem. [10]

OR

b) Let V be an inner product space. If $x, y \in V$ then prove that $|< x, y >= \|x\|\|y\|$ and the equality holds if and only if $x = \alpha y$ or $y = \alpha x$ for some $\alpha \in \mathbb{R}$. [10]

Q.2]

a) If $A, B \in M_n(\mathbb{R})$ are invertible then show that the product AB is invertible. Also prove that $(AB)^{-1} = B^{-1}A^{-1}$. [08]

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

$$2x - y - 3z = 0$$

$$-x + 2y - 3z = 0$$

$$x + y + 4z = 0$$

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) Show that a subset of a linearly independent set in a vector space is linearly independent. [08]

b) Let $V = \mathbb{R}^3$ and S = {(1, 1, 0), (2, 0, 2)}, Check whether (5, 2, 3) and (4, 1, 5) are in L(S).[07]

c) If $W = \{(x, y, z) / x \geq 0 ; x, y, z \in \mathbb{R}\}$ show that W is not a subspace of $\mathbb{R}^3$. [07]

[TURN OVER

8

Q.4]

a) Find an orthonormal basis for the space of solutions of the linear equation

$3x - 2y + z = 0$ using Gram Schmidt process. [08]

b) Show that the sum of the square of the diagonals of a parallelogram is equal to the sum of the square of the sides. [07]

c) Show that the following are inner product space over $M_2(\mathbb{R})$.let $A = \begin{bmatrix} a_1 & a_2 \\ a_3 & a_4 \end{bmatrix}$ then

$tr(A) = Traceof A = a_1 + a_4$. [07]

Q.5]

a) Let U, V be both finite dimensional vector spaces over $\mathbb{R}$, with $\dim U = n$ and $dimV = m$ then prove that the space $L(U,V)$ of linear maps from U into V is finite dimensional and $\dim L(U,V) = mn$. [08]

b) Show that the dimension of the solution of the system $AX = 0$ is n-rank A. [07]

c) Show that $F: \mathbb{R}^3 \to \mathbb{R}^3$ defined by $F(x,y,z) = (2x - y + z, x + y, 3x + y + z)$ is invertible linear transformation. [07]

Q.6]

a) If $D = (C_1, C_2, \ldots\ldots, C_n) = 0$ then prove that column vectors $C_1, C_2, \ldots\ldots, C_n$ are linearly dependent. [08]

b) Solve the following system using Cramer's rule. [07]
$x - y + 2z = 1,\ x + y + z = 2, 2x - y + z = 5$

c) Prove that the determinant of the vandermonde matrix $A = \begin{bmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{bmatrix}$ is

$(b-a)(c-a)(c-b)$. [07]

Q.7]

a) If A is an invertible square matrix, prove that any matrix B with $A \sim B$ is also invertible. [08]

b) Find eigen values and eigen vectors of the matrix $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 4 \\ 0 & 1 & 3 \end{bmatrix}$. [07]

c) Let λ be an eigen value of a linear T. Prove that λ^2 is an eigen value of T^2. Also prove in generally λ^k is an eigen value of T^k. [07]

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[TURN OVER

(10)

Con. : 298-19. 4 BQ-7026

(3 Hours) [Total Marks : 80

Note: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Q.1] Answer any four questions from the following. [16]

a. Write the general solution of the system and give geometrical interpretation.

$$2x - 3y + 4z = 0$$

$$3x + y + z = 0.$$

b. Find the inverse of the matrix $A = \begin{bmatrix} 1 & 5 & -2 \\ 2 & -1 & 1 \\ 3 & -1 & 2 \end{bmatrix}$

c. If $A \in M_n(\mathbb{R})$ is a invertible matrix, than show that the inverse of A is unique.

d. Reduce the matrix $\begin{bmatrix} 1 & -2 & 3 & -1 \\ 2 & -1 & 2 & 2 \\ 3 & 1 & 2 & 3 \end{bmatrix}$ to row echelon form.

e. If W = {(x, y, z)/x + y + z = 4; x, y, z are real number} then show that W is not subspace of $\mathbb{R}^3$.

f. If W_1 and W_2 are subspace of a vector space V than prove that $W_1 \cup W_2$ is a subspace of V if and only if $W_1 \subseteq W_2$ or $W_2 \subseteq W_1$.

Q.2] Answer any four questions from the following. [16]

a. Let $V = \mathbb{R}^3$ and S = {(1, 1, 0), (2, 0, 2)}, Check whether (5, 2, 3) and (4, 1, 5) are in L(S).

b. Prove that " Every nonzero singleton set is linearly independent".

c. Define linearly dependent, independent set and convex set in vector space V.

d. Check whether the given is basis of $\mathbb{R}^3$, if $B = \{(1,1,0), (-1,0,0)\}$ is a subset of $\mathbb{R}^3$.

e. Show that $(\mathbb{R}^2, <,>)$, where $<x, y> = 2x_1y_1 + x_1y_2 + x_2y_1 + x_2y_2$.

f. Show that the sum of the square of the diagonals of a parallelogram is equal to the sum of the square of the sides.

(11)

Q.3] Answer any four questions from the following. [16]

a. Let $T: U \to V$ be a linear transformation, ther show that i) ker T is a subspace of U.

ii) $Im\ T$ is a subspace of V.

b. Let A, B be two n×n matrices over IR, then show that $det(AB) = det(A).det(B)$.

c. Prove that the area of the triangle in the plane with vertices $(x_1, x_2), (y_1, y_2), (z_1, z_2)$ is the absolute value of $\frac{1}{2}\begin{vmatrix} x_1 & x_2 & 1 \\ y_1 & y_2 & 1 \\ z_1 & z_2 & 1 \end{vmatrix}$.

d. Let T: $V \to W$ be a linear transformation. Show that T is one-one if and only if

kernel T = {0}.

e. solve the following system using Cramer's rule.

$$x - y + 2z = 1, x + y + z = 2, 2x - y + z = 5.$$

f. Show that " the system of non-homogeneous linear equations $AX = B$ has a solution if and only if $rank\ A = rank\ (A, B)$".

Q.4] Answer any four questions from the following. [16]

a. Show that the following system is inconsistent.

$$2x + 6y + 11 = 0, 6x + 20y - 6z + 3 = 0, 6y - 18z + 1 = 0.$$

b. for what values of μ, λ the simultaneous equations given below have no solution.

$$x + y + z = 6, x + 2y + 3z = 10, x + 2y + \lambda z = \mu.$$

c. Find all eigen values of $A = \begin{bmatrix} 2 & 2 & 0 \\ 2 & 1 & 1 \\ -7 & 2 & -3 \end{bmatrix}$

d. Show that the egien values of a diagonal matrix D are same as its diagonal elements.

e. If λ be an eigen value of T than prove that λ^k be the eigen value of T^k.

f. Show that similar matrices have same characteristic polynomial and eigen values.

[TURN OVER

Q.5] Answer any four questions from the following. [16]

a. Find eigen value and eigen vector of $A = \begin{bmatrix} 2 & -1 \\ -8 & 4 \end{bmatrix}$

b. Let A be a $n \times n$ matrix over $\mathbb{R}$. Show that $A + A^t$ is symmetric.

c. Show that "If S_1 and S_2 are convex subset of a vector space V then $S_1 \cap S_2$ is convex if$S_1 \cap S_2 \neq \emptyset$".

d. Show that the vector (1, 2, 3), (2,2,0) from a linearly independent set.

e. Show that " If W is a subspace of an inner product space V then $W = (W^{\perp})^{\perp}$".

f. Define determinants of $n \times n$ matrix of reals define adjoint of A. show that

A(adjoint A) = (det A)I.

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S.Y.B.Sc (Comp. Science) June 2019.

Con. : 299-19. Mathematics – CP-III **BQ-7029**

Duration: 3 hrs Marks : 48

Note: 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Q.1] Answer any TWO questions from the following. [08]

a. Define big- O notation and Check whether $f(n)=\frac{1}{2}n^3+\frac{1}{2}n^2$ is of same order as n^3

b. Write an algorithm to find the g.c.d. of two non-zero integers. Trace it for the value $a=36, b=144$.

c. Define the following term with one example:-

a) Bipartite graph b) Complete graph.

.d. Explain planar graph with one example. Also check that $K_{3,3}$ is planar or not by using Euler's formula?

Q.2] Answer any TWO questions from the following. [10]

a. State the properties of tree.

b. Design an algorithm to find the sum of first n natural numbers. Trace it for n = 6.

c. Evaluate $\int_{-\infty}^{\infty}\frac{dx}{1+4x^2}$.

d. Using the Bisection method, find an approximation root of the equation $xsinx = 1$ and root lies in the interval [1, 1.5] upto 3th iteration.

Q.3] Answer any TWO questions from the following. [10]

a. Define binary tree and build a binary search tree for the numbers

17, 12 , 15, 21, 26, 8, 20, 11, 30

P.T.O....

(141)

b. Define incidence matrix, Draw the graph represented by the incidence matrix

$$\begin{bmatrix} 0 & 1 & 0 & 0 & 1 & 1 \\ 0 & 1 & 2 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 \\ 1 & 0 & 0 & 1 & 0 & 0 \\ 1 & 0 & 0 & 1 & 0 & 0 \end{bmatrix}$$

c. Find the area between the parabola $y^2 = 2x$ and the line $y = 4x - 1$.

d. Find the volume of the solid revolving around X-axis and area enclosed by the parabola $x^2 + 4y = 4$ and X-axis.

Q.4] Answer any TWO questions from the following. [10]

a. Evaluate the square root of 5 using the equation is $x^2 - 5 = 0$,using fixed point method.

b. Estimate $y(1)$ by using Euler's method for $y' = xy + y + x$ with $y(0) = 1$ and $h = 0.5$.

c. Show that the number of odd vertices in a pseudograph is even.

d. Use the Taylor method recursively to solve the equation $y' = x + y$ $y(0) = 1$, taking $h = 0.1$.

also find $y(0.4)$.

Q.5] Answer any TWO questions from the following. [10]

a. Factorize the matrix using Cholesley's method if $A = \begin{pmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{pmatrix}$.

b. Define gamma function and evaluate $\int_2^\infty \frac{x+3}{(x-1)(x^2+1)} dx$.

c. Write an algorithm to exchanging values of three variables without using temporary variable.

Trace it for the value $a = 5, b = 10, c = 15$.

d. Derive Newton- Raphson iterative formula to find the root of the equation $f(x) = 0$.

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(15)

Time: 3Hrs Marks: 90

N.B. (1) All questions are compulsory.

(2) Figures to the right indicate full marks to the sub-question.

(3) From Questions 1 to 6, sub-question (a) is compulsory. Attempt any one from sub-question (b) and (c).

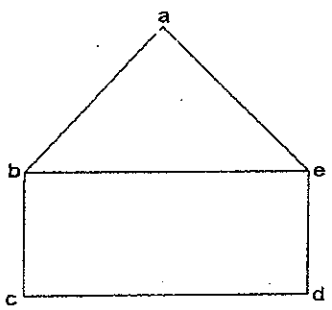
Q.1] (a) Design an algorithm to arrange the number in descending order by using bubble sorting. Trace it for the finite sequence {12,8,18,24,15,20,30}. 8

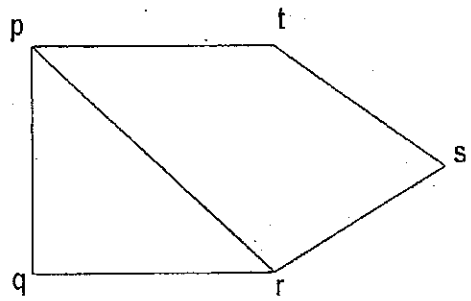
(b) Design the recursive mpower algorithm and trace it for $3^{11} mod\ 5$. 7

(c) Write an algorithm to find the g.c.d. of two non-zero integers. Trace it for the value $a = 36, b = 144$. 7

Q.2] (a) State and prove Handshaking lemma. Also give one example to verify. 8

(b) Check whether pair of graph is isomorphic or not. (justify your answer) 7





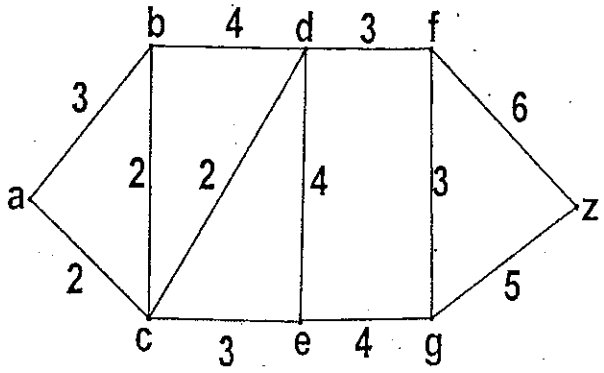
(c) Explain planar graph with one example. Also check that $K_{3,3}$ is planar or not by using Euler's formula? 7

Q.3] (a) State and prove any three properties of trees. 8

P.T.O...

16

(b)Use Kruskal's algorithm to find minimum spanning tree of the given graph: 7



(c) Build a binary search tree for the words banana, peach, apple, pear, coconut, mango, and papaya using alphabetical orders. 7

Q.4] (a) Define improper integral and Evaluate $\int_{-\infty}^{\infty} \frac{dx}{e^x+e^{-x}}$. 8

(b) Find the area of the surface of revolution generated by revolving about X-axis the hypocycloid, $x = a\cos^3 t \;\; y = a\sin^3 t$ where $0 \le t \le \pi$. 7

(c) Find the area enclosed between the curve $y = x^3$ and the line $y = x$. 7

Q.5] (a) Show that the Newton-Raphson method converges to solution quadratically. 8

(b) Solve the system by using Dolittle's LU-decomposition method: 7

$2x + y + 3z = 11, \;\; x + 2y + z = 9, \;\; 3x + y + 2z = 10.$

(c) Using Muller's Method, find the root of the equation $f(x) = x^3 - \frac{1}{2} = 0$ where

$x_1 = 0 \, , x_2 = 1 \, , x_3 = \frac{1}{2}$. 7

Q.6] (a) By the Adams-Bashforth-Moulton method for Predictor-Corrector method estimate the value $y(2)$. Assuming $h = 0.5$ if $y'(x) = \frac{x}{y}$ with $y(0) = 1$ 8

(b) By Euler's method estimate $y(2)$ for given equation $y' = 3x^2 + 1$ with $y(1) = 2$ assuming $h = 0.25$. 7

(c) Estimate $y(2)$ with $h = 0.25$ for the equation $\frac{dy}{dx} = \frac{2y}{x}$ using polygon method with $y(1) = 2$. 7

17

S.Y.B.Sc(comp. Science) July 2019

Con. : 300-19. Computer Science (P-I) **BQ-7033**

(2 Hours) Total Marks : 48

N.B. : (1) All Question are compulsory.
(2) All question carry equal marks.
(3) Draw diagrams wherever necessary.

Section-I

1. **Attempt the following (Any two)** (8)
   (a) Solve the recurrence relation : $a_{r+2}-2a_{r+1}+a_r=2r$.
   (b) A={1,2,3,4,5}
   R={(1,2),(1,3),(2,5),(3,2),(3,3),(4,5),(5,1),(5,2)}
   Draw a diagram and give matrix of R.
   (c) State & prove De Morgan's Law.
   (d) Consider a0=1 and a1=2 . Find first 5 terms in sequence {an} whose recurrence relation is $a_n=5_{an-1}-3a_{n-2}$.

2. **Attempt the following (Any two):-** (8)
   (a) Write an algorithm for searching and inserting an element in binary search tree.
   (b) Let E denote the following algebraic expression.
   [a+(b+c)]*[(d-e)/(f+g-h)]
   Represent E with binary tree T. Also state the preorder traversal of E
   (c) State the Depth First Algorithm.
   (d) State the Breadth First Algorithm.

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

Section-II

4. **Attempt the following (Any two):-** (8)
   (a) Write application of computer graphics.
   (b) Explain DDA algorithm.
   (c) Short note on(i)Scaling (ii)Translation.
   (d) Derive an expression for rotation about the origin.
5. **Attempt the following (Any two):-** (8)
   (a) Discuss properties of Bezier curves.
   (b) Explain Character clipping and its techniques.
   (c) Consider the Bresenham's line drawing algorithm with example.
   (d) Write a short note on Point Clipping.
6. **Attempt the following (Any two):-** (8)
   (a) Discuss Z-buffer algorithm.
   (b) Explain components of Animation System.
   (c) Write short note on Texture Mapping.
   (d) Differentiate between Diffuse and Point Source Illumination.

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TURN OVER

18

(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

Q.1 Attempt the following. (Any two) (10)

a) Solve the recurrence relation : $a_{r+2}-2a_{r+1}+a_r=2r$.
b) Consider the set A = {4,5,6,7}. Let R be the relation $\leq$ on A. Draw the directed graph & the Hasse diagram of R.
c) State & Prove De Morgan's Law.

Q.2 Attempt the following. (Any two) (10)

a) State the Depth First Algorithm.
b) Let E denote the following algebraic expression:
[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.

Q.3 Attempt the following. (Any two) (10)

a) Suppose a department contains 13 professors. Show that at least 2 of them their birthday in the same month.
b) Find number of permutation for the letter MOBILE and SPEAKER.
c) How many 4 digit numbers can be formed by using the digits 2,4,6,8 when repetition of digit is allowed.

SECTION-II

Q.4 Attempt the following. (Any two) (10)

a) State the DDA Line Drawing Algorithm.
b) Derive an expression for rotation about the origin.
c) Write an application of Computer Graphics.

Q.5 Attempt the following. (Any two) (10)

a) Write the properties of Bazier Curves.
b) Write a short note on Workstation transformation.
c) Write a short note on Point Clipping.

Q.6 Attempt the following. (Any two) (10)

a) Discuss the steps in Animation.
b) Write short note on Texture Mapping.
c) Differentiate between Diffuse and Point Source Illumination.

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19

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

Computer Science - (P-II)

July 2019

Con. : 301-19. **BQ-7035**

(2 Hours) **Total Marks : 48**

Instructions:

1. All questions are compulsory.
2. Attempt any **TWO** sub-questions from each question.
3. Each sub-question is of **4 marks.**

Section I

Q.1 Answer any TWO of the following: [8M]

(a) Define class and explain member function in class in C ++

(b) Write a C++ program to find factorial of any number

(c) Explain Scope resolution operator with example.

(d) Define constructors. Can we create multiple constructors In the same class? Justify your answer.

Q.2 Answer any TWO of the following: [8M]

(a) Explain operator overloading with example.

(b) What is inheritance? Explain different types of inheritance.

(c) Write a note on polymorphism.

(d) Explain different data types in C++.

Q.3 Answer any TWO of the following: [8M]

(a) Define Exception. Explain Exception handling mechanism with suitable example.

(b) What is STL? Write its components.

(c) Explain Class templates and member function templates.

(d) Write a short note on try and catch block.

Section II

Q.4 Answer any TWO of the following: [8M]

(a) Define Array and strings. Explain One dimensional and two dimensional arrays.

(b) Explain public access and private access control in Java.

(c) Write a note on constructor overloading and method overloading.

(d) Explain while loop and do while loop with suitable example in Java.

Q.5 Answer any TWO of the following: [8M]

(a) Differentiate between byte stream classes and character stream classes.

(b) Explain any three Java built in exceptions.

(c) Explain call by value and call by reference in Java.

(d) Explain the following keywords in java
"extends" "super"

Q.6 Answer any TWO of the following: [8M]

(a) What is Applet? Explain its basic structure.

(b) Explain AWT controls: labels and Buttons with example.

(c) Define a class to accept 10 numbers into an array and print the difference between the sum of even positioned elements and the odd positioned elements.

(d) Define graphic class and painting and updating an applet.

Con. : 301-19. **BQ-7035**

(2 Hours) Total Marks : 60

Instructions:

1. All questions are compulsory.
2. Attempt any **TWO** sub-questions from each question.
3. Each sub-question is of **5 marks.**

Q.1 Answer any TWO of the following: [10M]

(a) Explain copy constructor and dynamic constructor.
(b) Explain class and object with suitable example in C++
(c) Explain Scope resolution operator with example.

Q.2 Answer any TWO of the following: [10M]

(a) Explain single and multilevel inheritance,
(b) Explain unary and binary operator overloading.
(c) Write a note on virtual functions.

Q.3 Answer any TWO of the following: [10M]

(a) Define exception. Explain throwing and catching mechanism in exception.
(b) What is STL? Write its components.
(c) Explain opening and closing of a file in C++ with suitable example.

Q.4 Answer any TWO of the following: [10M]

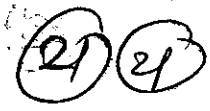
(a) Write increment decrement and assignment operators in Java.
(b) Explain the purpose of Access modifiers in Java.
(c) Write a note on parameterized constructor and "this " keyword in Java

Q.5 Answer any TWO of the following: [10M]

(a) Differentiate between byte stream classes and character stream classes.
(b) Write a program with an interface Shape which has a method draw ( ). Write two classes Square and Cube which implement the interface. Test the classes created.
(c) Explain 'extends' keyword in java using one suitable example.

Q.6 Answer any TWO of the following: [10M]

(a) What is Applet? Explain the life cycle of an applet.
(b) Explain AWT controls: labels and panel with example.
(c) Write a note on event handling.



S.Y.B.Sc (Comp. Science) July 2019

Computer Science (PART III)

Con. : 302-19. **BQ-7038**

(2 Hours) **Total Marks : 48**

SECTION-I

Q.1 Attempt any TWO question from the following 8M

a) Write purposes of DBMS.

b) What is Entity? Explain entity versus attribute and entity versus relationship with example.

c) Define the following terms

i) tuple

ii) attribute

iii)Weak entity

iv) candidate key

v)domain

d) Explain relational model with suitable example.

Q.2 Attempt any TWO question from the following 8M

a) Write any five Date functions with example.

b) Define Joins. Explain conditional, Equal and Natural Joins.

c) Define Relation. Differentiate between selection and projection.

d)Explain the following functions

LOWER( ), UPPER( ), TRIM( ) and RTRIM()

Q.3 Attempt any TWO question from the following 8M

a) Why we use stored procedures? Explain in detail.

b) What is Indexing? Explain TREE and Hash based indexing.

c) Give meaning of views. Explain creating and renaming views using SQL.

d) Explain Heap file, Sorted files and Clustered files.

[Turn over

22

SECTION -II

Q.4 Attempt any TWO question from the following 8M

a) Explain waterfall model. Write its strength and weaknesses.

b) Discuss any five phases of SDLC.

c) Write role of metrics and models in project management.

d) Explain Spiral model in detail.

Q.5 Attempt any TWO question from the following 8M

a)Write Characteristics and component of SRS

b) Draw DFD diagrams for online shopping .State the names and uses of symbols used in designing a DFD.

c) Write elements of object model and basic principles of O O approach.

d) Write short note on Decision table and Decision Tree.

Q.6 Attempt any TWO question from the following 8M

a) Explain Abstraction and its types.

b) Explain Object oriented database and object relational database.

c) What is V & V? Explain its types.

d) Explain the terms: Modularity, Cohesion and Coupling.

Con. : 302-19. 3 **BQ-7038**

(2 Hours) **Total Marks : 60**

SECTION-I

Q.1 Attempt any TWO question from the following [2 x 5=10]

a) What is attribute? Explain different types of attribute with example

b) What is Entity? Explain entity versus attribute and entity versus relationship with example.

c) Define the following terms

i) Cardinality

ii) Weak entity

iii) Candidate key

iv) Domain

Q.2 Attempt any TWO question from the following [2 x 5=10]

a) Write any four string functions with example.

b) Define Joins. Explain conditional, Equal and Natural Joins.

c) Define Relation. Differentiate between selection and projection.

Q.3 Attempt any TWO question from the following [2 x 5=10]

a) Define Triggers. Explain how to create, insert, and delete triggers.

b) Discuss different types of database users.

c) Give meaning of views. Explain creating and renaming views using SQL.

SECTION -II

Q.4 Attempt any TWO question from the following [2 x 5=10]

a) How to design a good user interface.

b) Discuss any five phases of SDLC.

c) Write role of metrics and models in project management.

[Turn over

Q.5 Attempt any TWO question from the following [2 x 5=10]

a) Explain the following

i) Feasibility study

ii)SQA

b) Draw DFD diagrams for food ordering system(up to first level).

c) Write elements of object model and basic principles of Object oriented approach.

Q.6 Attempt any TWO question from the following [2 x 5=10]

a) Draw a ERD and use case diagram for ATM

b) Explain Object oriented database and object relational database.

c) What is V & V? Explain its types.

June-19

S.Y.B.Sc

(comp.Scienc)

25

page 25