UG -F-2001—BCA

2024

Full Marks : 70

Time : 3 hours

Answer from **both** the Sections as directed

The figures in the right-hand margin indicate marks

Candidates are required to give their answers in their own words as far as practicable

SECTION– A — 4 Cmpt.

Answer any **four** questions : 10×4

1. Prove that every field is an integral domain.

2. Show that a necessary and sufficient condition for a non-empty subset H of a group G to be a subgroup is that

$$a \in H,\ b \in H \Rightarrow ab^{-1} \in H .$$

3. Prove that a subset W of a vector space $V(F)$ is a subspace if W is closed under vector addition and scalar multiplication.

4. Show that the vectors $(1, 1, -1)$ $(2, -3, 5)$ and $(-2, 1, 4)$ of R^3 are linearly independent.

5. Find the inverse of the following matrix.

$$\begin{bmatrix} 8 & 4 & -3 \\ 2 & 1 & 1 \\ 1 & 2 & 1 \end{bmatrix}$$

6. Show that the following system of linear equations is not consistent :

$$\begin{aligned} x - 4y + 7z &= 14 \\ 3x + 8y - 2z &= 13 \\ 7x - 8y + 26z &= 5 \end{aligned}$$

7. Prove that the lines $\frac{X-1}{2}=\frac{Y-2}{3}=\frac{Z-3}{4}$ and $\frac{X-2}{3}=\frac{Y-4}{4}=\frac{Z-5}{5}$ are Coplanar.

8. Find the equation of the plane through the point $(-1, 3, 2)$ are perpendicular to the planes $x + 2y + 3z = 5$ and $3x + 3y + z = 9$.

SECTION– B

9. Answer *all* questions of the following : 3×10

(*i*) In the multiplicative group $G = (1, w, w^2)$ find the inverse of w^2.

(*ii*) Prove that in a ring R

$$(-a)(-b) = ab \; ; \; \forall \; a, b \in R.$$

(*iii*) Define a matrix polynomial

(*iv*) Define linear independent of Vectors.

(v) Define rank of a matrix.

(vi) Define a basis of a vector space.

(vii) Define direction cosine of a line

(viii) Define subgroup of a group.

(ix) Define rectangular, polar and cylindrical coordinates.

(x) Define rank of a matrix with example.

UG -F-2002—BCA

2024

Full Marks : 70

Time : 3 hours

Answer any **four** questions out of eight from **Group A** and answer **all** questions from **Group B.**

The figures in the right-hand margin indicate marks

Candidates are required to give their answers in their own words as far as practicable

GROUP— A

(Long Answer Type Questions) 10×4

1. What is an ecosystem ? Write down the structure and function of an ecosystem.

2. What do you mean by bio-geochemical cycles ? Explain Nitrogen cycle with the help of suitable diagrams.

3. What are environmental pollutants ? Discuss the physical, chemical and biological transformation of environmental pollutants.

4. Write an essay on population explosion.

5. Explain the composition of Earth's atmosphere, its various segments and their significance.

6. What is water pollution ? Explain the point and non-point sources of water pollution.

7. Summarize the toxic effects of water pollution on aquatic organisms.

8. Write an essay on Rain Water Harvesting.

GROUP– B

(Short Answer Type Questions) 3×10

9. (*i*) Acid rain

(*Continued*)

(*ii*) Global Warming

(*iii*) Food chain

(*iv*) Ecological pyramids

(*v*) Air Quality Index (AQI)

(*vi*) Photochemical smog

(*vii*) Ozone depletion

(*viii*) BOD Measurement

(*ix*) Water Shed Management

(*x*) Waste water treatment

UG -C-2003—BCA

2024

Full Marks : 70

Time : 3 hours

Answer from **both** the Sections as directed

The figures in the right-hand margin indicate marks

Candidates are required to give their answers in their own words as far as practicable

SECTION— A

Answer any **four** questions : 10×4

1. Define Database Management System and its applications. What is 3-tier architecture in DBMS ?

2. What is deadlock ? Explain deadlock detection and recovery method.

3. What is two-phase locking and how does it guarantee serializability ? Explain.

4. Consider the following Relational Database.
Doctor (dno, dname, dcity)
Patient (opdno, pat_name, addr, disease)
The relation between patient and Doctor is many to many.
Solve any five of the following.

(*a*) Write DDL command to create Doctor Table.

(*b*) Insert data in the table.

(*c*) Find names of patient who are treated by 'Dr. Deshpande'.

(*d*) Display names of doctors who live in 'Pune' city.

(*e*) Count number of patients suffering from 'Cancer'.

(*f*) Add 'Discharge Date' Column to patient table.

(*Continued*)

(g) Display total no. of patients treated by each doctor.

5. Consider the following relations R1 and R2 :

R1:

Roll	Name
1001	Anil
1002	Sunil
1003	Ojas
1004	Radha

R2:

Roll	Name
1004	Ankit
1005	Sunil
2002	Radha
1001	Anil

R3:

Roll

empty

Show the result of following operation

(a) R1 UNION R2

(b) R1 × R2

(c) R1 INTERSECTION R2

(d) R1 – R2

(e) R1 ÷ R3

6. A Company has several departments. Each department has a supervisor and at least one employee. Employee must be assigned to at least one, but possibly more department.

   (*i*) Identify all entities

   (*ii*) Identify all relations

   (*iii*) Draw E-R Diagram.

   Take necessary considerations and identify keys.

7. What is normalization ? Discuss the anomalies of un-normalized database with proper example.

8. What are the Codd's Rules in DBMS ?

SECTION– B

All questions are compulsory : 3×10

9. Define attributes ? What are different types of attributes ?

(*Continued*)

10. Define System log.

11. What are ACID Properties ?

12. What is a view in SQL ? How does it different from a table ?

13. What do you mean by functional dependency ?

14. Explain weak entity with example.

15. Differentiate between DELETE and DROP SQL command with the help of an example.

16. List three advantages of DBMS over file system.

17. Write the syntax of any one command of DDL and DML each.

18. Name any three database software.

UG -C-2004—BCA

2024

Full Marks : 70

Time : 3 hours

Answer from **both** the Sections as directed

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Candidates are required to give their answers in their own words as far as practicable

SECTION— A

Answer any **four** questions : 10 × 4

1. Differentiate between object oriented programming and procedural programming. Also explain the major features of object oriented programming.

2. Write a program to create a class student consisting of data members, roll, name and marks of three subjects. Write the member function getdata() to accept and showdata()

to display the details of students. WAP to store the details of five students and display the details of student who has scored maximum marks.

3. What is constructor and also explain the purpose of using a constructor in C++ ? Write a program to demonstrate the use of constructor in inheritance.

4. What do you mean by operator overloading. Write a program to overload binary operator '+' to concatenate two strings.

5. Define Template. Differentiate between class Template and Function Template. Write a program to implement the concept of stack using class template.

6. What do you mean by file handling ? Write a program in C++ to copy the contents of one file to another file.

7. What is the difference between a virtual function and a pure virtual function ? Write a program to illustrate the concept of virtual function.

SECTION– B

Answer all the questions : 3×10

8. What is data hiding ?

9. Define multilevel inheritance.

10. Define inline function.

11. Define static class.

12. Define try, catch and throw keyword.

13. Write a function to swap two numbers without using third variable.

14. Differentiate between private and protected access modifier.

15. Define abstract class.

16. Define method overriding.

17. Differentiate between early binding and late binding.

18. What does the Scope Resolution operator do ?

UG -C-2005—BCA

2024

Full Marks : 70

Time : 3 hours

Answer from **both** the Sections as directed

The figures in the right-hand margin indicate marks

Candidates are required to give their answers in their own words as far as practicable

SECTION— A

Answer any **four** questions : 10 × 4

1. What are Logic Gates ? Discuss why NAND and NOR Gates are termed as Universal gates.

2. What do you mean by minterm and maxterm form ? Express the expression F=AB + AC + C + AD + ABC + ABC in canonical SOP form and POS form.

3. Design a BCD adder circuit. Explain the rules of BCD addition with an example.

4. What is Flip Flop ? Sketch and explain the working of clocked S-R flip-flop and its characteristic table.

5. What is meant by a decoder ? Design the circuit of a 3-line to 8-line decoder using basic gates.

6. Simplify the function using Karnaugh map technique
$F_{(A,B,C,D)} = \sum m(1,3,4,6,8,9,11,13,15) + d(0,2,14)$.
Implement the simplified expression using basic gates.

7. What is a Subtractor ? Draw truth table, circuit diagram and simplified expression for difference & borrow of a full Subtractor.

8. What are registers ? Explain Shift registers and its types.

(*Continued*)

SECTION– B

All questions are compulsory : 3×10

9. Simplify the Boolean expressions to minimum number of literals F=(A + B)(A + C')(B' + C').

10. Why is ripple counter so called ? What is its special feature ?

11. Define Pair, Quad and Octet in K-Map.

12. Differentiate between asynchronous and synchronous counters.

13. Find the sum of two hexadecimal numbers $(85C)_{16}$ and $(23C6)_{16}$.

14. What do you mean by arithmetic overflow ?

15. Find 1001-1011 using 1's and 2's complement arithmetic.

16. Difference between latch and flip-flop.

17. What is a multiplexer ?

18. Define integrated circuits.
