May 2022

[This question paper contains 8 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1104 **B**

Unique Paper Code : 32345202

Name of the Paper : Database Management Systems

Name of the Course : **Generic Elective (Computer Science)**

Semester : II

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Question No. **1** is compulsory in **Section – A**.
3. Attempt any **five** questions from **Section – B**.
4. Parts of the question must be attempted together.

SECTION – A

1. (a) Write down three characteristics of relations that make it different from regular tables and files. (3)

P.T.O.

(b) Write and draw the symbols used in Entity Relationship diagram for following : (4)

(i) To relate two entity-types

(ii) To represent multi-valued attribute

(iii) To represent derived attribute

(iv) To represent weak entity type

(c) A STUDENT table has following two attributes RollNo and Course. Write an SQL statement to insert a new attribute Grade to the STUDENT table. (2)

(d) Explain the different types of user-friendly interfaces and list the types of users who typically use each? (3)

(e) What is a transaction? List any two properties of a transaction. (2)

(f) For the given table, write down its degree, cardinality and identify two candidate keys. (4)

EMP-SSN	EMP-Name	Date of Birth	Telephone
E1	Smith John	11/03/1997	9999999988
E2	Hood Robert	12/06/1977	9988999988
E3	Brit Paul	12/04/1967	8889999999
E4	Annie W	01/09/1978	8899999777
E5	Brit Paul	01/10/1979	9889999999

(g) What is the need of allowing NULL value in foreign key? (2)

(h) Given a relational scheme R(A,B,C,D,E) with FDs F={A→B, B→C, AC→D, AC→BC}. Identify new functional dependency using transitivity and an existing functional dependency which follows augmentation rule. (2)

(i) What do you mean by Data Independence and how it is useful in database system? (3)

SECTION – B

2. (a) Who are parametric end users? What kind of transactions do they use? (4)

(b) Given the relational schema R(A,B,C,D,E,F,G,H,I,J) and the following set of functional dependencies. (6)

{{A,B} → {C}, {B,D} → {E,F}, {A,D} → {G,H}, {A} → {I}, {H} → {J}}

(i) Derive the primary key for R.

(ii) What normal form is the relation R in?

P.T.O.

(iii) Apply normalization to bring it to 3NF if required. State the reason behind each decomposition.

3. (a) Specify the Cardinality (1:1 / 1:N / M:N) for the following binary relationships based on the meaning of the entity types : (5)

(i) Student and Roll-No

(ii) Course and Textbook

(iii) Class and Instructor

(iv) Student and Class

(v) Student and Instructor

(b) What is partial dependency? Explain with example. Which kind of problem arises if non-prime attributes are partially dependent on the primary key? (3)

(c) Why should NULL in a relation be avoided as far as possible? (2)

4. (a) What are the responsibilities of Database Administrator (DBA) and Database designers? (4)

(b) Identify multivalued and composite attributes from the following complex attribute. (6)

{Add_ph({Ph(Area_code, Ph_number)}, Add (Street_add(Number, Street, Apartment_number), City, State, Zip))}

5. (a) Consider the following schema COMPANY to answer the given questions : (6)

PROJ(Pnmuber, Pname,Manager-number)

EMP(Empno, Empname, hiredate)

ASSIGNED(Pnumber, Empnumber, Hours)

(i) Find foreign keys of each table (if any) in the given schema.

(ii) Give one example of violation of entity integrity constraint while insertion in PROJ table.

(iii) Give one example of an insertion in ASSIGNED table that violates Referential Integrity Constraint.

(b) Consider a relation R(A,B,C,D,E,F,G,H) with the following functional dependencies : (4)

$\{A \rightarrow B,\ BC \rightarrow DE,\ AD \rightarrow GH\}$.

List all possible super keys of the given relation.

6. Consider the following schema about a COMPANY to answer the given questions : (10)

EMPOLYEE (Name, Ssn, Bdate, Address, Gender, Salary, SuperSsn, Dno)

DEPARTMENT(Dname, Dnumber, MgrSsn, MgrStartDate)

DEPENDENT(Essn, DependentName, Gender, Bdate, Relationship)

Write the following SQL queries :

(i) Give all the employees of the company 20 percent rise.

(ii) Retrieve the birthdate and address of the employee whose name is 'Franklin T. Wong'.

(iii) Retrieve all employees in department 5 whose salary is between 50,000 and 60,000 (inclusive).

(iv) Retrieve the names of all employees who do not have supervisors.

(v) Retrieve the name and address of all employees who work for the 'Research' department.

7. (a) Draw three tier architecture supported by DBMS. Briefly explain each level. What is the need of mapping between two levels? (4)

(b) Discuss insertion, deletion and modification anomalies. Why are they considered bad? Illustrate with examples. (6)

8. Consider the following set of requirements for a University database (10)

- A university has many departments.
- Each department has multiple instructor; one among them is the head of the department.
- An instructor belongs to only one department.
- Each department offers multiple courses, each of which is taught by a single instructor.
- A student may enrol for many courses offered by different departments.

For the given problem, Identify :

(i) Entities of interest.

(ii) Essential attributes associated with each entity.

(iii) Relationship existing among entities and their cardinality and participation constraints.

(iv) Draw the corresponding ER diagram.

[This question paper contains 8 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 762 **B**

Unique Paper Code : 42341202

Name of the Paper : Database Management Systems

Name of the Course : **B.Sc. (Prog.) / Math. Science**

Semester : II

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Question **1** is compulsory.
3. Answer any **five** questions out of remaining questions **(Q2–Q8)**.
4. Answer all parts of a question together.

1. Answer the following :

   (a) What is data independence? Differentiate between physical and logical data independence. (4)

P.T.O.

(b) What are the responsibilities of DBA? (2)

(c) Define the following terms : (2)

(i) Metadata

(ii) Derived attribute

(d) What is meant by a recursive relationship type? Give its example. (2)

(e) Differentiate between Specialization hierarchy and Specialization lattice. (2)

(f) What are the various reasons that lead to the occurrence of NULL values in relations? Explain with the help of example. (3)

(g) Explain the ***DROP*** command with ***cascade*** option in SQL with the help of an example. (3)

(h) What are the various update anomalies that can occur in a relation? (4)

(i) Given the following table and its associated functional dependencies : (3)

Emp_proj

Emp_ssn	*Project_no*	*Hours*	*Emp_name*	*Proj_name*

Emp_ssn → Emp_name
Project_no → Proj_name
Emp_ssn, Project_no → Hours

What is the highest normal form that the relation ***Emp_proj*** satisfies? Justify your answer.

2. (a) Write any four functionalities of DBMS. (4)

(b) Differentiate between the following : (6)

(i) Entity type and Entity set.

(ii) Centralized and Distributed DBMS.

(iii) Casual End user and Sophisticated end user.

3. Consider a MUSICAL COMPANY database in which data is recorded about the music industry. The data requirements are as follows : (10)

(i) Each musician has an SSN, a name, an address and a phone number.

(ii) Each instrument that is used in the songs has a name and a musical key.

(iii) Each album that is recorded on the company label has a title, a copyright date, a format and an album identifier.

(iv) Each song recorded at the company has a title and an author.

(v) Each musician may play several instruments and several musician may play a given instrument.

(vi) One or more musician perform each song and a musician may perform in a number of songs.

(vii) Each album has exactly one musician who acts as its producer. A musician may produce several albums.

Design an ER diagram for the above specifications and indicate all keys and cardinality constraints. Also state any assumptions that are made.

4. Consider the following schema about ***Supplier - Part*** database, primary key is underlined. (10)

Part (Partno, Partname, Color, Weight)

Project (Pjno, Pjnante, City)

Shipment (Sno, Partno, Pjno, Qty)

Supplier (Sno, Sname, Status, City)

Write SQL commands to express each of the following queries :

(i) Find the Project number of all the projects using the parts that are supplied by ***supplier*** 'S1'.

(ii) Retrieve supplier names for suppliers who supply ***part*** 'P4'.

(iii) For each part supplied, retrieve the part number and total quantity supplied for that part.

(iv) Change the color of ***part*** 'P6' to red and increase its weight by 7.

(v) Insert a new tuple into the relation ***Project***.

5. (a) Describe the three schema architecture. Why do we need mappings between schema levels? (4)

(b) Consider the following schema : (6)

Sailors (Sailor id, Sname, Rating, Age)

Boats (Boat id, Bname, Color)

Reserves(Sailor id, Boat id, Date)

Write the following queries in relational algebra:

(i) Find the names of sailors who have reserved boat 102.

(ii) Find the names of sailors who have reserved a red or a yellow boat.

P.T.O.

(iii) Find the Sailor_id of sailors with age over 30 who have not reserved a red boat.

6. (a) Consider the following relations for a database that keeps track of student enrollment in courses and the books adopted for each course : (5)

Student (Ssn, Name, Major, Bdate)

Course (Course#, Cname, Dept)

Enroll(Ssn, Course#, Semester, Grade)

Book_Adoption (Course#, Semester, Book_isbn)

Text (Book_isbn, Book_title, Publisher, Author)

Specify the primary keys and foreign keys for this schema, stating any assumptions you make.

(b) Explain the entity integrity and referential integrity constraints. Why is each considered important? (5)

7. (a) Consider the relation: **R (Dentist no, Appt dt, Appt time, Dentist_Name, Patient_no, Patient_Name, Surgery_No)** with the following FDs : (8)

Dentist_no, Appt_dt, Appt_time → Patient_no, Patient_Name

Dentist_no → Dentist_Name

Patient_no → Patient_Name, Surgery_No

Dentist_no, Appt_dt → Surgery_No

Appt_dt,Appt_time → Dentist_no, Dentist_Name

Patient_no → Dentist_Name

Decompose the above relation to 3 NF. State the reason behind each decomposition.

(b) Consider the following Table 1. (2)

Table 1

X	Y	Z
1	3	8
3	4	2
4	5	3
5	6	4
6	7	8
1	3	8

Which of the following functional dependency constraints do not hold in the Table 1.

(i) YZ → X

(ii) X → Z

(iii) X → Y

(iv) Z → X

8. (a) Map the ER diagram given in Figure 1 to a relational database. Cardinality constraints are given as follows : (8)

(i) BANK and BANK-BRANCH (1 : N)

(ii) BANK-BRANCH and ACCOUNT (1 : N)

(iii) BANK-BRANCH and LOAN (1 : N)

(iv) LOAN and CUSTOMER (M : N)

(v) ACCOUNT and CUSTOMER (M : N)

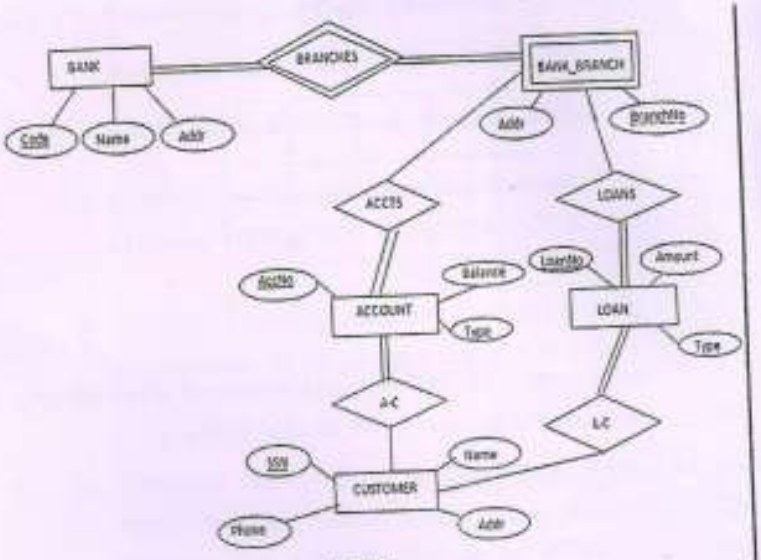


Figure 1

(b) How is EER model different from the ER model? (2)

May 2022

[This question paper contains 8 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 2535 **A**

Unique Paper Code : 32345201-OC

Name of the Paper : Introduction to Database System

Name of the Course : **Generic Elective for Honours: Computer Science**

Semester : II

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. **SECTION A** is compulsory.
3. Attempt any **four** questions from **SECTION B**.
4. Parts of a question must be answered together.
5. Marks are indicated against each question.

SECTION A

1. (a) Give a suitable data type for the following attributes : (1+1+1)

P.T.O.

(i) Name of a Student

(ii) Phone number of Student

(iii) Percent in class 12

(b) Define First Normal Form and Second Normal Form of database. Give examples. (4)

(c) Write complete syntax of the following commands. Give a suitable example of each.

(i) ALTER table

(ii) UPDATE table (3+3)

(d) Differentiate between :

(i) File-oriented system and databased-oriented system

(ii) Physical data independence and logical data independence (3+3)

(e) Define each of the following. Also draw the geometrical shape used in the ER Diagram.

(i) Entity

(ii) Key attribute

(iii) Binary relationship (2+2+2)

(f) Consider the following relational schema :

COUNTRY (Id, Code, Name, Capital, Continent, District, LifeExpectancy)

Write SQL statements for the following :

(i) Show all the details of countries that are in the continent Asia.

(ii) Retrieve the names and continents of the countries where life expectancy is more than 50 years.

(iii) Retrieve all the districts in India. (2+2+2)

(g) What is a weak entity? Explain with the help of a diagram. What is the distinction between a weak entity and a strong entity? (4)

SECTION B

2. (a) Give an example of IN operator in a SQL query. (2)

(b) Consider the STUDENT table below: (2+2+2+2)

RollNo	Name	Course	Sex	Marks	HomeCity
1	Sarika Goel	Chemistry	F	90	New Delhi
2	Mehek Bhasin	Chemistry	F	85	Patna
3	Manohar Lal	Economics	M	86	New Delhi
4	Sameer Kumar	Statistics	M	82	Gurugram
5	Sonia Jain	Economics	F	92	Patna
6	Sajid Khan	Chemistry	M	94	Lucknow

Give the output of the following SQL commands, w.r.t. the above table :

(i) `SELECT COUNT(*) FROM STUDENT WHERE Course = "Chemistry";`

(ii) `SELECT * FROM STUDENT WHERE Marks BETWEEN 85 AND 90;`

(iii) `SELECT RollNo, Name, HomeCity FROM STUDENT WHERE NOT (HomeCity = "New Delhi");`

(iv) `SELECT * FROM STUDENT WHERE Sex = 'F' AND Marks > 89;`

3. Give SQL queries for the following relational schema:

`CUSTOMER (CustomerId, CustomerName, ContactName, City, CountryId)`

`COUNTRY (CountryId, CountryName)`

(a) Create the CUSTOMER table with its constraints. (5)

(b) Insert a CUSTOMER <2567, "Samar", "Rahul", "Mumbai", 91> (2)

(c) Count total number of unique city names in the CUSTOMER table. (3)

4. (a) Explain Entity Integrity and Referential Integrity rules with the help of an example. (4)

(b) Classify the given commands as Data Definition Language (DDL) or Data Manipulation Language (DML). Justify your answer.

(i) Delete table

(ii) Create table (2+2)

(c) In a database table CUSTOMER, the attribute City had NULL values for some rows. What does this signify? (2)

P.T.O.

5. (a) What is the importance of primary key and foreign key? Can a table contain multiple primary keys and multiple foreign keys? Support your answer with an example. (6)

(b) Explain the following relationships with the help of an example :

(i) One to one relationship

(ii) Many to many relationship (2+2)

6. (a) Give two advantages and two disadvantages of a Database Management System. (4)

(b) Write a note on any **two** of the following :

(i) Data Dictionary

(ii) Database Administrator

(iii) Data Manipulation Language (DML)

(2+2+2)

7. Consider the relational schema Membership for a library database, as follows :

Membership (MemberID, Name, Address, PhoneNum,

ParentMID, ISBN, Title, Authors, BorrowDate, ReturnedDate, FineDue, FinePaid)

The ParentMID may have the values Null, Father_Name, Mother_Name or both Father_Name and Mother_Name. The following is the set F of functional dependencies that hold in Membership table:

F = {MID → Name, Address, PhoneNum, ParentMID;
(MID, ISBN, BorrowDate) → ReturnedDate, FinePaid, FineDue;
ISBN → Title, Authors}

Normalize the Membership schema to third normal form (3NF) and show the steps. (10)

8. An institute wishes to maintain data of its students and faculty. The following entities were identified :

Students: StudentRollNo, Name, Address & Course

Faculty: FacultyId, Name, Department & Designation

Course: CourseCode, Course Name, Department & Semester

P.T.O.

Draw an ER diagram which satisfies the following rules :

(i) Each course has many students, but a student can enroll in only one course.

(ii) Each student can be taught by many faculty members, and a faculty can teach many students.

(iii) A faculty can be appointed for only one course but each course can have many faculty members teaching it. (10)

[This question paper contains 6 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1401 **A**

Unique Paper Code : 42344403

Name of the Paper : Computer System Architecture

Name of the Course : **B.Sc. (Prog) / Mathematical Science**

Semester : IV

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Question No. **1** is compulsory.
3. Attempt any **5** of questions Nos. **2** to **9**.
4. Parts of a question must be answered together.

1. (a) How many 256 words x 8 bits per word RAM chips are needed to provide a memory capacity of 4096 words x 16 bits per word? (2)

P.T.O.

(b) What is radix of the numbers if the solution to the quadratic equation (2)

$x^2 - 10x + 31 = 0$ is $x = 5$ and $x = 8$?

(c) Represent the following conditional control statement by two register transfer statements with control functions.

If (P = 1) then (R1 ← R2) else if (Q = 1) then (R1 ← R3) (2)

(d) State any two differences between combinational and sequential circuit. (2)

(e) Give the characteristic table of JK flip-flop. (2)

(f) What is a binary counter? How many flip-flops will be required for an n-bit binary counter? (2)

(g) Consider a memory of capacity 16M words x 32 bits per word. How many address lines and input-output data lines are needed? (2)

(h) Simplify the following expressions using Boolean algebra.

(BC'+A'D) (AB'+CD') (2)

(i) Can the following microoperation be executed during a single clock pulse in the system? Specify a sequence of microoperations that will perform the operation

IR ← M[PC] (2)

(j) How many flip-flops will be complemented in an 8-bit counter to reach the next count after :

(i) 01100111

(ii) 11111111 (2)

(k) Convert the following decimal numbers to the base indicated

(i) 7562 to octal

(ii) 1938 to hexadecimal (2)

(l) Write a short note on input-output interface. (3)

2. (a) Define the full adder. Illustrate same with the help of truth table and logic diagram. Also write Boolean expression for carry and sum operations. (6)

(b) Given two registers A and B with contents as follow –

Register A (before operation) 1010

Register B (logic operand) 1100

Show the contents of A using the contents of B after performing the following operations.

(i) Mask operation

(ii) Selective Complement (4)

3. (a) Design a 4-bit combinational circuit decrementer using four full-adder circuit. Explain its working. (6)

(b) Simplify the given Boolean function using four-variable maps. [Sum of the Products (SOP) form.]

$F(A, B, C, D) = \Sigma(0,2,4,5,6,7,8,10,13,15)$. (4)

4. (a) An instruction is stored at location 300 with its address field at location 301. The address field has the value 400. A processor register R1 contains the number 200. Evaluate the effective address if the addressing mode of the instruction is

(i) immediate

(ii) relative

(iii) index with R1 as the index register. (6)

(b) Explain the concept of Direct Memory Access using block diagram? How does DMA transfer take place? (4)

5. (a) What are the different types of instruction formats?

Given the following instructions (in hexadecimal), identify the category to which each of these belong.

(i) F800

(ii) 7800 (6)

(b) Design a 3x8 decoder using 2x4 decoders. Explain its working. (4)

6. (a) Write a program to evaluate the arithmetic statement :

$$X = (A+B) * (C+D)$$

using zero address and one address instructions. (6)

(b) What is hardwired control unit? Explain its working with a suitable diagram. (4)

7. (a) List phases of the instruction cycle. Draw flowchart of the instruction cycle. (6)

(b) How can an effective address be determined using direct and indirect address instructions? How many references to memory are needed for each type of instruction to bring the operand into a processor register? (4)

8. (a) The content of AC in the basic computer is hexadecimal B675 and the initial value of E is 1. Determine the contents of AC, PC, AR and IR in hexadecimal after the execution of CMA instruction (7200). The initial value of PC is hexadecimal 072. (6)

(b) What is the difference between isolated I/O and memory-mapped I/O? What are the advantages and disadvantages of each? (4)

9. (a) Write short notes on the following :–

(i) BSA and BUN

(ii) Types of ROM (6)

(b) Explain the working of a 4-to-1 MUX with a suitable diagram. (4)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1877 **A**

Unique Paper Code : 32345402

Name of the Paper : Information Security and Cyber Laws

Name of the Course : **Computer Science : Generic Elective for Honours**

Semester : IV

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. **All** questions are compulsory from **Section A**.
3. Please attempt any **four** questions from **Section B**.
4. Part of a question must be answered together.

SECTION – A

1. (a) Briefly explain the terms plain text, cipher text and key. (3)

P.T.O.

(b) Differentiate between authorization and authentication. (3)

(c) Explain substitution cipher using a suitable example. (3)

(d) Describe encryption and decryption. Explain the various techniques used by cryptanalysts to crack the encrypted message. (3)

(e) What are the characteristics of a good security policy? (3)

(f) Explain cyber forensics with suitable examples. (4)

(g) Explain C.I.A triad. Describe the various techniques to secure a system. (4)

(h) Differentiate between symmetric and asymmetric key encryption. (4)

(i) Describe internal and external threat. (4)

(j) What are the major threats to email? Describe the various techniques to secure an email. (4)

SECTION – B

2. (a) Describe at least two ways of breaking a Caesar cipher on an English-language message. Encrypt the message **"CORONA PANDEMIC IS NOT OVER NOW"** using Caesar cipher with key size 3. (5)

   (b) Encrypt the message **"CORONA PANDEMIC IS NOT OVER NOW"** using the Rail fence technique by using 2 rails. (5)

3. (a) What do you mean by cyber-attacks? Explain Denial of Service and Man-In-the-Middle attack in detail. (5)

   (b) Describe the characteristics of strong password. Briefly explain any two attacks related to password security. (5)

4. (a) What do you mean by Intrusion Detection System? Give types of IDS. (5)

   (b) What is the difference between digital signature and electronic signature? Explain the working of digital signature. (5)

5. (a) What do you understand by Hackers? Give the hat categories of hackers. (5)

(b) Describe any five digital India initiatives. (5)

6. (a) What is firewall? Explain any three different types of firewalls. (5)

(b) What do you mean by risk management? Explain the three strategies for dealing with the risk. (5)

7. (a) Describe threat with respect to computing system. Explain different kinds of threats. (5)

(b) Differentiate between vulnerability and threat. What are the punishments under section 66, 66A, 66B of IT (Amendments) ACT 2008? (5)

8. (a) Describe the sections 65, 66F and 72 of IT (Amendments) ACT 2008. Explain the penal provisions for the same. (6)

(b) Write short note on the following **(any four)** :

(i) Logic bomb

(ii) Worms

(iii) Trojan horse

(iv) Trap door

(v) Virus (4)

(500)

[This question paper contains 8 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1467 **A**

Unique Paper Code : 42343409

Name of the Paper : Programming in C++ (SEC)

Name of the Course : **B.Sc. (Prog.) Physical Science / Mathematical Science**
(Admission 2019 onwards)

Semester : IV

Duration : 2 Hours Maximum Marks : 25

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Question No. **1** is compulsory.
3. Attempt any **three** questions from Q. No. **2** to Q. No. 7.

1. (a) What is data hiding? Explain how it is achieved in C++. (2)

   (b) Write a function called *power* that takes two parameters: a double value **n** and an int value **p**, calculates n raised to power p (n^p) and returns the result as a double value. (2)

P.T.O.

(c) Consider the value of a = 8, b = 2, c = 6 and x = 2. What will be the value of x for each of the following?

(i) x = a-- + ++c;

(ii) x = (c / 2) % 10;

(iii) x = c / b * a / b;

(iv) x += a + b; (2)

(d) What is the output of the following :

```
int x, y=10;
x =(16%y ? y+5: y++);
cout<<"x="<<x<<"y= "<<y;
```

Also convert the code using an if-else statement. (2)

(e) Write a function, *islower*, which takes a single character (a letter) as an argument and returns a 1 if the letter is lowercase, or a 0 if it is uppercase. (2)

2. A point on the two-dimensional plane can be represented by two numbers: an x coordinate and a y coordinate. For example, (4, 5) represents a point in a 2-D plane.

Write a program that declares a class called **Point** to model a point in 2-D plane.

The class comprises of the following :

1. Two private data members to store the *x* and *y* coordinates
2. A parameterised constructor for setting the values for the data members
3. Function ***showPoint*** to display the values of the x and y coordinates of the point
4. Function ***addPoint*** which accepts two Point objects ***P1 and P2*** and adds P1 into P2 (the sum of two points can be defined as a new point whose x coordinate is the sum of the x coordinates of the two points, and whose y coordinate is the sum of the y coordinates)

In the **main** function, code for the following :

1. Define three points inside main(), and have the user input values to two of them, use the parameterised constructor for the same

2. Set the third point equal to the sum of the first two by calling the function **addPoint**

3. Display the value of the new point using **showPoint.**

Interaction with the program might look like this:

Enter coordinates for p1: 3 4

Enter coordinates for p2: 5 7

Coordinates of p1 + p2 are: 8, 11 (5)

3. (a) When are two or more functions said to be overloaded? Explain with suitable examples. (2)

(b) Define a structure called ***Employee*** that contains two members: an employee number (type int) and the employee's salary (type float).

Create an array of type **Employee** in **main()** and ask the user to fill in the data for three employees. Display the information for each employee entered by the user. (3)

4. (1+2+2)

```
class ABC
{
    int mem1;
    float mem2;
    ABC ( )        //function 1
    {
        mem1=10;
        mem2=2.5;
    }
   public:
    void readABC( ); //member function 1
    void dispABC( ); //member function 2
};
class PQR : public ABC
{
    int mem3;
    float mem4;
   public:
    void readPQR( ); //member function 3
    void dispPQR( ); //member function 4
};
class XYZ: private PQR
{
    int mem5;
    char mem6[10];
  public:
    void readXYZ( ); //member function 5
    void dispXYZ( ); //member function 6
};
int main( )
{
  ABC ob1;   //statement 1
  PQR ob2;
  XYZ ob3;
  return 0;
}
```

(a) Justify whether or not the `statement 1` will initialize all the data members for object `ob1` with the values given in the `function 1`.

(b) Mention all the member functions which are accessible by object `ob2` declared in the main () function. Give reason.

(c) Mention all the member functions which are accessible by object `ob3` declared in the main () function. Give reason.

5. Write a menu-driven program that allows the user to input, inside the **main()**, the marks for 5 students in a 2D integer array (**marks**) where each row contains marks of 3 subjects for each student. The menu should have two options- to calculate total marks of each student and to calculate average marks in each subject. Display the output to the user depending on the option chosen.

Write a function called ***totalMarks*** which takes as input the array **marks** and returns a 1D array after calculating total marks in three subjects of each student.

Each entry of the 1D array corresponds to the total marks of each student in three subjects.

Write another function, ***avgMarks***, that takes as input the array **marks** and returns a 1D array that stores the average marks in each subject. (1+2+2)

6 Write a program that reads the text from the user and creates a text file "File.txt". Write a function name **countVowels()** to count the number of vowels present in the file. The output of the function should be as shown in the example below.

Example:

If the contents of the file are:

An object is a unit that has both data and the functions that operate on that data.

The function *countVowels()* should display:

Number of vowels in file are 26 (5)

7. (a) Write a recursive function that takes n as an argument and generates the following series.

For $n = 7$, the output should look like

1 4 9 16 25 36 49 (3)

(b) Give the output of the following : (2)

i)
```
float a = 12.25, b = 12.025;

if(a = b)
    cout<<" a and b are equal ";
else
    cout<<" a and b are not equal";
```

ii)
```
void test (int &y)
    { y++; }

int main()
{
    int x=20;
    test(x);
    cout<<x;
    return 0;
}
```

[This question paper contains 8 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1509 **A**

Unique Paper Code : 42347610

Name of the Paper : Computer Networks

Name of the Course : **B.Sc. (Programme) DSE**

Semester : VI

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. The paper has **two** sections. **All** questions in **'Section A'** are compulsory.
3. Attempt any **five** questions from **'Section B'**. Parts of a question must be answered together.

SECTION A

1. (a) Explain MAN in computer network with example. (2)

   (b) Name the layer of the OSI model responsible for the following :

P.T.O.

(i) Providing interface to transmission media.

(ii) Providing interfaces for the end user. (2)

(c) Define a hyperlink. How can you create a hyperlink in a web page? (2)

(d) List any two problems with the TCP/IP reference model. (2)

(e) In which layer/s of the network reference model does the router operate? What is the main function of that layer/s? (2)

(f) How does the networking metrics **throughput** and **delay** help in calculating the performance? (3)

(g) List an advantage and disadvantage of star topology. How many links are required to connect k computers in a star topology? (3)

(h) To provide more reliability than a single parity bit can give, an error-detecting coding scheme uses one parity bit for checking all the odd-numbered bits and a second parity bit for all the even-numbered bits. What is the Hamming distance of this code? Explain your answer. (3)

(i) What is the purpose of cladding in an Optical fiber? How does a Single mode fiber differ from a Multi mode fiber? (3)

(j) A network has the IPv4 address 134.40.0.0. What class does this IP address belong to? Identify its subnet mask. How many hosts can this network support before subnetting. (3)

SECTION B

(Attempt any **five***)*

2. (a) What do you understand about service primitives? How can these four primitives can be used in a client-server environment for a request-reply Interaction? Explain. (6)

(b) What is the main difference between TCP and UDP? (4)

3. (a) What is the difference between half-duplex and full duplex transmission modes? Explain using diagrams and give examples of each. (6)

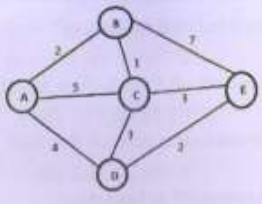
(b) What do you understand about Point-to-point connection and Multipoint connection? Give an example of each. Which one is better and why? (4)

4. (a) Compare Satellites with optical fibre as the communication medium. (6)

(b) Explain working of Low Earth Orbit (LEO) satellites in communication. (4)

5. (a) A bit stream 10011101 is to be transmitted using the standard CRC method. The generator polynomial is x^3+1. What is the actual bit string transmitted? Suppose the third bit from the left is inverted during transmission. How will the receiver detect this error? (6)

(b) Using Djikstra's shortest path algorithm, find the route from Router A to Router E given the following configuration. Show the working steps.



(4)

6. (a) A learning bridge connects a LAN segment with computers A, B and C to another LAN segment with computers P, Q and R. Show how the bridge learns the segment to which each computer is connected if the following sequence of frames are transmitted over the network.

- A sends to B
- B sends to A
- P broadcasts
- Q sends to A
- Q sends to P
- C sends to R
- R sends to P (6)

(b) Four 1 kbps connections are multiplexed together. A unit is 1 bit. Find the following :

(i) The duration of 1 bit before multiplexing

(ii) The transmission rate of the link

(iii) The duration of a time slot

(iv) The duration of a frame (4)

7. (a) What are the four HTTP request types, and what does the server respond with when it receives the specific request type? When does a HTTP server return the status code 404? When does it return status code 400? (6)

(b) A router has the following (CIDR) entries in its routing table :

Address/mask	Next Hop
135.46.56.0/22	Interface 0
135.46.60.0/22	Interface 1
192.53.40.0/23	Router 1
default	Router 2

For each of the following IP addresses, what does the router do if a packet with that address arrives?

(i) 135.46.63.10

(ii) 135.46.57.14

(iii) 192.53.40.7

(iv) 192.53.56.7 (4)

8. (a) Define a noiseless channel and noisy channel used for network communication. List two protocols of each type and explain any one of them. (6)

(b) Define framing and the reason for its need. Explain one framing method with the help of an example. (4)

9. (a) Differentiate the following :

(i) Bus topology and Ring topology

(ii) Flow control and Error control (6)

(b) Specify the characteristics of the SMTP. (4)

[This question paper contains 6 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1434 **A**

Unique Paper Code : 42343602

Name of the Paper : PHP Programming (SEC)

Name of the Course : **B.Sc. Program / B.Sc. Mathematical Science**

(Admission Year 2019)

Semester : VI

Duration : 2 Hours Maximum Marks : 25

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Question no. **1** is compulsory.
3. Attempt any **3** questions from Question no. **2** to **7**.

1. (a) Name the softwares required to create a PHP based web application. (2)

P.T.O.

(b) Consider the value of $x = 12, $y = 4, $z = 4 and $a = 2. What will be the value of $a for each of the following? (Show step by step execution of each statement)

(i) $a = $z / $y * $x / $y;

(ii) $a += $x + $y; (2)

(c) Define the terms 'class' and 'inheritance' w.r.t. PHP objects. (2)

(d) Write a PHP code segment to find a string into another string using two variants (i) case sensitive (ii) case insensitive (4)

2. Write the output of the following PHP code segment : (5)

```
<?php
$str = 'one,two,three,four';
print_r(explode(',',$str,1));
print "<br>";
$cars = array('1','23',101,33, 'ZZ', 'aa');
```



```
sort($cars, SORT_NUMERIC);
echo "<br>";
$a = "Original";
$my_array = array("a" => "Cat", "b" => "Dog", "c" =>
    "Horse");
extract($my_array);
echo "$a = $a; $b = $b; $c = $c";
echo "<br>";
$str = addslashes('What docs "yolo" mean?');
echo($str);
echo "<br>";
echo strcmp("Hello","hELLo");
echo "<br>";
?>
```

3. (a) Explain the difference between INCLUDE and REQUIRE directives in PHP. (2)

P.T.O.

(b) Write a PHP program that would print the information (name, year of joining, salary, address) of an employee by creating a class named 'Employee'. The output should be as follows :

Name	Year of joining	Address
Robert	1994	64C-WallsStreet

(3)

4. Whatis the difference between "=" and "=>" operators in PHP? Write a PHP code segment to perform the following :

(i) Assign 5 elements to numeric array and associative array.

(ii) Display the elements stored in part(i) using foreach....as looping statement. (5)

5. What is a regular expression? Write a PHP code segment to explain the usage of the following regular expressions :

(i) /[a-zA-ZO-9]*/

(ii) /(very)*good/

(iii) /bob$/ (5)

6. Create an HTML FORM to read ROLLNO, NAME and MARKS in 5 subjects from the user. Write a PHP code to compute the PERCENTAGE and GRADE using user defined functions. The criteria for assigning GRADE is as follows : (5)

PERCENTAGE	GRADE
>=80	A
>=60 and <80	B
>=40 and <60	C
<40	FAIL

7. Write the PHP code segment for the following (making your own assumptions for database name, table name, username and password) :

(i) Connect to MYSQL from PHP (Connecting to database server) (1)

(ii) Create a table containing EMPLOYEE ID and EMPLOYEE NAME (1)

(iii) Insert 2 records in the table created in part(ii) (1)

(iv) Fetch all the records from the table and display them in the tabular form. (2)