RUBRICS MODEL PAPER COMPUTER SCIENCE 1ST YEAR

SECTION –A

1. A set of specialized program that are used to control overall resources and operations of computer is called:

A. Device Driver

B. Utility Program

C. **System software**

D. Language processor

2. Which operation is used to provide data to computer:

A. **Input**

B. Processing

C. Output

D. Storage

3. Example of auxiliary memory is:

A. Cache

B. RAM

C. **Optical disk**

D. PROM

4. Fixed size group of bit that are handled together is called:

A. Bit

B. Nibble

C. Byte

D. **Memory word**

5. A bus that is used to designate a memory location or register where information is stored is:

A. Data bus

B. **Address bus**

C. Parallel bus

D. Serial bus

6. MOV, LD, and STO are examples of:

A. **Data transfer instructions**

B. Data processing instructions

C. Arithmetic instructions

D. Logical instructions

7. Which is the first program run by the computer when it is powered on:

A. Device driver

B. Utility software

C. **BIOS**

D. Disk cleaner

8. If we want to transfer information one bit at a time on a physical interface the computer use:

A. Parallel port

B. PS/2 port

C. **Serial port**

D. Fire wire port

9. The data produced by Presentation layer of OSI model is:

A. APDU

B. **PPDU**

C. SPDU

D. TPDU

10. Which of the following requires line of sight communication:

A. Twisted pair cable

B. Coaxial cable

C. Radio waves

D. **Micro wave**

11. Which of the following is the feature of mobile communication:

A. Limited power

B. Interference

C. Health hazard

D. **Device portability**

12. A feature of DBMS by which server can determine when, how and to what extent data about him/ her is to be exchanged with others is:

A. Data sharing

B. Data administration

C. Data security

D. **Data privacy**

13. An example of half-duplex mode is:

A. Radio station

B. TV station

C. **Walkie-talkies**

D. Mobile phone

14. If a student opened a form, made changes and saved the form, what he did:

A. **Edit form**

B. Delete form

C. Add a record

D. Save a record

15. If a user wants to change a set of records according to specified criteria, which of the following query will be used?

A. Select query

B. **Update query**

C. Save query

D. Delete query

SECTION-B

Time: 2 Hours 40 Minutes **Marks:** 36

Q. 1. Attempt any **NINE** of the following questions. Each question carries **4** marks.

i. Define language processor and its types.

Answer:

Language Processor: It is a system software that translates a source program into object program.

There are three types of language processors that are:

1. Interpreter
2. Compiler
3. Assembler

Interpreter: It is a language processor that translates a high level language program line-by-line and carries out the specified action in sequence.

Languages that use interpreter are BASIC, LISP, PHP etc.

Compiler: It is a system software that translates source code into a set of machine language instructions that can be understood by Digital computer's CPU.

Languages that use compiler are C, C++, JAVA etc.

Assembler: It is a special system software that is used to convert an Assembly language program into a machine language program for later execution.

Marking Hints	Marks
Definition	1
Type 1	1
Type 2	1
Type 3	1

ii. **Describe internal processor memory**.

Answer:

Internal processor memory is a type of memory that is directly accessible to the CPU. There are two main types of internal processor memory that are:

a. Cache Memory
b. Registers

a. **Cache Memory**: It is extremely fast memory that is built into CPU or located next to CPU on a separate chip. There are two main levels of Cache which are L1 Cache and L2 Cache

L1 Cache: L1 is built into the actual processor core, which is fastest and closest to the CPU.

L2 Cache: L2 reads larger quantity of data from RAM and makes available this data available to L1 Cache.

c. **Registers**: These are temporary storage locations used to hold data and instructions. A processor contains many different types of registers that are:

- Accumulator Register
- Status Register
- Instruction Register
- Program Counter
- Buffer Register

Marking Hints	Marks
Definition of Cache memory + L1, L2	1+1
Definition of Register + Names of Registers	1+1

iii. **Write two differences of sequential Access storage and Direct Access storage**.

Answer:

Sequential Access storage	**Direct Access storage**
1. In this storage mechanism data is stored and read in a fixed or linear order.	1. In direct access storage mechanism data is stored and read directly from storage devices using memory addresses.
2. It is less efficient to access particular piece of data.	2. It is more efficient to access particular piece of data.

Marking Hints	Marks
Each difference	2+2

iv. B**riefly write about four stages of instruction cycle**.

Answer: The four stages of an instruction cycle that a CPU carries out are:

a. Fetch b. Decode c. Execute d. Store

- First, instruction is fetched from the memory address that is currently in the program counter and stores it in the Instruction Register.
- Secondly, instruction is interpreted by instruction decoder which is inside (IR). Here required data is fetched from main memory to be processed and then placed it in data register.
- In third stage i.e., execution, the decoded information is passed to relevant unit of CPU to perform action like mathematical, logical, reading or writing etc.
- The last stage of instruction cycle is storage of results that are generated by the operation or sent output to device.

Marking Hints	Marks
Each stage carries one mark	1+1+1+1

v. What is BIOS? Write its function in computer.

Answer: BIOS stands for Basic Input Output System. It is a firmware that is built into the computer-system. It is a program that is used by microprocessor when we start / powered ON the computer systems.

Functions of BIOS:

a. It loads and starts an Operating system.
b. By using BIOS users configure the hardware.
c. By using BIOS users can enable or disable system components

Marking Hints:

Marking Hints	Marks
Definition	1
3-functions	1+1+1

vi. **Define port briefly write about any two types of ports**.

Answer: Port is a physical connection with the motherboard that is used to connect external cables and devices to the motherboard. These ports would be Serial, Parallel, PS/2, USB & Fire wire etc.

Two types of ports: 1. Serial ports b. Parallel ports

Serial port: It is serial communication physical interface through which information is transferred in or out one bit at a time. A mouse COM1 and modem COM2 are serial ports.

Parallel port: It is a parallel communication physical interface that can transmit multiple bits over several wires at a time LPT1, LPT2, LPT3 are parallel ports.

Marking Hints	Marks
Definition of port + names of ports	1+1
Types of ports	1+1

vii. Differentiate between Synchronous and Asynchronous transmission.

Synchronous Transmission	Asynchronous Transmission
1. Large volume of data can be transmitted at a time.	1. Only one Byte of data can be transmitted at a time.
2. Data is transmitted Block-by-Block or word-by-word.	2. Data is transmitted character-by-character.
3. The time interval of transmission is constant.	3. The time interval of transmission is random.
4. Examples of Synchronous Transmission are: Video Conferencing, Chat rooms, and telephone conversations.	4. Examples of Asynchronous Transmission are: Email, letters, forums etc.

Marking Hints	Marks
1 mark for each difference	1+1+1+1

viii. W**rite any two advantages and disadvantages of wireless networks**.

Answer:

Two Advantages of Wireless Network:

1. **Manageability**: We can easily be connected to different wireless networks without having to change the physical connection.
2. **Mobility**: Users are no longer tied to a specific location because network services are available at different locations.

Two Disadvantages of Wireless Network:

1. **Security**: A malicious individual can tap into a wireless network easily.
2. **Coverage**: Users might face problems of signal's range.

Marking Hints	Marks
Advantages	1+1
Disadvantages	1+1

ix. Define GPS. Write about GPS segments.

Answer:

GPS (Global Positioning System): It is a satellite based navigation system that is used for land, sea, and air navigation to provide time and location for vehicles and ships etc.

GPS has three segments or components that are:

1. **Space segment**. It consists of 24 operating satellites that transmit one-way signals for finding position and time of current GPS satellite.
2. **Control segment**: It consists of a global network of ground facilities that track, the GPS satellites, monitor their transmission, perform analysis and send commands and data to the constellation.
3. **User Segment**: It consists of GPS receiver equipment, that receives signals from the GPS satellites and uses the transmitted information

Marking Hints	Marks
Definition of GPS	1
Each segment	1+1+1

x. **What is file management system and also write any three limitations of file management system**.

Answer:

File Management System

It is the first computer-based method to process data. In this system files are accessed and stored by using file handling programs developed in programming languages.

Three disadvantages of File management system:

1. **Data Redundancy**: Independent data files include lot of duplicated data that causes redundancy problem.
2. **Inconsistency**: Data in this system is not consistent due to redundant storage.
3. **Integrity problem**: Lack of reliability and accuracy of data. Data values may need to satisfy integrity constraints.

Marking Hints	Marks
Definition of FMS	1
Each disadvantage	1+1+1

xi. Write about different languages of SQL.

Answer:

SQL is a standard query language for all relational database management systems (DBMS). Structured Query Language (SQL) is divided into the following languages: **(1)**

DDL (Data Definition Language)

DML (Data Manipulation Language)

DCL (Data Control Language)

Data Definition Language (DDL) (1)

DDL is database language that defines the structure in which data are stored. These structures may include database, table, query fields and records. Command used in DDL are CREATE, ALTER, DROP, TRUNCATE and RENAME etc.

Data Manipulation Language (DML) **(1)**

A DML is a language that enables users to access or manipulate data. We can insert, modify and delete the data in the database and information can be retrieved from database. Command used for DML are: SELECT, UPDATE, INSERT, DELETE, MERGE and LOCK TABLE etc.

Data Control Language (DCL) **(1)**

DCL is a database language used to control access to the data in a database. We can give rights to the users and revoke already given rights. Commands used for DCL are GRANT and REVOKE.

Q.No./ Part No.	Marking Hint	Marks
Q. xi	Structured Query Language (SQL) DML DDL DCL	1 1 1 1
	Total	**4 Marks**

xii. What is field property? Write about any three field properties of a column in table/ relation.

Answer:

Field property appear in the bottom left corner of Table Window. Field properties determine how data will be entered, stored and displayed.

Decimal Places applies to Number or Currency fields and determines the number of digits after the decimal point.

Input Mask defines a pattern to which input data must conform.

Caption determines the label used with the field on forms and reports, and what appears at the top of a column in queries (the default is the Field Name).

Q.No./ Part No.	Marking Hint	Marks detail
Q. xii	Definition of Field Property Decimal places+ Input Mask + Caption	1 1+1+1
	Total	**4 Marks**

SECTION-C

Marks: 24

NOTE: Attempt any **THREE** of the following questions. Each question carries 8 marks.

2. What is general purpose application software? Write in detail about Productivity Software and Educational Software. 8

Answer:

General-Purpose Application Software **1**

General-purpose applications software are programs or packages that perform common information processing jobs for end users to fulfill his/ her general needs. These are called commercial software. A single software can be used for a variety of tasks. These are divided into the following main categories.

Productivity Software
Business Software
Entertainment Software
Education Software

Types of General Purpose Application Software

Productivity Software:

The productivity software is a type of Application software that is used to produce documents, presentations, databases, charts and graphs.

Some common productivity software are:

Database Software: This software allows creating a database and to retrieve, manipulate, and update data that we store in the database, e.g., MySQL, MS Access, Microsoft SQL Server and Oracle.

Word processors: Word processing software is used to create, edit, and format text documents. The most popular examples of this type of software are Word, WordPad and Notepad etc.

Spreadsheet Software: Spreadsheet software are used to work with numbers and formulae. User enter numbers in the grid of rows and columns on the worksheet and computer performs the calculations. Excel and Lotus 1-2-3 are examples of Spreadsheet software.

Educational Software

Educational software allows a computer system to be used as a teaching and learning tool. Some examples of educational software are:

Computer Based Training (CBT): These Application software are used for the purpose of training.

Example: A training software for pilots to train them how to fly an airplane and also for doctors to train them in surgeries.

Encyclopedia: Encyclopedia software contains entries like dictionary and provides complete historical information about them. Encyclopedia articles focus on information or knowledge collected from the Whole. The main aim of the encyclopedia software is to preserve the knowledge for later use. Encarta and Britannica are popular encyclopedia software.

Computer Aided Learning (CAL): The term Computer Aided Learning (CAL) covers a range of computer-based packages that aim to provide interactive instructions usually in a specific subject area.

Teachers can use audio video software aids through computer to prepare lesson plans and electronic presentations using PowerPoint about their lectures.

Q.No./ Part No.	Marking Hint	Marks detail
Q. 2	Definition of General Purpose Application Software with names Productivity Software Educational Software	2 3 3
	Total	**8 Marks**

3. Write in detail about general purpose registers used in CPU? 8

Answer:

(a) General Purpose Registers

There are four commonly used general purpose registers.

i. Accumulator (AX)
ii. Base Register (BX)
iii. Counter Register (CX)
iv. Data Register (DX)

i. Accumulator (AX)

Accumulator is a general purpose register and is used by CPU for performing arithmetic and logic operations and to hold the result of those operations. It acts as a temporary storage location that holds an intermediate value in mathematical and logical calculations. Intermediate results of an operation are written to the accumulator by overwriting the previous value.

- As complete 32-bit data register: EAX
- Lower halves of the 32-bit register can be used as 16-bit data register: AX
- Lower and higher halves of the above-mentioned 16-bit register can be used as two 8-bit data registers: AH, AL.

ii. Base Register (BX)

The Base Register can perform arithmetic and data movement and it has some special addressing abilities. BX register can hold a memory address that points to another variable. It usually contains a data pointer. A complete 32-bit register can be used in three ways

- As complete 32-bit data register: EBX
- Lower halves of the 32-bit register can be used as 16-bit data register: BX.
- Lower and higher halves of the above-mentioned 16-bit register can be used as two 8-bit data registers: BH, BL.

iii. Counter Register (CX)

The Counter Register acts as a counter for repeating or looping instructions. The instructions given are automatically repeated and will decrement the value of CX and quits when it is equal to 0. A complete 32-bit register can be used in three ways:

- As complete 32-bit data register: ECX
- Lower halves of the 32-bit register can be used as 16-bit data register: CX.
- Lower and higher halves of the above-mentioned 16-bit register can be used as two 8-bit data registers: CH, CL.

iv. Data Register (DX)

Data Register has a Special role in multiply and divide operations. It works like a buffer and holds anything that is copied from the memory to be ready for the processor to use it. A complete 32-bit register can be used in three ways:

- As complete 32-bit data register: EDX
- Lower halves of the 32-bit register can be used as 16-bit data register: DX.
- Lower and higher halves of the above-mentioned 16-bit register can be used as two 8-bit data

In Input/ Output (I/O) operations DX register can be used as a port number.

Q.No./ Part No.	**Marking Hint**	**Marks detail**
Q. 3	Accumulator + Base Register + Counter register + Data Register	2+2+2+2 = 8
	Total	**8 Marks**

4. What is TCP/ IP protocol suite? Write its most commonly used protocols HTTPs and FTP. Describe 4 layers of TCP/ IP. 8

Answer:

TCP/IP Protocol Suite Architecture

A protocol suite is a group of protocols that all work together to allow software or hardware to perform a function. The TCP/IP protocol suite is a good example of it. The TCP/IP protocol suite consists of:

a. TCP/IP Architecture
b. TCP/IP PORTS
c. TCP/IP Applications

The most common TCP/IP Protocols are:

HTTPs - Used between a web client and a web server, for secure data transmissions. Often used for sending credit card transaction data or private data from a web client (i.e., Internet browser on a computer) to a web server.

FTP - Used between two or more computers. One computer sends data to or receives data from another computer directly.

TCP/IP Layers:

TCP/IP is normally considered to be a 4-layer system. The TCP/IP model breaks down into the following four layers.

Application Layer

Transport Layer

Internet Layer

Network Access Layer

1. **Application Layer**

This is the top layer of TCP/IP protocol suite. This layer deals with application network processes. These processes include FTP (File Transfer Protocol), HTTP (Hypertext Transfer Protocol), and SMTP (Simple Mail Transfer Protocol).

2. Transport Layer

The Transport Layer provides the means for the transport of data segments across the Internet. The Transport Layer is concerned with host-to-host communication. Transmission Control Protocol provides reliable, connection-oriented transport of data between two endpoints (sockets) on two computers that use Internet Protocol to communicate.

3. **Internet Layer**

The Internet Layer provides a global logical addressing scheme, a process for packetization of data, another process for routing packets to their destination and for providing connectivity between networks. The Internet Layer is concerned with network to network communication. The main protocol used at this layer is IP.

4. **Network Access Layer**

The Network Access Layer provides access to the physical network. This layer is concerned with building packets. The data is transmitted and received across the physical network in network access layer. This layer combines the Physical and Data link layers of OSI model and routes the data between devices on the same network. It also manages the exchange of data between the network and other devices.

Q.No./ Part No.	**Marking Hint**	**Marks**
Q. 4	Definition of TCP/IP protocol Suite with names of components HTTPS + FTP Application Layer + Transport Layer + Internet Layer + Network Access Layer	1+1 1+1 1+1+1+1
	Total	**8 Marks**

5. Define normalization. Describe 1NF, 2NF, 3NF with example. 8

Answer

Normalization

Normalization (data) is the process of organizing the data in relational database in order to minimize duplication of information (data) and to safeguard the database against certain anomalies. The basic purpose of normalization is to divide large table into smaller and well-formed tables/relations and remove the inconsistencies or anomalies.

Normal Form

The degree of normalization is termed as Normal Form. For example, First Normal Form (INF), Second Normal Form (2NF), Third Normal Form (3NF) etc.

First Normal Form (1NF)

The relation is considered to be in First Normal Form (INF), if the intersection of each row and column contains only one value. In 1NF we remove the repeating groups. Consider the following example.

Employee Table

Proj No	Project Name	EmpNo	EmpName	JobClass	ChargePer Hour	Hours
15	Evergreen	103	Jameel Khan	Elect. Engineer	1000	23
		101	Faisal Naeem	DB Designer		19
		105	Bilal Ahmad	DB Designer		35
18	MIS	114	Zubair Ahmad	Programmer	750	12.6
		118	M. Waseem	System Analyst		45.3
		104	Shaukat Ali	App Designer		32.4

Unnormalized Table

The Employee table contains repeating groups. To normalize the above table, all repeating groups must be eliminated. We re-arrange the relation (table) as below, to convert it to First Normal Form.

Employee Table

ProjNo	ProjName	EmpNo	EmpName	JobClass	ChargePerHour	Hours
15	Evergreen	103	Jameel Khan	Elect. Engineer	1000	23
15	Evergreen	101	Faisal Naeem	DB Designer	900	19
15	Evergreen	105	Bilal Ahmad	DB Designer	900	35
18	MIS	114	Zubair Ahmad	Programmer	750	12.6
18	MIS	118	Waseem	System Analyst	800	45.3
18	MIS	104	Shaukat Ali	App Designer	600	32.4

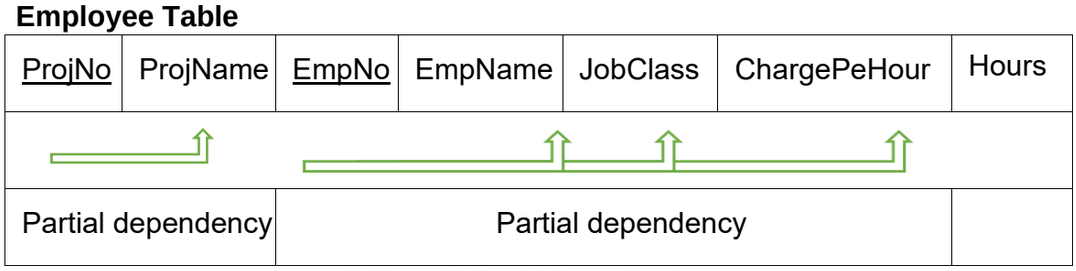
Attribute Proj_No is not an adequate key and does not uniquely identifies all the records. To maintain a proper primary key, the new key must be composed of a combination of Proj_No and Emp_No.

2nd Normal Form:

A relation will be in 2NF, if:

1. it is in the first normal form (1NF) and
2. all non-key attributes must be fully functional dependent on the whole primary key means there should be No partial dependencies. Consider the table.

Employee Table



Tables with Partial Dependencies

Attribute ProjName is dependent on ProjNo, while EmpName, JobClass and ChargePerHour are dependent on EmpNo. Dependencies based on only part of a composite primary key are called partial dependencies.

Project Table

ProiNo	ProjName

Normalized Table

Employee Table

EmpNo	EmpName	JobClass	ChargePerHour

Table in 2NF

Hours Table

ProjNo	EmpNo	Hours

Normalized Table

Because the number of hours spent on each project by each employee is dependent on both ProjNo and EmpNo, we place these hours in the Hours table hours.

3rd Normal Form **2**

The relation should be in third normal form if:

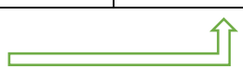
1. it is in the second normal form
2. There is no transitive dependency among the columns in a relations.

A transitive dependency is a dependency of one non-key attribute on another non-key attribute. Consider Table:

Employee Table

Table with Transitive Dependencies

EmpNo	EmpName	JobClass	ChargePerHour



Transitive dependency

Both JobClass and ChargePerHour are non-key attributes and the ChargesPerHour is dependent on JobClass. So by removing transitive dependency the following new tables will be created.

Employee Table

EmpNo	EmpName	JobClass

Table in 3NF

Job Table

JobClass	ChargePerHour

Table in 3NF

Q.No./ Part No.	Marking Hint	Marks
Q. 5	Normalization + Normal Form + 1NF + 2NF + 3NF	1 + 1 + 2 + 2 + 2
	Total	**8 Marks**