Federal Board **HSSC-I** Examination
Computer Science Model Question Paper
(Curriculum 2009)

<u>SOLUTION SECTION – A (Q:1)</u>

Q.1 **Choose the correct answer i.e. A / B / C / D by filling the relevant bubble for each question on the OMR Answer Sheet according to the instructions given there. Each part carries one mark.**
<u>**(Answers are underlined)**</u>

1. Which one of the following is the most powerful digital computer system?
   A. Mainframe Computer
   B. Minicomputer
   C. Microcomputer
   D. Supercomputer

2. Which of the following is most suitable to print salary slips of 2000 employees on very cheap cost?
   A. Dot matrix printer
   B. Laser printer
   B. Desk jet printer
   D. Plotter

3. Cache Memory works between:
   A. RAM and Processor
   B. RAM and ROM
   C. Processor and Hard Disk
   D. ROM and Hard Disk

4. Memory card used in mobile phone is an example of:
   A. Magnetic Memory
   B. Secondary Memory
   C. Optical Memory
   D. Flash Memory

5. How many memory locations can be addressed with 64-bit address bus?
   A. 32
   B. 64
   C. 2^{32}
   D. 2^{64}

6. How many different operations can be performed by CPU, if opcode of an instruction format consists of 4 bits?
   A. 4
   B. 8
   C. 16
   D. 32

7. Which of these expansion slots has highest video performance?
   A. PCI
   B. PCI Express
   C. SATA
   D. AGP

8. Which of the following register holds the address of the next instruction to be executed?
   A. Program Counter
   B. Instruction Register
   C. Counter Register
   D. Data Register

9. The IP Address 191.10.1.0 lies in:
   A. Class A
   B. Class B
   C. Class C
   D. Class D

10. Email sending mechanism is an example of the following mode of communication.
    A. Simplex
    B. Simple Duplex
    C. Half Duplex
    D. Full Duplex

11. Cellular communication divides the physical region into sections called:
    A.   Pods   **B.   Cells**
    C.   Cubes   D.   Sectors

12. Which wireless technology is used in TV remotes and Toys?
    A.   Infrared   B.   Bluetooth
    C.   Wi-Fi   D.   Wi-Max

13. What is the type of this statement? "**Create table Student**"
    A.   DCL   **B.   DDL**
    C.   DXL   D.   DML

14. The relationship between entities AUTHOR and BOOK is:
    A.   Unary   **B.   Binary**
    C.   Ternary   D.   Recursive

15. Identify the cardinality of following relationship:
One COLLEGE can have many DEPARTMENTs, One DEPARTMENT belongs to one COLLEGE.
    A.   One-to-One   **B.   One-to-Many**
    C.   Many-to-Many   D.   Many-to-One

SOLUTION SECTION – B (Q:2)

Part – i: Differentiate between hard copy and soft copy devices along with one example of each. **(1+2)**

Answer:

Hard copy devices	Soft copy devices
1. An output device that prints data in printed form (on paper)	An output device that displays data in electronic form
2. The output generated by these devices cannot be modified	The output shown on these devices can be easily modified
3. Example: Printer or Plotter	Example: Display screens

Part – ii: Write down any one application of the following scanner types: a. Handheld scanner b. Flatbed scanner c. Optical scanner **(1+1+1)**

Answer:

a. Application of Handheld scanner

It is an input device used to scan books, newspapers, or magazines by dragging over the image. It is used at homes or offices.

b. Application of Flatbed Scanner

It is an input device used to scan pages, images, or other documents by placing over it. It is commonly used at offices or homes.

c. Application of Optical Scanner

It is a light sensing input device that reads printed text or graphics. It is commonly used in ATMs.

Part – iii: Define utility software, language processor and device driver. **(2+1)**

Answer:

a. Utility software

It is a type of system software that helps user to maintain a computer system for effective functioning e.g., virus scanning, disk compression

b. Language processor

It is a type of system software that translates a program written in human-understandable form into machine-understandable format e.g., compiler

c. **Device driver**

   It is a type of system software that is used to familiarize the device with the computer system. It controls the working of a device e.g., printer.

Part – iv: Differentiate between Intel P4 and AMD Athlon processors with reference to clock speed, bus width and architecture. **(3)**

Answer:

	Intel P4 processor	**AMD Athlon**
1. Clock speed	1.7 to 3.0 GHz	1.4 to 2.33 GHz
2. Bus width	32/64 bits	32/64 bits
3. Architecture	CISC / RISC	RISC

Part – v: What is an Instruction Cycle? Illustrate with diagram. **(2+1)**

Answer:

Instruction Cycle steps

   1. **Fetch Operation**

   The control unit fetches/ takes the instruction from main memory and places it in Instruction Register.

   2. **Decode Operation**

   The control unit decodes/ translates the instruction placed in Instruction register by examining the instruction.

   3. **Execute Operation**

   The decoded instruction is executed by performing different operations like arithmetic.

Instruction Cycle
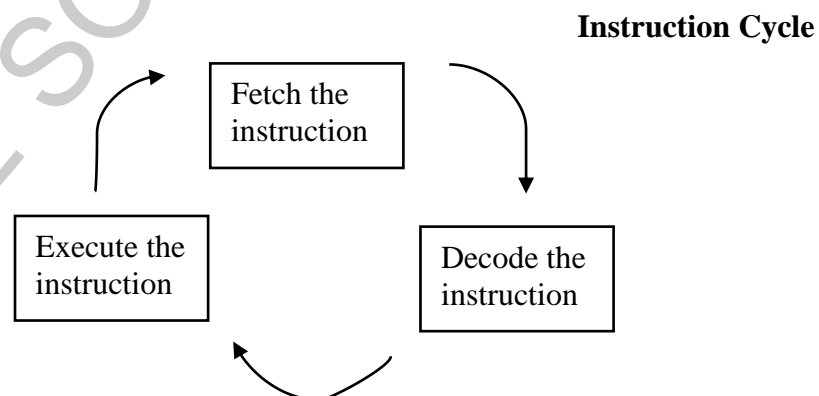
Part – vi: Write down three differences between SIMM and DIMM memory chips.   (3)

Answer:

SIMM	DIMM
1. Single In-line Memory Module is a small circuit board used in early computers of 1980s 90s.	Dual In-line Memory Module is a small circuit board used in today's computers.
2. It typically uses 32-bit bus, hence slower data transfer rate.	It typically uses 64-bit bus, hence faster data transfer rate.
3. Its storage capacity ranges from 256KB to 32MB.	Its storage capacity ranges from 64MB to 512MB.

Part – vii: The following Microprocessor diagram has three internal system buses, observe the diagram carefully and name the Buses shown in the diagram.   (3)

Answer:
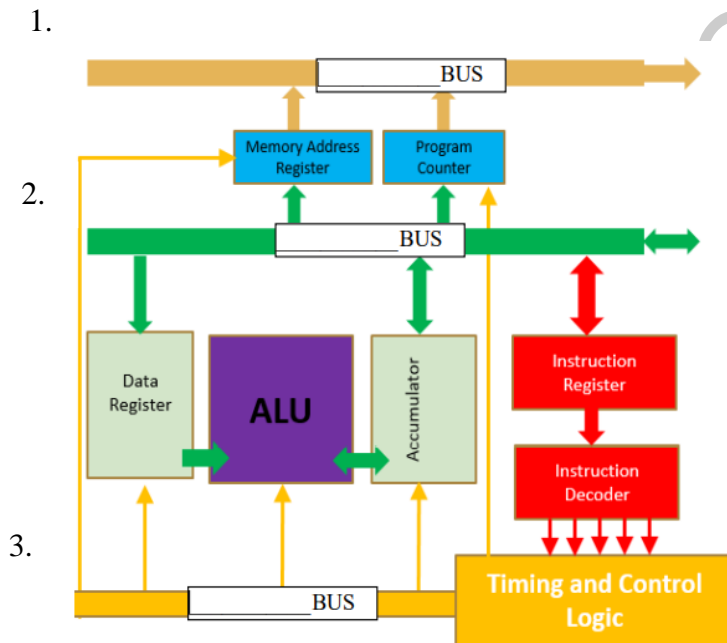
Names of Buses	
1.	Address bus
2.	Data bus
3.	Control bus

Part – viii: Differentiate between Client-Server and Peer-to-Peer network architecture.

(3)

Answer:

Client-Server network architecture

1. A centralized network architecture based on server and clients.
2. A client requests for services and server responds with a service.
3. It is more stable and secure network, hence supports large network.

Peer-to-Peer network architecture

1. A de-centralized network architecture based on peers.

2. Each node can request for services and provides services.

3. It is less stable and secure network, hence supports small networks.

Part – ix: Categorize the following topologies as per their characteristics (Star, Ring, Bus, Mesh). (1.5+1.5)

Answer:

Expensive (most expensive to least expensive)	Least Cabling (least to most)
Mesh	Bus
Star	Ring
Ring	Star
Bus	Mesh

Part – x: Give any three limitations of Mobile Communication System. (3)

Answer:

Limitations of Mobile Communication system

1. Mobile Communication system has slower speed or data transfer rate.

2. Mobile Communication has less protection and security.

3. Mobile Communication has interference due to bad weather or high buildings.

4. Mobile Communication has limited battery and CPU power.

Part – xi: Complete the required information in the following table against the said satellites. (1+1+1)

Satellites	Distance from the Earth	Purpose
GEO		
MEO		
LEO		

Answer:

Satellite	Distance from the Earth	Purpose
GEO	Above 35786 km	Used for weather forecasting, satellite radio and television
MEO	From 2000 - 35786 km	Used for GPS and navigation
LEO	From Earth's surface to 2000 km	Used for mobile telephones and video conferencing

Part – xii: Write down any one usage of Wi Max, Bluetooth, and Infra-Red technologies.

Answer: (1+1+1)

1. **Usage of Wi Max technology**

   It is a high-speed broadband wireless network used for communication over a city and has a range of 40-50 km e.g., cable TV network of a city.

2. **Usage of Bluetooth technology**

   It is a low-speed wireless network used for short range communication within 10 meters e.g., exchange of data between two mobile devices.
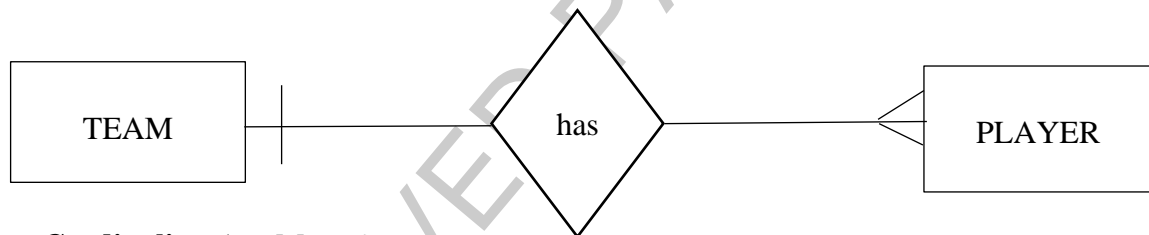
3. **Usage of Infra-Red technology**

   It is a high-speed wireless network used for short range communication e.g., TV remote control, toys remote control, home security system.

Part – xiii: A team consists of many players and a player plays for only one team. Draw an ER diagram and identify cardinality for the said situation. (2+1)
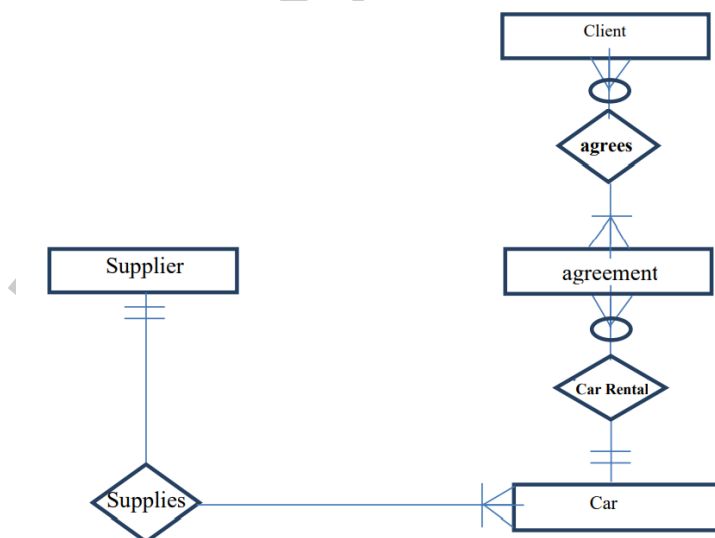
Answer: **ER-Diagram**

Cardinality: 1 to Many

Part – xiv: Understand the ER Diagram and write the answers to the following questions: (3)

i. List one example of one-to-many relationship.

ii. Mention Entities used in ER diagram.

iii. How many minimum cars supplier must supplies?

Answer:

i. **Example of one-to-many relationship:**

One SUPPLIER supplies many CARS **or**

One CAR has many AGREEMENTS

ii. **Entities:**

CLIENT, AGREEMENT, CAR, SUPPLIER

iii. **Minimum cars supplier must supply:**

Supplier must supply **ONE** car

Part – xv: **What are Columnar, Tabular and Datasheet Form views?** (3)

Answer:

1. **Columnar Form view:**

A columnar form is used to display one record at a time. It shows labels and text boxes for all fields of one record.

2. **Tabular Form view:**

A tabular form is used to display multiple records at a time in different rows. It shows labels on top of each column.

3. **Datasheet Form view:**

A datasheet form is used to display multiple records at a time. It shows records in datasheet view of table with rows and columns.

Part – xvi: **Specify the suitable data types for Roll No, DOB and Address. Identify the suitable Primary key. Also write down the number of tuples and attributes in the table.**
(1.5+0.5+1)

Registration No.	Roll No.	Name	DOB	Address	Phone
CS12/05	1	ALI	12-05-1999	G-7 Islamabad	9233658721
CS34/21	2	AMNA	26-08-1999	Cantt Rawalpindi	9234737536

Answer:

i. Suitable data types: Roll No : Number
DOB : Date/Time
Address: Text

ii. Suitable Primary key: Roll No **or** Registration No.

iii. Number of tuples: 2

Number of attributes: 6

SOLUTION   SECTION – C

Q. No. 3 (a) Differentiate between Sequential access and Direct access storage.   (4)

Answer:

Sequential access storage:

1.   Sequential access storage, stores files and data in specific order or sequence.
2.   This type of storage access data or files in the same sequence in which it is stored.
3.   Its access time varies according to the required location; hence it has slow access time.
4.   This storage is suitable for applications like preparation of electricity bills, pay slips etc.
5.   An example of sequential access storage device is Magnetic Tape.

Direct access storage:

1.   Direct access storage, stores files and data by placing at any location, wherever space is available.
2.   This type of storage access or reach any location by direct or random access.
3.   Equal access time is required to access any location; hence it has fast access time.
4.   This storage is suitable for applications like reservation of airline ticket, determine balance in customer's bank account etc.
5.   An example of direct access storage device is Magnetic Disk.

Q. No. 3 (b) Which one of the following storage media is better and why? Support your answer with three reasons. (i) Magnetic (ii) Optical   (1+3)

Answer:

Better storage media: **Magnetic storage**

Reason 1: Speed:

Magnetic storage has faster read and write operations and hence high speeds than optical storage.

Reason 2: Storage Capacity:

Magnetic storage has larger storage capacity and space. It comes with terabyte capacities, but optical disks have much smaller space as compared to magnetic storage.

Reason 3: Multiple partitions:

Due to larger storage capacity, multiple partitions can be used to store data.

Q. No. 4 Describe the following types of Ports: (2+2+2+2)

        a. Serial Port   **b. Parallel Port**
        c. USB Port   **d. Fire wire Port**

Answer:

    a.   **Serial Port:**

A serial port is an interface or connection that allows transmission of one bit at a time. It has 9 or 25 pins and has slower data transfer rate. It is one of the oldest types of port that is usually used to connect devices that do not require fast data transmission like mouse, keyboard etc.

    b.   **Parallel Port**

A parallel port is an interface or connection that allows transmission of multiple bits at a time. It has 25 pins to carry data. It has faster data transfer rate. It is usually used to connect devices that require fast data transmission like scanner, printer etc.

    c.   **USB Port**

A Universal Serial Bus is a plug and play interface or connection that automatically determines the type of device attached. It allows communication of variety of devices in modern computers like keyboard, mouse, scanner, printer, flash drive, digital camera etc. It has fast data transmission.

    d.   **Firewire Port**

A firewire port is a high-speed connecting device used for connecting peripherals like hard drives, digital audio/ video devices including camcorders, digital cameras. It can also provide power to some devices without any other interface. It has 4 or 6 pins. It allows fast transfer rates.

Q. No. 5 (i) Compare the TCP suite with OSI model. **(4)**

Answer:

OSI Model layers   **TCP/IP Model Layers**
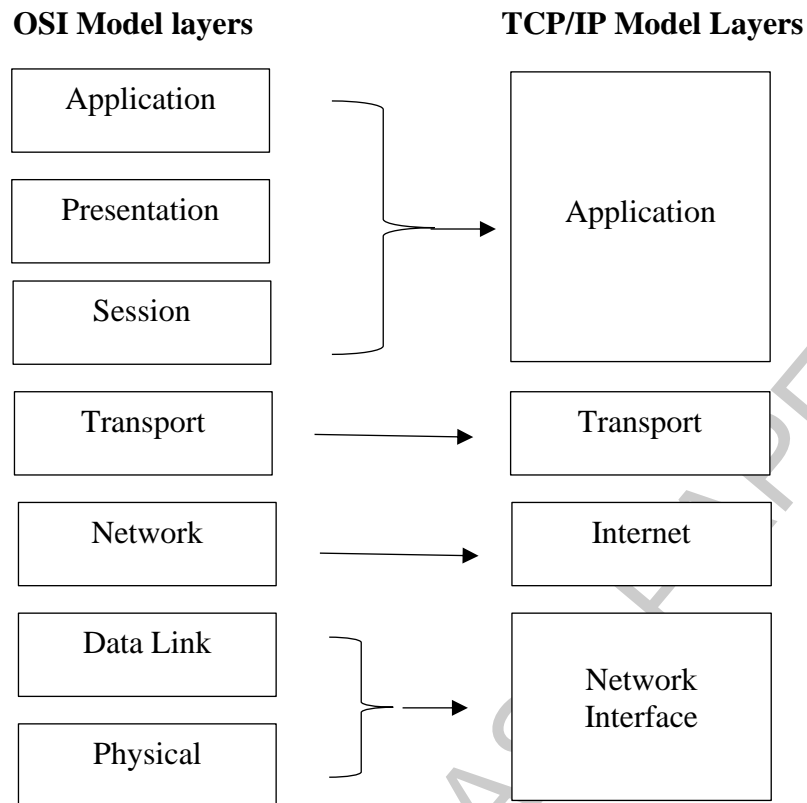
OSI model	TCP/IP suite
1 OSI model is a logical and conceptual model that defines network communication used by systems for interconnection and communication with other systems.	TCP/IP suite helps to determine how a specific computer should be connected to the internet.
2 Session and presentation layers are part of this model.	There are no session and presentation layers.
3 In this model, the data link layer and physical layer are separate layers.	In this model, data link and physical layers are both combined as a single internet layer.
4 It helps to standardize router, switch, and other hardware.	It helps to establish a connection between different types of computers.

Q. No. 5 (ii) Differentiate between circuit switching and Packet switching. (4)

Answer:

Circuit switching	Packet switching
1. Circuit switching is a network that transmits data by creating a dedicated path or circuit between two nodes.	In Packet switching, each packet containing the information that needs to be processed goes through the dynamic route. No dedicated connection or circuit is required.
2. A uniform path is followed throughout the session.	There is no uniform path that is followed end to end through the session.
3. Since a dedicated channel has been used, the transmission of other data becomes impossible.	Multiple users can use the same channel while transferring their packets.
4. An example of circuit switching is Telephone network.	An example of this type is Message switching network

Q. No. 6 Observe the table STUDENT, apply normalization rules, and convert the table up to 3NF by showing step by step procedure of 1NF, 2NF and 3NF. (2+3+3)

STUDENT

St ID	Name	Class	Section	Gender	Group	Practical Subject
1	MUHAMMAD TALHA	XI	G	MALE	ICS-PHY	Physics, Computer
2	HAMZA AZIZ	XI	G	MALE	ICS-PHY	Physics, Computer
3	MUHAMMAD SUFYAN	XI	G	MALE	ICS-PHY	Physics, Computer
4	KOMAL SAMUAIL	XI	F	FEMALE	ICS-STATS	Stats, Computer
5	ISHA SHAUKAT	XI	F	FEMALE	ICS-PHY	Physics, Computer

Answer:

First Normal Form (1NF):

A relation is in 1NF if every row and column intersection contain atomic/single values only.

The following relation is in 1NF after remove repeating groups.

STUDENT

St ID	Name	Class	Section	Gender	Group	Practical Subject
1	MUHAMMAD TALHA	XI	G	MALE	ICS-PHY	Physics
1	MUHAMMAD TALHA	XI	G	MALE	ICS-PHY	Computer
2	HAMZA AZIZ	XI	G	MALE	ICS-PHY	Physics
2	HAMZA AZIZ	XI	G	MALE	ICS-PHY	Computer
3	MUHAMMAD SUFYAN	XI	G	MALE	ICS-PHY	Physics
3	MUHAMMAD SUFYAN	XI	G	MALE	ICS-PHY	Computer
4	KOMAL SAMUAIL	XI	F	FEMALE	ICS-STATS	Stats
4	KOMAL SAMUAIL	XI	F	FEMALE	ICS-STATS	Computer
5	ISHA SHAUKAT	XI	F	FEMALE	ICS-PHY	Physics
5	ISHA SHAUKAT	XI	F	FEMALE	ICS-PHY	Computer

Second Normal Form (2NF):

A relation is in 2NF if it is in 1NF, and all non-key attributes are fully functional dependent on primary key. These relations are in 2NF after removing partial functional dependencies.

STUDENT

St ID	Name	Class	Section	Gender
1	MUHAMMAD TALHA	XI	G	MALE
2	HAMZA AZIZ	XI	G	MALE
3	MUHAMMAD SUFYAN	XI	G	MALE
4	KOMAL SAMUAIL	XI	F	FEMALE
5	ISHA SHAUKAT	XI	F	FEMALE

GROUP

Group ID	St ID	Group	Practical Subject
1	1	ICS-PHY	Physics
2	1	ICS-PHY	Computer
3	2	ICS-PHY	Physics
4	2	ICS-PHY	Computer
5	3	ICS-PHY	Physics
6	3	ICS-PHY	Computer
7	4	ICS-STATS	Stats
8	4	ICS-STATS	Computer
9	5	ICS-PHY	Physics
10	5	ICS-PHY	Computer

Third Normal Form (3NF):

A relation is in 3NF if it is in 2NF, and no transitive dependency exists. These relations are in 3NF after removing transitive dependencies.

STUDENT

St ID	Name	Gender ID	Section ID	Group ID
1	MUHAMMAD TALHA	MALE	1	1
2	HAMZA AZIZ	MALE	1	1
3	MUHAMMAD SUFYAN	MALE	1	1
4	KOMAL SAMUAIL	FEMALE	2	2
5	ISHA SHAUKAT	FEMALE	2	1

SECTION

Section ID	Section	Class
1	G	XI
2	F	XI

GROUP

Group ID	Group
1	ICS-PHY
2	ICS-STATS

STUDENT SUBJECT

St ID	Practical Subject
1	1
1	2
2	1
2	2
3	1
3	2
4	3
4	2
5	1
5	2

PRACTICAL SUBJECT

Subject ID	Practical Subject
1	Physics
2	Computer
3	Stats

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NOTE:

This is suggested (proposed) solution or answers to the questions given in SECTION-B and C. Students can write any valid alternate answers.