Second Year Computer Science
Option – I (Programming Using C)
Dada Education Official PK – Preparation Paper Answer Key

SECTION B – Short Questions

Q2.

(i)

- **Library Functions**: Built-in functions in C.
  - Examples: `printf()`, `scanf()`, `strcpy()`, `sqrt()`
- **Address Operator**: `&` is used to get the address of a variable.
  - Example: `int a = 5; printf("%p", &a);`

(ii)

- **Steps to Create Table in MS Access**:
  1. Open MS Access
  2. Create a new database
  3. Select "Table Design"
  4. Define fields and data types
  5. Set primary key
  6. Save the table
- **Message Sequence**: Order in which messages are processed.
  - Examples: Welcome message, error message

(iii)

- Reserved words **cannot** be used as variable names in C because they have predefined meanings.
  - Examples: `int`, `float`, `return`

(iv)

- **C Preprocessor Directives**: Instructions processed before compilation.
  - `#define`: Macro definition
  - `#include`: Includes standard/header files
- **IDE Shortcut Keys**:
  - `Ctrl + S` (Save), `Ctrl + Z` (Undo), `Ctrl + C` (Copy)

(v)

- **Factorial Program**:

```
int factorial(int n) {
    if(n == 0) return 1;
    return n * factorial(n - 1);
}
```

- **Logical Operators**: `&&`, `||`, `!`
  - Example: `if(a > 0 && b > 0)`
- **Pointer in C**: Stores the address of another variable.
  - Declaration: `int *p;`
  - Initialization: `p = &a;`

(vi)

- **scanf()**: Used to take input.
  - Syntax: `scanf("%d", &num);`
- **Data Redundancy**: Repetition of data in a database.
- **Reserved Words in C**: `int`, `float`, `char`, `return`, `if`, `else`, etc.

(vii)

- **Built-in Functions with Examples**:
  - `abs(x)`, `pow(x, y)`, `sqrt(x)`, `fopen()`, `scanf()`, `printf()`

(viii)

- **Differences**:
  - **Primary Key vs Foreign Key**: Unique vs reference key
  - **Source vs Object Code**: Human-readable vs machine-readable
  - **Increment/Decrement**: `++`, `--`
  - **Internal/External Variables**: Local vs global scope

(ix)

- **Program to Generate Output**:

```
for(int i=1; i<=3; i++)
    printf("%d\n", i*i);
```

- Output:

```
1
4
9
```

(x)

- **Definitions**:
  - **DBMS**: Software for managing databases

- **Data Dictionary**: Stores metadata
- **Function Prototype**: Declares function signature
- **Algorithm**: Sequence of steps
- **Notation**: Algorithm writing format
- **Table**: Structure of data
- **Query**: Data retrieval request
- **Break/Continue**: Loop control statements

(xi)

- **Function to Return Maximum**:

```
int max(int a, int b) {
    return (a > b) ? a : b;
}
```

(xii)

- **C Program Equivalents**:

```
A = ((x*y)+(x-y))/(x+y);
A = 3.14*r*r;
A = (3*a)/7;
C = sqrt((b*b) - (4*a*c))/(2*a);
OR C = v + b + d;
D = (x*y)+(z*x) - 3*xyz;
```

(xiii)

- **Program to Calculate Area of Rectangle**:

```
int length = 5, width = 3;
int area = length * width;
```

- **Scope of Identifiers**:
  - Local: Within function/block
  - Global: Outside all functions

(xiv)

- **Strings**: Array of characters ending with `\0`
- **If-Else Structure**:

```
if(condition) {
   // statements
} else {
   // statements
}
```

- **Basic C Program**:

```
#include<stdio.h>
int main() {
    printf("Hello World");
    return 0;
}
```

(xv)

- **Loop Program to Print Patterns**:

```
for(int i=1; i<=5; i++) {
    for(int j=1; j<=i; j++)
        printf("*");
    printf("\n");
}
```

SECTION C – Long Questions

Q3.

- **Function**: A block of reusable code.
- **Advantages**: Reusability, modularity, clarity
- **Function Prototype**: Declares return type and parameters
    - Example: `int sum(int, int);`
- **Switch & Break Example**:

```
switch(choice) {
   case 1: break;
   default: break;
}
```

Q4.

- **Database Models**:
    - Hierarchical
    - Network
    - Relational
- **Data Types in C**:
    - `int`, `float`, `char`, `double`, `void`

Q5.

- **Control Structure Types**:
    - Sequential
    - Selection (if, switch)
    - Iteration (loops)

- **Iteration Example**:

```
for(int i=0; i<5; i++) {
    printf("%d ", i);
}
```

Q6.

- **Decision Structures in C**:
    - `if`, `if-else`, `nested if`, `switch`
- **Loops in C**:
    - `for`, `while`, `do-while`
- **Nested Loop Example**:

```
for(int i=1;i<=3;i++) {
    for(int j=1;j<=3;j++)
        printf("* ");
    printf("\n");
}
```

Q7.

- **If-Else Statement**:
    - Used for conditional execution
- **Difference from Switch**:
    - `if`: Handles ranges and logical conditions
    - `switch`: Handles discrete values
- **Database Relationship Types**:
    - One-to-One
    - One-to-Many
    - Many-to-Many
- **Example**: A student enrolled in multiple courses

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