1. **Structure of Test Items**

Test Items should have the following elements

* Subject code
* Subject title
* Unit concerned
* Course Objective dealt by the test item
* Type of question (From the list given in Section B given below.)
* Question
* Marks
* Time expected to be taken by an average student to answer the question in minutes
* Sample answer
* Cognitive category
* Knowledge category
* Keywords (maximum 5)
* Difficulty level (Level 1, Level 2, Level 3) (Optional)

**Example:**

* Subject code: M3-R4
* Subject Title: PROGRAMMING AND PROBLEM SOLVING THROUGH ‘C’ LANGUAGE
* Unit concerned: 9. Pointers
* Course Objective dealt by the test item : Understand storage classes and pointers in “C” language
* Type of Question: **Type VI**
* Question:

Assume that **p** is a pointer to an integer and **j** is an integer. Further, assume that an integer occupies 4 bytes. Value pf p = Is the expression **p + j** legal? If yes, is it an integer or a pointer? If it is a pointer, what does it point to?

* Marks: 4
* Time expected to be taken by an average student to answer the question in minutes: 5
* Sample Answer:

Yes. The expression **p+j** is legal.

It is a pointer.

It points to a location that is current location + 4j bytes (assuming that an integer occupies 4 bytes).

* Cognitive category: Understand
* Knowledge category: Conceptual
* Keywords: Pointers, Pointer Arithmetic
* Difficulty level: Level 2

1. **Summary of Question Types**

**i) 1 Mark Questions:**

* Type I: Multiple Choice Questions
* Type II: State TRUE or FALSE
* Type III: Match the following
* Type IV: Fill Up the Blanks using Given List
* Type V: Fill Up the Blanks

**ii) 5 /10 Mark Questions**

* Type VI: Short Question
* Type VII: “Use features of a Package” Question
* Type VIII: “Reorder the Sequence” Question
* Type IX: “Compute” Question
* Type X: “Complete the Program” Question
* Type XI: “Correct Logical Errors and Complete the Program” Question
* Type XII: “Correct Syntax Errors and Complete the Program” Question
* Type XIII: “Modify Code” Question
* Type XIV: “Alternative Solutions” Question
* Type XV: “Programming” Question
* Type XVI: “Compare” Question
* Type XVII: “Draw the Block Diagram” Question
* Type XVIII: “Draw the Flow Chart” Question
* Type XIX: “Correct and Complete the Block Diagram” Question
* Type XX: “Correct and Complete the Flow Chart” Question
* Type XXI: “Determine the output” Question

**C. Types of Questions: Details**

**Type I: Multiple Choice Questions**

* Selection type.
* Each question carries 1 mark.
* Each question will have 4 choices for answer.
* “None of the above” as one of the choices is to be avoided.
* Examples:
  + The domain name in a URL refers to the

(A) protocol (B) file name (C) server (D) directory

* + ROM means

(A) Read Once Memory (B) Read Only Memory

(C) Read On Memory (D) Read Other Memory

**Type II: State TRUE or FALSE**

* Selection type
* Each question carries 1 mark.
* Examples:
  + State True or False

The increment operator ++ does not work with float variable.

* + State True or False

Cookie is information that is exchanged between one specific Browser and one specific Server exclusively.

**Type III: Match the following**

* Selection type
* Each question carries 1 mark.
* A word / phrase is given in column X. A list of descriptions is provided in column Y. The candidate has to match the word / phrase in column X to the nearest matching description in column Y.
* The list in column Y can have 2/3 descriptions only one of which is the best match for the entry in column X.
* Examples
  + Match words and phrases in column X with the closest related meaning/ word(s) / phrase(s) in column Y.

X Y

Returns initialized storage in run-time calloc ( )

malloc ( )

* + Match words and phrases in column X with the closest related meaning/ word(s) / phrase(s) in column Y.

X Y

Scroll Bar contains buttons that you can click to issue commands

lets you bring different parts of a document into view

**Type IV: Fill Up the Blanks using Given List**

* Selection type.
* Each question carries 1 mark.
* A list of words / phrases is provided. The candidate has to fill up the blank using a word / phrase from the given list only.
* The list can have 2 to 3 words / phrases, only one of which is correct
* Examples:
  + Fill up the blanks using a word / phrase from the list: URL, HTTP

\_\_\_\_\_\_\_\_ is an acronym for the address of a document on the Internet.

* + Fill up the blanks using a word / phrase from the list: a character, an integer

File Descriptor is---------------------

**Type V: Fill Up the Blanks**

* Supply type.
* Each question carries 1 mark.
* The candidate has to fill up the blank using appropriate word / phrase.
* Examples:
  + Fill up the blank

---------- statement can be used within a **for** statement, and when executed, it causes the remaining statements in the loop body to be skipped.

* + Fill up the blank

With reference to name caching in DNS, TTL expands to ------------------

**Type VI: Short Question**

* Question is for specified marks (generally 5)
* Can be Supply type or Selection type. Any one single type from Types I to V described above is to be used.
* The entire question must be related to a single topic from the specified part of the syllabus.
* Examples:
  + Set a question of Type VI, for 5 marks, from “4. Word Processing” Unit of the syllabus.

Question:

With reference to the Mail Merge operation in MS-Word, Fill up the blanks: (5 Marks)

The document that contains information that is to be identical in each copy is called -----------.

After clicking Select **Recipients**, you have clicked **Type a new list** as you don't have a data file yet. You then used the form that opened to create your list. The list is saved as a file that you can reuse. This extension of this file will be ----- . While editing the recipient list, you can combine multiple criteria for filtering, using ------ .

------------ is an example for a file that can’t be a data source. --------------- is an example for a file that can be a data source.

* + Set a question of Type VI, for 5 marks, from “6. Electronic Mail” Unit of the syllabus.

Question:

With reference to Electronic Mail, list any 5 basic types that can appear in a MIME Content-Type declaration and provide single-line descriptions of their meanings.

(5 Marks)

**Type VII: “Use features of a Package” Question**

* Question is for specified marks (generally 5)
* The question is on the use of some features of a specific application software package included in the syllabus. Examples are: MS-Word, MS-Excel, MS-Office
* Some structured data is assumed to be given (for example, in an MS-Excel sheet, or in an MS-Access Table, or in a HTML Table etc). A specific value based on this data is required. The question may ask for the actual value or a formula to compute the value, or a query to get the value etc.
* The entire question must be related to a single topic from the specified part of the syllabus.
* Example:
  + Set a question of Type VII, for 5 marks, from “5. Spread Sheet Package” Unit of the syllabus.

Question:

Assume that there is numerical data in Cells A1 to A10 and B1 to B10.

* The sum of the values in Cells A2 to A8 is required in the in the Cell A11. Write the required formula to be entered into cell A11.
* The sum of the values in the Cells A1 to A10 and B1 to B10 is required in the Cell B11. Write the required formula.
* Assume that the cell A12 also has a numerical value.
* The product of the value in Cell A12 and the value in the Cell A11 (the sum as computed above) is required in the Cell A13. Write the required formula.
* The product of the value in Cell A12 and the value in the Cell B11 (the sum as computed above) is required in the Cell B13. Write the required formula.

(5 Marks)

**Type VIII: “Reorder the Sequence” Question**

* Question is for specified marks (generally 5)
* A sequence of actions is provided.
* The specific objective that the sequence of actions is supposed to achieve is also specified.
* However, the given sequence of actions may not be the correct sequence though the individual actions are all correct.
* The actions in the given list need to be reordered into correct sequence to achieve the specified objective.
* Example:
  + Set a question of Type VIII (Reorder the Sequence), for 5 marks, from “5. Video and Animation” Unit of the syllabus.

Question: The steps involved in creating Digital Video from Analog source are listed below. But the steps may not be in the correct order. Indicate the correct sequence of steps by marking the correct step number, 1 to 5, against each step.

1. The video source is played and the analog signal is sent to the video card.
2. Digitized video is processed, using suitable tool, to add special effects.
3. A video source such as a video camera, VCR, or TV is connected to a video capture card in a computer.
4. The video file is compressed in to suitable format like MPEG4.
5. The sound from the video source is digitized using the video capture card.

(5 Marks)

**Type IX: “Compute” Question**

* Question is for specified marks (generally 5)
* Some data is given and the question is that some specific value or values based on the given data need to be computed.
* The entire question must be related to a single topic from the specified part of the syllabus.
* Example:
  + Set a question of Type IX (Compute), for 5 marks, from “3. Audio fundamentals and representation “ Unit of the syllabus

Question:

It is given that the playback frequency for CD-quality audio is 22,050 Hz.

What should be the sampling frequency according to Nyquist criterion? (2 marks)

What would be the resulting bit rate in Kbps, for a mono channel, if we assume 16-bit quantization? (1.5 marks)

What would be this value for stereo but with 8-bit quantization? (1.5 marks)

(5 Marks)

**Type X: “Complete the Program” Question**

* Question is for specified marks (generally 5)
* A program with some blanks is provided.
* The specific objective that the program is to implement is also specified.
* The blanks in the program need to be filled up appropriately to make it a correct and complete program that implements the specified objective.
* Example:
  + Set a question of Type X (Complete the Program), for 5 marks, from “6. Functions” Unit of the syllabus.

Question:

The following function is to implement Selection Sort. However, there are some blanks in the program. Fill up the blanks to make the function a complete and correct function that implements Selection Sort:

// function to implement Selection Sort

// list is an array of n integer elements

// the array list and its size n are passed as parameters

// the elements of list are sorted into ascending order

Void selectSort (int list [ ], int n)

{

int j, k, min, temp;

for (j = 0; j<n-1; j++) {

min = \_\_\_\_;

for (k = \_\_\_ ; k <n; k++)

if (list[k] \_\_\_ list[min])

min = k;

temp = list[j];

list[\_\_\_\_] = list[\_\_\_\_];

list[min] = temp;

}

}

(5 Marks)

**Type XI: “Correct Logical Errors and Complete the Program” Question**

* Question is for specified marks (generally 5)
* A program with some errors is provided. The errors should be semantic (logical) ones only.
* The number of errors is generally expected to be equal to the number of marks for which the question is being set. However, the contributor of the test item may choose to introduce more or less number of errors based on the perceived difficulty of students in locating and correcting these errors.
* The specific objective that the program is to implement is also specified.
* The errors in the program need to be corrected appropriately to make it a correct and complete program that implements the specified objective.
* Example:
  + Set a question of Type XI (Correct Logical errors and Complete the Program), for 5 marks, from “6. Functions” Unit of the syllabus.

Question:

The following function is to implement Selection Sort. However, there are some logical errors in the program. Correct the errors to make the function a complete and correct function that implements Selection Sort:

// function to implement Selection Sort

// list is an array of n integer elements

// the array list and its size n are passed as parameters

// the elements of list are sorted into ascending order

void selectSort (int list [ ], int n)

{

int j, k, min, temp;

for (j = 0; j<n-1; j++) {

min =j+1;

for (k = j+1; k <n-1; k++)

if (list[k] > list[min])

min = k;

temp = list[j-1];

list[j-1] = list[min];

list[min] = temp;

}

}

(5 Marks)

**Type XII: “Correct Syntax Errors and Complete the Program” Question**

* Question is for specified marks (generally 5)
* A program with some errors is provided. The errors should be syntactic ones only.
* The number of errors is generally expected to be double the number of marks for which the question is being set. However, the contributor of the test item may choose to introduce more or less number of errors based on the perceived difficulty of students in locating and correcting these errors.
* The specific objective that the program is to implement is also specified.
* The errors in the program need to be corrected appropriately to make it a correct and complete program that implements the specified objective.
* Example:
  + Set a question of Type XII (Correct Syntax Errors and Complete the Program), for 5 marks, from “6. Functions” Unit of the syllabus.

Question:

The following function is to implement Selection Sort. However, there are some syntax errors in the program. Correct the errors to make the function a complete and correct function that implements Selection Sort:

// function to implement Selection Sort

// list is an array of n integer elements

// the array list and its size n are passed as parameters

// the elements of list are sorted into ascending order

void selectSort (int list [ ]; int n);

{

int j, k, min, temp;

for (j = 0: j<n-1: j++) {

min =j;

for (k = j+1: k <n: k++)

if (list[k] < list[min])

min = k;

\*temp = list[j];

list[j] = list[min];

list[min] = \*temp;

}

}

return 0;

}

(5 Marks)

**Type XIII: “Modify Code” Question**

* Question is for specified marks (generally 5)
* A program or a code fragment is given along with its purpose.
* The program or code fragment needs to be modified in accordance with the given requirements
* Examples:
  + Set a question for 5 marks, of Type XIII, from “4. Conditional Statements and Loops” Unit of the syllabus.

Question:

The following code fragment counts the number of occurrences of each digit (“0” to “9” in ndigit[0] to ndigit[9]), white space characters blank, tab, newline (in integer variable nwsp), and of all other characters (in integer variable nothers):

// assume suitable declarations and initializations have already been made

While ( (c = getchar( ) ) != EOF) {

If (c >= ‘0’ && c <= ‘9’) ++ndigit [c – ‘0’];

else if (c == ‘ ‘ | | c == ‘\n’ || c == ‘\t’ ) ++nwsp;

else ++nothers;

}

Modify the above code replacing the sequence of “if … else” statements with “switch” statement and any other statements necessary. The purpose of the modified code remains same as earlier.

(5 Marks)

* + Set a question for 5 marks, of Type XIII, from “9. HTML Programming Basics” Unit of the syllabus.

Question:

The following HTML code fragment creates a part of a Table shown after the code:

<table border = “border”>

<caption> Performance </caption>

<tr>

<th> </th>

<th> Bubble Sort </th>

<th> Insertion Sort </th>

<th> Selection Sort </th>

</tr>

The appearance of the part of the table may be as follows:

Performance

|  |  |  |
| --- | --- | --- |
| Bubble Sort | Insertion Sort | Selection Sort |

Modify the above HTML code fragment so that a new row with label “Algorithm”, and another row “Time O(n\*n) O(n\*n) O(n\*n)” appear as shown below:

Performance

|  |  |  |
| --- | --- | --- |
| Algorithm | | |
| Bubble Sort | Insertion Sort | Selection Sort |
| O(n\*n)  Time | O(n\*n) | O(n\*n) |

(5 Marks)

**Type XIV: “Alternative Solutions” Question**

* Question is for specified marks (generally 5)
* A solution (a code fragment, an SQL query etc) is given along with its purpose.
* The question asks for one or more alternative solutions to achieve the same purpose.
* Examples:
  + Set a question for 5 marks, of Type XIV, from “3. Introduction to C Language” Unit of the syllabus.

Question: The values of 2 integer variables j and k can be interchanged using the following statements:

int temp;

temp = j; j = k; k = temp;

Provide two other different code fragments to achieve the same purpose.

(5 Marks)

* + Set a question for 5 marks, of Type XIV, from “5. Spreadsheet Package” Unit of the syllabus.

Question: We have numerical values in the cells A1, A2, A3, A4, B1, B2, B3, and B4.In cell A5, we type the formula shown below:

= (A1+A2+A3+A4+B1+B2+B3+B4)/8

Write 3 other different formulas to get the same result.

(5 Marks)

**Type XV: “Programming” Question**

* Question is for specified marks (generally 10)
* For a question on “C” programming, a function prototype is to be specified along with clear description of the objective of the function, the input parameters, and return type.
* Programming questions in other languages, including HTML, JavaScript etc may use any convenient format.
* Examples:
  + Set a question for 10 marks, of Type XV, from “4. Conditional Statements and Loops” and “6. Functions” Units of the syllabus.

Question:

You are given the following “C” function prototype:

Void prfb (int n)

This function accepts one integer parameter n, assumes that n is a positive, does not return any value; and prints the first n members of the following sequence:

1, 3, 4, 7, 11, 18, 29, . . .

Implement the function prfb.

(10 Marks)

* + Set a question for 10 marks, of Type XV, from “9. HTML Programming Basics” Unit of the syllabus.

Question:

Write the HTML code for creating the following layout:

|  |  |  |
| --- | --- | --- |
| **THE EURO CUP RESULTS** | | |
| **Game** | **Brazil** | **Germany** |
| 1 | 3 | 2 |
| 2 | 4 | 1 |
| 3 | 0 | 8 |
| 4 | 8 | 7 |
| 5 | 2 | 1 |

(10 Marks)

**Type XVI: “Compare” Question**

* Question is for specified marks (generally 5)
* Two or more programs, products, systems need to be compared based on the given criteria.
* Examples:
  + Set a question for 5 marks, of Type XVI, from “2. Computer Organization” Unit of the syllabus.

Question: Compare Laser Printers with Dot Matrix Printers with respect to the following criteria (for each criterion, write the type of Printer to be selected; if you reason that both are equal with respect to a criterion, write “Either”):

* Printing Speed
* Printing powerful graphics
* Printing multiple copies using carbon paper
* Printing in color
* Printing on continuous stationery

(5 Marks)

* + Set a question for 5 marks, of Type XVI, from “2. Algorithms for Problem Solving” Unit of the syllabus.

Question: Compare Insertion Sort with Merge Sort with respect to the following criteria (for each criterion, write the Sorting Algorithm preferred; if you reason that both are equal with respect to a criterion, write “Either”):

* Number of comparisons required in the worst case
* Suitability for sorting very large amount of data
* Suitability for sorting very small amount of data
* Additional memory required

(5 Marks)

**Type XVII: “Determine the output” Question**

* A complete program or a code fragment is given
* The output produced by the program / code fragment is to be determined.
* Example:
  + Set a question for 5 marks, of Type XVII, from “6. Functions” Unit of the syllabus.

Question: Write the output produced by the following program:

#include <stdio.h>

void transfer(int n, int s, int d, int t);

void main( )

{

i n t n;

n = 4;

mtn ( n ,1, 2, 3 ) ;

return;

}

void mtn ( int n, int s, int d, int t)

{

i f (n > 0) {

mtn (n-1, s, t, d);

printf(”%d---%d\n”, s, d ) ;

mtn (n-1, t, d, s);

}

return;

}

**Type XVIII: “Draw the Block Diagram” Question**

* Question is for specified marks (generally 5)
* A block diagram / schematic diagram is to be drawn to represent the specified system.
  + Example: Set a question of Type XVIII (Draw the Block Diagram), for 5 marks, from “2. Basic Computer Organization” Unit of the syllabus.

Question: Draw a block diagram to represent the basic organization of a computer system. (5 Marks)

**Type XIX: “Draw the Flow Chart” Question**

* Question is for specified marks (generally 5)
* A flow chart is to be drawn to solve the given problem.
  + Example: Set a question of Type XIX (Draw the Flow Chart), for 5 marks, from “2. Algorithms for Problem Solving” Unit of the syllabus.

Question: Draw a flow chart representing an algorithm to reverse the digits of a given integer.

(5 Marks)

**Type XX: “Correct and Complete the Block Diagram” Question**

* Question is for specified marks (generally 5)
* A block diagram / schematic diagram with some errors and / or incomplete information is given.
* The specific system that the diagram is supposed to represent is also specified.
* The errors in the diagram could be wrong labels, incorrect text in the blocks, incorrect arrows connecting the blocks etc. Incompleteness could mean that the label for a block is missing, or a connecting arrow between two blocks is missing etc.
* The errors in the diagram need to be corrected appropriately and any incomplete information has to be completed to make it a correct and complete diagram that represents the specified system.
* Example:
  + Set a question of Type XX (Correct and Complete the Block Diagram), for 5 marks, from “2. Basic Computer Organization” Unit of the syllabus.

Question: The figure shown below is supposed to be the block diagram showing the basic organization of a computer system. There are five errors in the block diagram. Correct them.

(5 Marks)

Primary

Storage

Secondary

Storage

Control

Unit

Arithmetic

Logic Unit

Output

Unit

Input Unit

Information

(Results)

Program &

Data

Central Processing Unit (CPU)

data flow

control

**Type XXI: “Correct and Complete the Flow Chart” Question**

* Question is for specified marks (generally 5)
* A flow chart with some errors and / or incomplete information is given.
* The specific objective that the flow chart is supposed to achieve is also specified.
* The errors in the flow chart could be wrong kind of flow chart symbols, wrong labels on the edges etc. Incompleteness could mean that the label for a block is missing, or a connecting arrow between two blocks is missing etc.
* The errors in the flow chart need to be corrected appropriately any incomplete information has to be completed to make it a correct and complete flow chart that achieves the specified objective.
* Example:
  + Set a question of Type XXI (Correct and Complete the Flow Chart), for 5 marks, from “2. Algorithms for Problem Solving”.

Example:

You are to input a number N (assumed to be greater than 2) and then generate and print all the numbers which are less than or equal to N from the sequence 2, 3, 5, 8, 13, 21, 34, …. Further, you are supposed to count and print the number of odd numbers in the generated sequence of numbers. An algorithm to achieve this is represented by the following flow chart. However there are 5 errors in the flow chart. Some flow chart symbols may have been used wrongly and also there may be some logical errors. Correct all these errors so that the flow chart represents correct solution to the given problem.

Start

YES

NO

YES

NO

Input N

Print Count

STOP

Print F3

F2 = F3 F1 = F2

Count = Count+1

Is (F3 %2) =1?

Is F3 < N

F3 = F1 + F2

Print F1 Print F2

F1 = 2 F2 = 3 Count = 1