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MMT–001

M. Sc. (MATHEMATICS WITH APPLICATIONS IN COMPUTER SCIENCE) [M. Sc. (MACS)]

Term-End Examination

December, 2023

MMT-001 : PROGRAMMING AND DATA STRUCTURES

Time : $1\frac{1}{2}$ *Hours* *Maximum Marks : 25*

(Weightage : 20%)

Note : *Question No.* ***1*** *is compulsory. Answer any* ***three*** *questions from Q. Nos.* ***2*** *to* ***5****. All programs should be written in 'C' language only. Use of calculator is* ***not*** *permitted.*

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1. Write the output of the following segments of code. Justify your answers with short explanations : 2×5=10

   (i)
```
int main()
{ int a = 0;
  a = 4 + 4/2 * 5 + 20;
  printf("%d", a);
  return 0;
}
```

(ii)
```
int main()
 { int a = 10, b, c;
    b = a++;
    c = ++a;
    printf("%d %d %d", a, b, c);
    return 0;
}
```

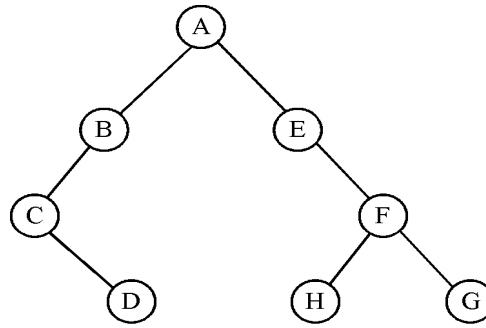
(iii)
```
int main()
  { int a;
     switch(a)
       {
         printf("OH...");
       }
     printf("GOD");
}
```

(iv)
```
void show();
int main()
{ show();
    printf("BREAD");
    return 0;
}
void show()
{
   printf("Butter");
}
```

(v)
```
struct book
  { char * author;
    char * title;
    int pages;
}mybook = {"ANSI C", "Kernighan & Ritchie", 288};
int main()
{  printf("Book Info \n");
   printf("Title : %s\n", mybook.title);
   printf("Author : %s\n", mybook.author);
   printf(" Pages : %d\n", mybook.pages);
   return 0;
}
```

2. (a) Give *two* differences between Functions and Macros in 'C' language. 2

(b) Provide inorder, preorder and postorder traversal of the binary tree given below : 3



3. (a) Define a node for a doubly linked list of integers using pointer implementation. Also, write a function that prints the *n*th node of this list. 3

(b) Define the term 'Binary Search Tree' (BST). List the operations that can be performed on BST. 2

4. (a) Write function in 'C' to demonstrate PUSH and POP operations of stack. 2

(b) Explain the following with suitable example code in 'C' : 3

(i) L value and R value

(ii) Break and Continue

5. (a) Write the definition of the following function in C : 3

$$f(x) = \begin{cases} x^2 , & \text{if } x = 2 \\ \dfrac{x^2 - 4}{x - 2}, & \text{elsewhere} \end{cases}.$$

(b) Explain the use of the enum data type, with an example. 2