Final Assessment

Duration: 3 Hour **Time:** 10:00 AM – 01:00 PM

Total Marks: 40

Note: *MCQ may have multiple answers. In such case, you have to write all the correct choices. Otherwise, mark will not be awarded for that question.*

1. a) As we move down the memory hierarchy from Registers to Magnetic Tape, will the cost per bit "increase" or "decrease"? State the reason. ***(2 M → CO1)***

   b) Write the name of the architecture which is commonly being used by the majority of the systems. ***(1 M → CO5)***

   c) Draw a sample NFA which accepts the input string: ***aaabbacd*** ***(4 M → CO1)***
   *[**Hint:** Use lesser number of states]*

   d) Write any two sample outputs of the following regular expression: ***c (a* ∪ b*) d***
   (2 M → CO2)

2. a) What is the output of the following statement? State the reason.
   (1 M + 1 M → CO1)

```
int a = 15, b= 10;
sum = (a > b)?: 0:  ;
printf("%d", sum);
```

   (a) 0 (b) 5 (c) 10 (d) Error

   b) What is the output of the following statement, if short-circuit evaluation is not supported by the programming language? State the reason. ***(1 M + 1 M → CO2)***

```
int list [] = {0, 1, 2, 3, 4, 5};
int index = 0, key = 15;
while(index < len(list) && list[index] != key)
{
  index = index + 1;
}
printf("%d", index);
```

   0+1 = 1<6
   1+1 = 2<6
   2+1 = 3<6
   3+1 = 4<6
   4+1 = 5<6
   5+1 = 6<6

   (a) 5 (b) 6 (c) 4 (d) Error

c) Draw the complete descriptor, case and discriminated union tables for the following datatype. *(Consider the tag as Integer datatype).* *(4 M → CO4)*

```
union
{
   int a;
   float b;
   char c;
}
```

3. a) What is the output of the following statement in C-Programming? State the reason. *(1 M + 1 M → CO3)*

```
printf();
```

(a) Prints Nothing (b) NULL (c) "" (d) Error

b) What is the value of "a" and "b" in subtract() when: (i) Shallow Binding; (ii) Deep Binding; and (iii) Ad hoc Binding techniques; is used? *(2 M + 2 M + 2 M → CO3)*

```
void addition()
{
   int a = 5, b = 6, c = 6, add;
   add = b + c;
   int subtract()
   {
     return (a - b);
   }
   int multiply()
   {
     int a, b;
     a = 3, b = 6;
     return (a * b);
   }
   int division(subtract)
   {
     int a = 4, b = 5;
     return subtract();
   }
   division(subtract);
}
```

4. a) (i) What is the name of the technique that is used by the compiler to identify which option to choose from the following grammar for statement A. *(1 M + 2 M → CO2)*

$A \rightarrow aB \mid bB \mid dB \mid B$

$B \rightarrow a \mid f$

(ii) Check whether the rule A will pass the corresponding test or not. State the reason?

b) For the following program: *(4 M + 1 M → CO4)*

(i) Draw the Activation Record Instance.

(ii) Write the output of the program.

```
void main()
{
  int a = 5, b = 10, c = 15, d = 0;
  do
  {
   if (a == 5)
   {
     int x = 0;
     a = a – 1;
   }
   for(int f = 0; f <= a; f++)
   {
     printf("%d\t", f);
   }
  } while(d != 0);
  while(b == 10)
  {
    int k =5;
    printf("%d", k);
    b = b – 1;
  }
}
```

5. a) Consider that a program has 2 classes namely "A" and "B'. Class B is a subtype of Class A. Also, Class A and class B has 1 variable each namely "x" and "y" respectively. Suppose, you create an object b1 of type class A and b2 of type class B in stack memory. What will happen if you execute the following statement: **b2 = b1** *(2 M → CO5)*

(a) Value of "x" in b2 is alone copied to "x" in b1

(b) Both "x" and "y" values of b2 will be copied to b1

(c) Throws error

(d) None of the above

b) Write the output of the following codes: *(4 M → CO5)*

(i) (CDR '(A B C))

(ii) (CAR '((A B) C D))

(iii) (QUOTE (A B C))

(iv) (CDR '())

c) Headed horn clause in prolog language is called as _____ statement. *(1 M → CO5)*