SLIIT
ACADEMY

Higher Diploma
in
Information Technology

Midterm Examination
Year 2, Semester 1 (2019)
January Intake

Design & Analysis of Algorithms (IT1205)

Duration: 1 Hour

Instructions to Candidates:

- This is a closed book examination.
- This paper contains 2 questions on 1 page without the cover page.
- Answer all questions in the WORKBOOK provided.
- Read all questions before answering.
- The total marks obtainable for this examination is 20.

QUESTION ONE (10 marks)

I. Explain two algorithm design methods. (02 marks)

II. State two advantages of using asymptotic notations when analyzing an algorithm for time complexity? (02 marks)

III. What is the best case & worst case running time for an insertion sort algorithm given below? Justify your answer. (06 marks)

```
INSERTION-SORT(A)
1 for j ←2 to length[A]
2   do key ← A[j]
3      ◁ Insert A[j] into the sorted sequence A[1..j-1]
4      i ← j - 1
5      While i > 0 and A[i] > key
6           do  A[i+1] ← A[i]
7               i ←i-1
8      A[i+1] ← key
```

QUESTION TWO (10 marks)

I. What is a recursion equation of a recursive function? (01 mark)

II. Solve the following recurrence equation using repeated substitution method. (03 marks)

a. $T(n) = T(n-1) + cn\,;\; T(1) = d$

III. Solve the following recurrence equation using recursion tree method. (03 marks)

a. $T(n) = 2T\left(\frac{n}{2}\right) + cn\,;\; T(1) = d$

IV. Solve the following recurrence equation using master method. (03 marks)

a. $T(n) = T\left(\frac{3n}{2}\right) + cn$

End of the Question Paper