[All Rights Reserved]

SLIATE

**SLIATE**

###### SRI LANKA INSTITUTE OF ADVANCED TECHNOLOGICAL EDUCATION

(Established in the Ministry of Higher Education, vide in Act No. 29 of 1995)

**Higher National Diploma in Information Technology**

**First Year, First Semester Examination – 2018**

**HNDIT 1107 – Mathematics for IT**

Instructions for Candidates: No. of questions : 05  
**Answer four (04) questions only.**  No. of pages : 03  
**All questions carry equal marks.**  Time : Two (02) hours

**01.**

1. Define the following terms and give an example for each of them.
2. Set
3. Finite set
4. Cardinality of a set
5. Complement of a set (08 Marks)
6. State whether each statement given below is true or false, if false correct it.
7. The empty set is a subset of every set.
8. A′ ∩ B′ = (A ∩ B) ′
9. If set F = {1, 2, 3} and set G = {2, 3, 1} then F ⊂ G.
10. If T and L are two disjoint sets, n(T ∪ L) = n(T) + n(L). (08 Marks)
11. Let U = {1, 2, 3, …., 20}

A = { *x : x* ∈***N****,* 3 < *x* < 12 }

B = { *x : x* ∈***N****,* *x* is even, *x <15* }

C = { *x : x* ∈***N*** *,* 4 *- x =* 3}

Find elements :

1. (02 Marks)
2. (02 Marks)
3. (02 Marks)
4. (03 Marks)

**(Total 25 Marks)**

**02.**

1. There were 100 students in the library who responded to how they completed their research paper.

18 students only used the periodicals

29 students used the web and books

15 students used books, the web, and periodicals

40 students used books and periodicals

20 used the web and periodicals

60 students used books

7 students did not use the web, nor books, nor the periodicals.

1. Represent the above information with a Venn diagram. (05 Marks)
2. How many students used the web in their research? (02 Marks)
3. How many students used books and periodicals? (02 Marks)
4. Let A = {1, 2, 3, 4} and B = {5, 7, 9}. Determine
5. Is A B B A ? (03 Marks)
6. Is n (A B) n (B A)? (03 Marks)

1. Write the dual of each set equation:
2. (04 Marks)
3. Prove the following using laws of algebra of sets.(mentioning laws)

(A ∩ B) ∪ (A ∪ Bc )c = B (06 Marks)

**(Total 25 Marks)**

**03.**

1. Let R be the following relation on A = {p, q, r, s}.

R = {(p, p), (r, s), (s, q), (p, r), (r, q)}

Find:

* 1. Domain of R. (01 Mark)
  2. R-1 (02 Marks)
  3. Matrix representation MR of R (02 Marks)
  4. The composition relation RoR using the above MR. (04 Marks)

1. Consider the following relations on the set A = {1, 2, 3}.

R = {(1, 1), (1, 2), (1, 3), (3, 3)}

S = {(1, 1), (1, 2), (2, 1), (2, 2), (3, 3)}

Determine whether or not each of the above relations on A is

1. reflexive
2. symmetric
3. transitive (06 Marks)
4. Determine whether each set of ordered pairs is a function from A into B. If it is not a function give reasons.
5. (a,2),(b,3),(c,2),(d,3) Given A a ,b, c ,d, B 2,3
6. (1,1),(1,2),(2,3),(3,4) Given A 1,2, 3, B 1,2,3,4
7. Marks)

(iv). Let f(x) = 2x+1 and g(x) =x2-2.

Find the formula defining the composition functions: gof(x) and fog(x).

(06 Marks)

**(Total 25 Marks)**

**04.**

1. Define the following matrices with examples:
   1. Diagonal matrix
   2. Symmetric matrix
   3. Lower triangular matrix (06 Marks)
2. Let A = B = D =

Calculate (if possible)

1. AB (02 Marks)
2. (DB)T (03 Marks)
3. BA + DT (04 Marks)
4. BTDT (04 Marks)

Find the value of ***a*** and the value of ***b***. (06 Marks)

**(Total 25 Marks)**

**05.**

1. State three (03) applications of matrices. (03 Marks)
2. If A =

Find:

1. adjoint of A (04 Marks)
2. determinant of A (04 Marks)
3. A-1 using adjoint matrix of A (04 Marks)
4. Use Cramer’s rule to find values for x, y and z in the following system of linear equations:

-2x – y – 3z = 3

2x – 3y + z = -13

2x – 3z = -11 (10 Marks)

**(Total 25 Marks)**