EXAMINATION PAPER

FACULTY	**:**	**COMPUTER SCIENCE AND MULTIMEDIA**		
COURSE	**:**	**BACHELOR (HONS) OF INFORMATION TECHNOLOGY**		
YEAR/ SEMESTER	**:**	**FIRST YEAR / SEMESTER ONE**		
MODULE TITLE	**:**	**DISCRETE MATHEMATICS**		
CODE	**:**	**BIT 114**		
DATE	**:**	**APRIL 13-2018, FRIDAY**		
TIME ALLOWED	**:**	**3 HOURS**		
START	**:**	**1:00 PM**	**FINISH**	**: 4:00 PM**

Instruction to candidates

1. This question paper has THREE (3) Sections.
2. Answer **ALL** questions in Section A, MCQ.
3. Answer **5** questions in Section B, MSAQ.
4. Answer **2** questions in Section C, MEQ.
5. No scripts or answer sheets are to be taken out of the Examination Hall.
6. For Section A, answer in the OMR form provided.

Do not open this question paper until instructed

SECTION A

Multiple Choice Questions **(30*1=30)**

1. **If we have 'n' variables, then the truth table have _____rows.**
   a. 4
   b. 16
   c. 2^n
   d. 2^{n-1}

2. **Set of first element of ordered pair forming a relation is called its_____.**
   a. range
   b. domain
   c. Relation in A
   d. relation in B

3. **Variables that are not constrained in any way are called _____.**
   a. free variables
   b. bounded variables
   c. universal variables
   d. Instantaneous variables

4. **Every even integer is also_____.**
   a. natural number
   b. irrational number
   c. rational number
   d. whole number

5. **A tree with no vertices is:**
   a. null tree or empty tree
   b. complete tree
   c. binary search tree
   d. AVL tree

6. **Union of two sets A and B is**
   a. $A = B$
   b. $A \neq B$
   c. $A \cup B$
   d. $A \cap B$

7. **The smallest positive integer in the graph is called_____.**
   a. chromatic number
   b. indegree
   c. outdegree
   d. incidence matrix

8. **A walk is called a *path* if it has_____.**
   a. no repeated vertices or edges
   b. repeated vertices or edges
   c. repeated vertices but non repeated edges
   d. non repeated vertices but repeated edges

9. **Solve equation and find the values of X if $x^2 + 3x=0$**
   a. x = -3
   b. x = 0, x = -3
   c. x = 3
   d. x = 0, x = 3

10. **Expand and simplify (x - y) (x + y).**
   a. $x^2 - 2xy + y^2$
   b. $x^2 + 2xy + y^2$
   c. $x^2 - y^2$
   d. $x^2 + y^2$

11. **Which of the following can only be used in disproving the statements?**
   a. Direct proof
   b. Contra positive proofs
   c. Counter Example
   d. Mathematical Induction

12. **The collection of _____ is called graph.**
   a. row and columns
   b. vertices and edges
   c. equations
   d. none of these

13. Which of the following statements is the negation of the statements "4 is odd or -9 is positive"?

a. 4 is even or -9 is not negative
b. 4 is odd or -9 is not negative
c. 4 is even and -9 is negative
d. 4 is odd and -9 is not negative

14. Which of the following starts and ends at the same vertex?

a. closed walk
b. circular walk
c. cycle
d. Tree

15. Which of the following is true if P(X) denotes "X>5" and U be the integers?

a. P(8)
b. P(3)
c. P(4)
d. None of the above

16. A theorem used to prove other theorems is known as:

a. Lemma
b. Corollary
c. Conjecture
d. None of the mentioned

17. Which of the following is not a type of graph?

a. Euler
b. Hamiltonian
c. Tree
d. Path

18. _____ is known as a greedy algorithm.

a. Kruskal's algorithm
b. Prim's algorithm
c. Dijkstra algorithm
d. Bellman ford algorithm

19. Every node N in a binary tree T except the root has a unique parent called the _____of N.

a. Antecedents
b. Predecessor
c. Forerunner
d. Precursor

20. Suppose that a connected planar graph has 30 edges. If a planar representation of this graph divides the plane into 20 regions. Then numbers of vertices are:

a. 10
b. 8
c. 12
d. 14

21. A graph with n vertices that has an edge between each pair of vertices is called:

a. Complete
b. Cycle
c. Simple
d. Multi

22. The degree of any vertex of graph is _____.

a. the number of edges incident with vertex
b. number of vertex in a graph
c. number of vertices adjacent to that vertex
d. number of edges in a graph

23. Which of following is a solution to the recurrence relation?
$a_n=6a_{n-1}-9a_{n-2}$ with $a_0=0$ and $a_1=2$

a. $a_n=A3^n+B3^n$
b. $a_n=A3^n+B(-3)^n$
c. $a_n=A(-3)^n+B(-3)^n$
d. none of above

24. A vertex with no children is called_____.

a. leaf
b. external
c. non leaf
d. internal

25. The Four Color Theorem states_____.

a. the chromatic number of a planar graph is no greater than four
b. the chromatic number of a planar graph is no less than four
c. the chromatic number of a planar graph is exactly four
d. the chromatic number of a planar graph is four

26. The operator's ∧, ∨, and ¬are called_____.

a. logical operators
b. logical operands
c. logical connectives
d. Quantifiers

27. A Hamilton circuit is_____.

a. a cycle that passes through all the vertices of a graph
b. the shortest cycle through all vertices of a graph
c. a cycle that passes through all the vertices of a graph exactly once
d. none of above

28. The children of a same parent node are_____.

a. siblings
b. adjacent nodes
c. leaf nodes
d. non leaf nodes

29. The graph connected to a cyclic graph is called_____.

a. cyclic graph
b. regular graph
c. tree
d. not a graph

30. What is an Euler circuit in a graph G?

a. A simple circuit containing every edge of G
b. A simple circuit containing every vertex of G
c. A multi graph containing every vertex of G
d. A multi graph containing every edge of G

SECTION B
Short Answer Questions
Attempt any five (5) questions out of eight (8) questions (5*6=30)

1. Prove 1+4+7+10+ …… (3n-2)=n/2 (3n-1) using mathematical induction.

2.

a. Let p : 5 is rational and q : 15 is a prime number. Is it a conjunction? (2)

b. Write the conjunctions for the statements. (2)

P : Morgan eats mango.

q : john eats apple.

c. Find the truth value for the following. (2)

A : 18+1 = 19

B : 180+1 =1801

3. Define Trivial and Vacuous Proof. Explain with one example of each. (3+3)

4. Explain predicates and Quantifiers with one examples of each. (3+3)

5. Solve the recurrence relation an=an−1+n with initial term a0=4.

6. Define fallacy. Explain different forms of fallacy. (1+5)

7. Draw the directed and undirected graph respectively. Also explain both the graph in short. (2+4)

8. Define Quantified statement. Describe the rules of inference for quantified statements. (1+5)

SECTION C
Long Answer Questions
Attempt any two (2) questions out of three (3) questions (2*20=40)

1. Define linear homogeneous recurrence with the example. What is the solution of the recurrence relation for the following? (4+4+4+4+4)

I. $a_n = a_{n-1} + 2a_{n-2} + 3a_{n-3}$ with initial conditions $a_0 = 1$, $a_1 = 6$ and $a_2 = 10$.

II. $a_n = a_{n-1} + 2a_{n-2}$ with $a_0=2$ and $a_1=7$.

III. $a_n = 4a_{n-1} - 3a_{n-2}$ *with* $a_1 = 0$ *and* $a_2 = 12$

IV. an=an−1+an−2an=an−1+an−2 with a0=0 and a1=1

2.

a. Prove the following (3*5=15)

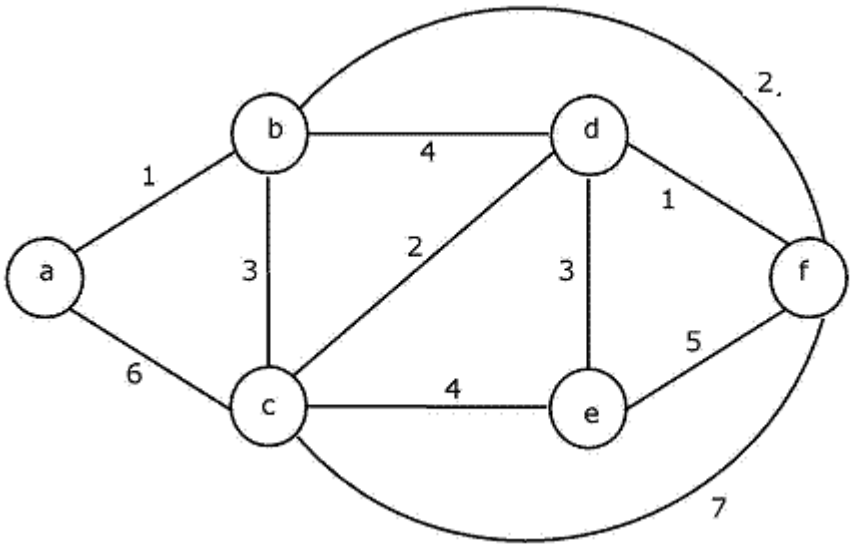
I.	[(A→B)∧A]→B	is a tautology.
II.	(A∨B)∧[(¬A)∧(¬B)]	is a contradiction.
III.	(A∨B)∧(¬A)	is a contingency.

b. Explain any five connectives of propositional logic with truth tables. (5)

3.

a. Explain first and Second Principal of Mathematical Induction. (6)

b. Define minimum spanning tree. Explain the two classical algorithms for computing MST? Using Prim's Algorithm, find MST for following (2+6+6=14)



*******BEST OF LUCK******