BACHELOR OF COMPUTER APPLICATION
SECOND SEMESTER
DISCRETE MATHEMATICS
BCA-203

[PART-A : Objective]

Choose the correct answer from the following: 1X20=20

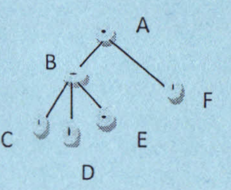
1. If p and q are any two propositions, then $p \vee q$ is called
   a. Conjunction
   b. Disjunction
   c. Negation
   d. None of these

2. If the truth value of a proposition p is T, then the truth value of $\sim(\sim p)$ is
   a. T
   b. F
   c. Cannot be determined
   d. None of these

3. If a vertex v of a rooted tree has no children then it is called
   a. Leaf
   b. depth of v
   c. descendent of v
   d. none of these

4. The degree of a vertex of a complete graph K_m is
   a. m
   b. $m-1$
   c. $m+1$
   d. $m+2$

5. The height of A of the following rooted tree is



   a. 0
   b. 1
   c. 2
   d. 3

6. A cyclic group is always
   a. Abelian
   b. Non abelian
   c. Non commutative
   d. None of these

7. The truth value of $p \wedge q$, when p is false and q is true is
   a. T
   b. F
   c. Cannot be determined
   d. None of these

8. If A and B are any two sets, then the set of elements that belong to A but not belong to B is called
   a. Union of A and B
   b. Intersection of A and B
   c. Difference of A and B
   d. None of these

9. The number of permutations of n objects including n_1 identical objects of type1, n_2 identical objects of type2 and n_3 identical objects of type3 is equal to
   a. $\frac{n!}{n_1!}$
   b. $\frac{n!}{n_2!}$
   c. $\frac{n!}{n_3!}$
   d. $\frac{n!}{n_1!n_2!n_3!}$

10. Let A={0,1,2,3} and let R_1={(0,0), (1,1),(2,2),(3,3)} , R_2={(0,0), (1,1), (2,2), (3,3), (1,2),(2,1)}.
    Which Of the above relation is /are equivalence relations?
    a. Only R_1
    b. Only R_2
    c. Both R_1 and R_2
    d. Neither R_1 nor R_2

11. The recurrence relation of the sequence {4, 12, 36,108,……} is
    a. $a_{n+1} = 3a_n$
    b. $a_{n+1} = 2a_n$
    c. $a_{n+1} = 5a_n$
    d. $a_{n+1} = 4a_n$

12. If $(R,+,.)$ is aring, then for any $a,b,c \in R$, which of the following is false

a. $a.(b-c) = a.b - a.c$

b. $(-a)(-b) = ab$

c. $(a-b).c = a.c - a.b$

d. $a.(-b) = -(ab)$

13. The dual form of $p \vee \sim p \equiv T$ is

a. $p \wedge \sim p \equiv F$ b. $p \wedge \sim p \equiv T$

c. $p \vee \sim p \equiv F$ d. None of these

14. The number of lines of a complete bipartite graph $K_{m,n}$ is

a. $m+n$ b. mn

c. m/n d. n/m

15. The set of natural numbers with the binary operation addition is a

a. Semi group b. Group

c. Abelian group d. None of the above

16. The least and greatest element of the Poset ({1, 2, 4, 8, 16}, |), where '|' means divisor of, are respectively

a. 1, 4

b. 2, 8

c. 1, 16

d. 4, 16

17. If the repetition is not allowed, then how many numbers from the six digits 1, 2, 3, 5, 7, 8 are less than 4000?

a. 120 b. 360 c. 480 d. 60

18. The length of any shortest cycle in a graph is called ________.

a. distance b. diameter

c. girth d. circumference

19. If q is the number of edges and v_i's are the vertices of a graph G, then Choose the correct answer.

a. $q = \frac{1}{2}\sum degv_i$ b. $q = 2\sum degv_i$

c. $q = \sum degv_i$ d. $q = 3\sum degv_i$

20. If $f: A \rightarrow B$ and $g: B \rightarrow C$, then the domain of the function gof is ______.

a. A b. B c. C d. None of these

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UNIVERSITY OF SCIENCE & TECHNOLOGY, MEGHALAYA

Question Paper CUM Answer Sheet

[PART (A) : OBJECTIVE]

Serial no. of the main Answer sheet

Course : ....

Semester : .... Roll No : ....

Enrollment No : .... Course code : ....

Course Title : ....

Session : 2016-17 Date : ....

Instructions / Guidelines

- The paper contains twenty (20) / ten (10) questions.
- The student shall write the answer in the box where it is provided.
- The student shall not overwrite / erase any answer and no mark shall be given for such act.
- Hand over the question paper cum answer sheet (Objective) within the allotted time (20 minutes / 10 minutes) to the invigilator.

Full Marks	Marks Obtained	Remarks
20		

Scrutinizer's Signature *Examiner's Signature* *Invigilator's Signature*

2017/06

BACHELOR OF COMPUTER APPLICATION
SECOND SEMESTER
DISCRETE MATHEMATICS
BCA-203

Duration: 3 Hrs. **Marks: 70**

$\left\{\begin{array}{l}\textbf{Part : A (Objective)} = 20 \\ \textbf{Part : B (Descriptive)} = 50\end{array}\right\}$

[PART-B : Descriptive]

Duration: 2 Hrs. 40 Mins. **Marks: 50**

[Answer question no. One (1) & any four (4) from the rest]

1. Define conditional and bi conditional proposition. Construct the truth table for both the conditional and bi conditional propositions. 2+2+3+3=10

2. Prove by mathematical induction that 5+5=10

(i) $1^2 + 2^2 + 3^2 + \cdots \ldots + (2n-1)^2 = \frac{1}{3}n(2n-1)(2n+1)$

(ii) $n^3 + 2n$ is divisible by 3, for $n \geq 1$.

3. (a) State and prove the Handshaking theorem for an undirected graph. 2+2+3+3=10

(b) For each of the following degree sequences, find if there exist a graph. In each case, either draw a graph or explain why no graph exist.

(i) 4, 4, 4, 3, 2 (ii) 3, 3, 3, 3, 2

4. (a) Define subgroup. Prove that the necessary and sufficient condition for a non empty subset H of a group (G, .) to be a subgroup is 2+5+3=10

$a, b \in H \Rightarrow ab^{-1} \in H.$

(b)The union of two subgroups may not be a subgroup. Justify with an example.

5. From a club consisting of 6 men and 7 women, in how many ways can we select a committee of 2+2+2++2+2 =10

(a) 3 men and 4 women?

(b) 4 persons which has at least one woman?

(c) 4 persons that has at most one man?

(d) 4 persons that has both men and women?

(e) 4 persons so that two specific members are not included?

6. (a) Define a Poset and give an example. What is maximal and minimal elements of a poset? 3+2+5=10

(b) Find the maximal and minimal elements of the posets given in the following Hasse diagrams

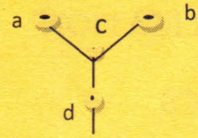

Fig.1

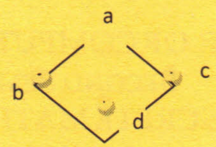

Fig.2

7. (a) Define a full binary tree and give an example. 4+6=10

(b) The number n of vertices of a full binary tree is odd and the number of pendant vertices (leaves) of the tree is equal to $(n+1)/2$.

8. (a) Define inverse of a function. Prove that a function $f: A \to B$ is invertible if and only if it is one one and onto. 2+3+2+3=10

(b) Define composition of functions. If $f: A \to B$ and $g: B \to C$ are one one and onto functions, then show that fog is also an one one and onto function.

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