



Register Number:

Date:

11-01-2020

ST. JOSEPH'S COLLEGE (AUTONOMOUS), BANGALORE – 27  
BCA (DATA ANALYTICS) – I SEMESTER  
SEMESTER EXAMINATION – JANUARY 2021  
BCADA1220: DISCRETE MATHEMATICS AND ITS APPLICATIONS

THIS QUESTION PAPER CONTAINS 3 PRINTED PAGE AND THREE PARTS

STUDENTS ARE ALLOWED TO USE SCIENTIFIC CALCULATORS

Time: 2 1/2 hrs.

Maximum marks: 7X10=70

PART A

Answer All Questions

20 X 1 = 20

- Statement: Is the moon round is what  
a.) proposition b.) not a proposition c.) potential proposition d.) none
- An expression which always has a truth value is called  
a.) conjunction b.) disjunction c.) contingency d.) tautology
- To multiply identical bases, \_\_\_\_\_ the exponents  
a.) subtract b.) multiply c.) divide d.) multiply and divide
- $(5^{10} \cdot 5^8) / 5^{20}$  is given by  
a.) 2/5 b.) 1/5 c.) 1/25 d.) 1/65
- $\cos 45^\circ$  is given by  
a.) 1.732 b.) 1.414 c.)  $1/\sqrt{2}$  d.)  $\sqrt{3}/2$
- Log of a negative number are  
a.) infinity b.) fraction c.) defined d.) undefined
- Implication is also called as  
a.) hypothesis b.) conclusion c.) conditional statement d.) all the above stated
- Evaluate:  $(0.00032)^{3/5}$   
a.) 25 b.) 5 c.) 1/125 d.) 1/225
- A ladder leaning against the wall makes a angle of 60 degree with the ground. If the length of the ladder is 19m, find the distance of the foot of the ladder from the wall.  
a.) 8m b.) 15m c.) 9.5m d.) 13m
- $\int x^2 dx$  with limits 2 to 3  
a.) 9/3 b.) 16/3 c.) 91/3 d.) 19/3
- Derivative of  $14 - 10t$  is given by

- a.) 14 b.) 10 c.) -10 d.) -14
12. General word for maxima or minima is  
a.) maximum b.) minimum c.) extremum d.) derivative
13.  $P \rightarrow Q$  is called  
a.) conjugation b.) modus ponens c.) quantifiers d.) implication
14. A \_\_\_\_\_ is an ordered collection of objects.  
a) Relation b) Function c) Set d) Proposition
15. What is the Cartesian product of  $A = \{1, 2\}$  and  $B = \{a, b\}$ ?  
a)  $\{(1, a), (1, b), (2, a), (2, b)\}$  b)  $\{(1, 1), (2, 2), (a, a), (b, b)\}$   
c)  $\{(1, a), (2, a), (1, b), (2, b)\}$  d)  $\{(1, 1), (a, a), (2, a), (1, b)\}$
16. The Cartesian Product  $B \times A$  is equal to the Cartesian product  $A \times B$ .  
a) True  
b) False
17. The function  $f : \mathbb{R} \rightarrow \mathbb{R}$  defined by  $f(x) = 3 - 4x$  is  
(a) Onto (b) Not onto (c) None one-one (d) None of these
18. The function  $f : \mathbb{A} \rightarrow \mathbb{B}$  defined by  $f(x) = 4x + 7, x \in \mathbb{R}$  is  
(a) one-one (b) Many-one (c) Odd (d) Even
19. Given set  $A = \{1, 2, 3\}$  and a relation  $R = \{(1, 2), (2, 1)\}$ , the relation  $R$  will be  
(a) reflexive if  $(1, 1)$  is added (b) symmetric if  $(2, 3)$  is added  
(c) transitive if  $(1, 1)$  is added (d) symmetric if  $(3, 2)$  is added
20. Given a function  $f$  as  $f(x) = 5x + 4, x \in \mathbb{R}$ . If  $g : \mathbb{R} \rightarrow \mathbb{R}$  is inverse of function  $f$  then  
(a)  $g(x) = 4x + 5$  (b)  $g(x) = 5/(4x-5)$  (c)  $g(x) = (x-4)/5$  (d)  $g(x) = 5x - 4$

## PART B

**Answer Any Four Questions**

**4 X 5 = 20**

21.) A ball is thrown in the air. Its height at any time  $t$  is given by

$$h = 3 + 14t - 5t^2$$

What is the maximum height?

22.) Find the maxima and minima for the following function with suitable graphs

$$y = 5x^3 + 2x^2 - 3x$$

23.) Explain the conditions of a function to be continuous with suitable

example.

24.) If  $2^x(x-1) + 2^x(x+1) = 1280$ , then find the value of  $x$ .

25.) Let  $A$  and  $B$  be two finite sets such that  $n(A) = 20, n(B) = 28$  and  $n(A \cup B) = 36$ ,

find  $n(A \cap B)$ .

26.) Determine whether the following ordered pairs of numbers is a function.

$$R = (1,1); (2,2); (3,1); (4,2); (5,1); (6,7)$$

### PART C

Answer Any Three Questions

3 X 10 = 30

27.) There are two temples, one on each bank of a river, just opposite to each other. One temple is 54m high. From the top of this temple, the angle of depression of the top and the foot of the other temple are  $30^\circ$  and  $60^\circ$  respectively. Find the width of the river and the height of the other temple.

28.) Explain the following terms:

- a.) Modus Ponens
- b.) Hypothetical Syllogism
- c.) Disjunctive Syllogism
- d.) Modus Tollens
- e.) Tautology

29.) Integrate  $\sqrt{x^5} dx$

Integrate  $(3-4x)^6 dx$

30.) In a class of 100 students, 35 like science and 45 like math. 10 like both. How many like either of them and how many like neither?

BCADA1220\_A -2