



UNIVERSITY OF THE PUNJAB

Third Semester – 2019

Examination: B.S. 4 Years Program

Roll No. in Fig.

Roll No. in Words.

PAPER: Discrete Mathematics (IT)

MAX. TIME: 30 Min.

Course Code: MATH-231/IT-21404 Part-I (Compulsory)

MAX. MARKS: 10

Signature of Supdt.:

Attempt this Paper on this Question Sheet only.

Please encircle the correct option. Division of marks is given in front of each question.

This Paper will be collected back after expiry of time limit mentioned above.

Q.1. Encircle the right answer, cutting and overwriting is not allowed. (1x10=10)

1. The negation of the conditional statement $p \rightarrow q$ is
a. $\neg p \rightarrow q$ b. $p \wedge \neg q$ c. $q \rightarrow p$ d. $\neg q \rightarrow \neg p$
2. If $A = \{1, 2, 3\}$, then the number of elements in $P(A) = \dots$
a. 2^4 b. 2^3 c. 2^6 d. 2^7
3. Consider the relation $\{(1,3), (1,4), (2,3), (2,4), (3,1), (3,4)\}$ on set $A = \{1, 2, 3, 4\}$ is a. . a. Symmetric b. Reflexive c. Transitive d. Irreflexive
4. The 8th term of the following geometric sequence
4, 12, 36, 108, ...
a. 8748 b. 8768 c. 12 d. 8766
5. 1, 10, 10^2 , 10^3 , 10^4 , 10^5 , ... is
a. Arithmetic series b. Geometric series c. Arithmetic sequence
d. Geometric sequence
6. The total number of one-to-one functions, from a set with three elements to a set with four elements is.....
a. 24 b. 16 c. 12 d. 9
7. If $f(x) = 2x + 1$ then its inverse =
a. $x - 1$ b. $\frac{x-1}{2}$ c. $1 + x$ d. None of these
8. Compute the summation $\sum_{i=1}^3 (2i - 1)$
a. 8 b. 3 c. 9 d. 10
9. The number of distinct permutations that can be formed using the letters of the word "BENZENE" is
a. 120 b. 420 c. 240 d. None of the above
10. Which term of the sequence 4, 1, -2, ... is -77
a. 26 b. 27 c. 28 d. None of these



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PAPER: Discrete Mathematics (IT)

Course Code: MATH-231/IT-21404 Part – II

MAX. TIME: 2 Hrs. 30 Min.

MAX. MARKS: 50

ATTEMPT THIS (SUBJECTIVE) ON THE SEPARATE ANSWER SHEET PROVIDED

Q.2. Solve the following short questions.

(10 x 2 = 20)

1. How many integers from 1 through 1000 are multiples of 3 or multiples of 5?
2. Use truth table to show that $(p \wedge \sim q) \wedge (\sim p \vee q)$ is a contradiction.
3. For all subsets A and B of a universal set U, prove that $(A - B) \cup (A \cap B) = A$
4. Suppose R and S are binary relations on a set A. If R and S are reflexive, is $R \cap S$ reflexive?
5. Define symmetric relation.
6. How many functions are there from a set with three elements to a set with four elements?
7. Define $g : Z \rightarrow Z$ by the rule $g(n) = n^2$ for all $n \in Z$. Is g one-to-one? Prove or give a counter example.
8. How many 2-permutation are there of $\{W, X, Y, Z\}$? Write them all.
9. Define Recursion.
10. Draw the graph of the binary relation C from R to R defined as follows: for all $(x, y) \in R \times R$, $(x, y) \in C \Leftrightarrow x^2 + y^2 = 1$.

Q.3. Solve the following long questions.

(5 x 6 = 30)

1. Define a relation R on the set of all integers Z as follows: for all integers m and n, $m R n \Leftrightarrow m \equiv n \pmod{3}$. Prove that R is an equivalence relation.
2. State and prove the DeMorgan's Law.
3. Prove that if n is an odd integer, then $n^3 + n$ is even.
4. Use mathematical induction to prove that $1 + 3 + 5 + \dots + (2n - 1) = n^2$ for all integers $n \geq 1$.
5. Let $f: R \rightarrow R$ and $g: R \rightarrow R$ be defined by $f(x) = 3x + 2$ for all $x \in R$ and $g(x) = \frac{x-2}{3}$ for all $x \in R$. Show that f and g are inverse of each other.