

5. Find the regression equations: $x - 2y + 50 = 50$

$$2x - 3y + 10 = 0$$

6. Find the probability of throwing ones between 10 in 48 tosses of a fair die.

OR Define normal distribution and list the characteristic of a normal curve

7. A simple of 16 from a population with unknown variance yielded the sample values $\bar{x} = 14$ and $S^2 = 25$, find the 90% confidence interval for μ .

8. Following table shows the result of an examination taken on 2 groups of students:

	Mean	Standard deviation	Sample size
Group 'A'	75	15	150
Group 'B'	70	20	250

Is there a significant difference in the mean score obtained by two groups. Use $\alpha = 0.05$.

OR The correlation coefficient taken from a sample of 20 pairs of observation was completed to be 0.40. Does this sample come from a population with zero correlation? Use $\alpha = 0.05$.

Group "C"

$$2 \times 12 = 24$$

9. a) If G is a simple connected planar graph with v vertices and e edges such that $v \geq 3$, then prove that $e \leq 3v - 6$

b) Prove that the number of odd vertices in any graph is always even.

OR State the properties of Hamiltonian graph. If G be a graph with p vertices such that for any two non-adjacent vertices v_i and v_j satisfy the condition $d(v_i) + d(v_j) \geq p$, prove that G is a Hamiltonian graph.

10. Define parametric and non-parametric tests with examples. Describe the uses of chi-square test with its restriction - a die is thrown 120 times and the frequencies of top faces are as follows.

Faces	1	2	3	4	5	6
Frequencies	10	15	25	25	18	27

Test whether the die was fair. Uses $\alpha = 0.05$.

Exam: 2078

Group "A"

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Attempt ALL the questions. Tick (V) the best answers.

1. Which of the following is equivalent to $p \rightarrow q$?

- a. $\sim q \rightarrow \sim p$ b. $\sim p \rightarrow \sim q$ c. $q \rightarrow p$ d. $p \rightarrow \sim q$

2. Which of the following is true?

- a. The set of all rational numbers is countable
b. The union of a finite set and a countable set is countable
c. Both a and b
d. None of the above

3. The set $N \times N$ is ...

- a. finite b. denumerable c. non-denumerable d. uncountable

4. For any given integers a , b , and c which of the following is true?

- a. if a/b then $(-a)/b$ b. if a/b then a/b
c. if a/b then $(-a)/(-b)$ d. all of the above

5. The numbers 353, 727, 101,..... are called -

- a. twin primes b. repunit primes
c. palindromic primes d. composite number

6. A positive integer d is the gcd of the integers a and b if...
- $\frac{d}{a}$ and $\frac{d}{b}$
 - if $\frac{c}{a}$ and $\frac{c}{b}$, then $\frac{c}{d}$
 - both a and b
 - none of the above
7. The number of edges of a complete graph K_4 is
- 6
 - 7
 - 8
 - 9
8. If G be a graph with $p (>2)$ vertices such that $d(v) \geq \frac{P}{2}$ for any vertex v of G , then called
- Eulerian graph
 - Hamiltonian graph
 - tree
 - forest
9. If G_1 and G_2 be two isomorphic graphs with isomorphism ϕ then which of the following is not true?
- G_1 and G_2 have same number of vertices
 - G_1 and G_2 have same number of edges
 - ϕ is one to one and onto
 - if a vertex $u \in G_1$ has degree k , then $\phi(u) \in G_2$ has degree k .
10. The chromatic number of the complete graph K_5 is
- 4
 - 5
 - 6
 - 7
11. If the correlation coefficient between two variables is zero, then the corresponding regression lines are
- parallel
 - coincident
 - perpendicular
 - none of the above
12. In L.P. problem, the result obtained by setting the non-basic variable
- feasible solution
 - basic solution
 - optimal solution
 - all of the above
13. If $P(A) = \frac{1}{2}$, $P(B) = \frac{1}{3}$, and $P(A \cap B) = \frac{1}{4}$, then $P\left(\frac{A}{B}\right) = ?$
- $\frac{3}{4}$
 - $\frac{2}{3}$
 - $\frac{1}{6}$
 - $\frac{1}{2}$
14. If x is a random variable, a and b are any constants, then
- $\text{Var}(ax+b) = a \text{Var}(x)$
 - $\text{Var}(ax+b) = a \text{Var}(x) + b$
 - $\text{Var}(ax+b) = a^2 \text{Var}(x)$
 - $\text{Var}(ax+b) = a^2 \text{Var}(x) + b$
15. Which of the following is true for t-distribution?
- Mean (μ) = 0
 - Covariance (σ^2) = $\frac{\gamma}{\gamma-2}$ for $\gamma > 1$
 - $\alpha_3 = 0$ for $\gamma > 3$
 - All of the above
16. Which of the following is not the property of a good estimator?
- Reliable
 - Unbiasedness
 - Efficiency
 - Sufficiency
17. The rejection of null hypothesis, when it is true is called
- power of a test
 - type I error
 - type II error
 - confidence interval
18. What is the degree of freedom for 2 by 3 contingency table in chi-square test?
- 2
 - 3
 - 5
 - 6
19. The power of test is
- β
 - $1-\beta$
 - α
 - $1-\alpha$
20. Which of the following is the alternating hypothesis for a left tailed test?
- $H_1: \mu \geq \mu_0$
 - $H_1: \mu \neq \mu_0$
 - $H_1: \mu < \mu_0$
 - $H_1: \mu = \mu_0$

- Define valid argument
the ground got wet.
It did not rain
Therefore the ground is
Prove that the union of
If P is a prime integer then
Find the remainder when
Solve by simplex method
Maximize, $P = 2x + 3y$
5. Find the correlation coefficient
 $4x - 5y + 33 = 0$
State and prove Baye's theorem
OR Let μ and σ be the parameters of a normal distribution
for any $k > 0$ $P(|X| > k) = ?$
7. If two independent variables X and Y have means $\bar{X} = 23$ and $\bar{Y} = 17$, find the mean of $Z = X + Y$.
8. A manufacturer of a product claims that the average life of his product is 0.9 years. If a random sample of 100 products shows a mean life of 0.85 years, do you think that the manufacturer's claim is justified?
OR A random sample of 1000000 bulbs was tested and found that 999990 were working and 1000 were not working. Is there significant difference between the claimed value and the observed value?
9. (a) If G be a connected graph with 5 vertices, show that it must lie on any cycle of length 3 or more.
OR Prove that a convex polygon has at least three acute angles.
10. Differentiate between the terms 'bias' and 'variance'. How does bias decrease and variance increase respectively?

Is there significant difference between the claimed value and the observed value?

Attempt ALL the questions

- What is the probability of getting a sum of 7 when two dice are thrown?
- What is the probability of getting a sum of 10 when two dice are thrown?
- What is the probability of getting a sum of 12 when two dice are thrown?
- What is the probability of getting a sum of 15 when two dice are thrown?
- What is the probability of getting a sum of 18 when two dice are thrown?

If the set $A = \{1, 2, 3, 4, 5, 6\}$ and $B = \{7, 8, 9, 10, 11, 12\}$, then find $P(A \cup B)$.

a. $2n$
b. n^2
c. n
d. n^3

Group "B"

8x7=56

1. Define valid argument with example. Test the validity of the argument: if it rained, then the ground got wet.
 It did not rain
Therefore the ground is not wet

2. Prove that the union of two countable sets is countable
 If P is a prime integer then prove that $(P-1)! \equiv -1 \pmod{P}$
 Find the remainder when $1! + 2! + 3! + \dots + 1000!$ is divided by 12.
 Solve by simplex method:
 Maximize, $P = 2x + 3y + 6z$ Subject to: $2x + 3y + z \leq 10$
 $x + y + z \leq 8$
 and $2y + 3z \leq 6$

5. Find the correlation coefficient between x and y from the following regression equations:
 $4x - 5y + 33 = 0; \quad 20x - 9y - 107 = 0$

6. State and prove Bayes' theorem.
 OR Let μ and σ be the mean and standard deviation of a random variable x then prove that for any $k > 0$ $P(|x-\mu| \geq k\sigma) \leq \frac{1}{k^2}$

7. If two independent random samples of size $n_1 = 16$ and $n_2 = 25$ have the means, $\bar{x} = 18$ and $\bar{x} = 23$, find the 95% confidence interval for $(\mu_1 - \mu_2)$.

8. A manufacturer of tires claims that the life of his tires have a standard deviation equal to 0.9 years. If a random sample of 10 of these tires have a standard deviation 1.2 years, do you think that $\alpha > 0.9$ years? Use $\alpha = 0.05$.

- OR A random sample of size 9 yield mean $\bar{x} = 23$ and $\sigma = 4$. Test the hypothesis $\mu = 21$ versus against the alternative that is larger. Use $\alpha = 0.01$,

2x12=24

Group "C"

9. (a) If G be a connected graph, then prove that an edge e of G is a bridge iff e does not lie on any cycle of G . (b) Prove that a complete graph K_n is planar iff $n \leq 4$.

- OR Prove that a connected graph G is Eulerian iff each of its vertex has even degree.
10. Differentiate between parametric and non-parametric tests. Following table shows the decreases in the weight after using drug A and drug B used in 5 and 7 persons respectively.

Drug A	10	12	13	11	14		
Drug B	8	9	12	14	15	10	9

Is there significant difference in the efficiency of the two drugs? Use $\alpha = 0.01$.

Exam: 2079

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Group "A"

- Attempt ALL the questions. Tick (\checkmark) the best answers.

1. What is the negation of 'all people are intelligent'?
 a. All people are not intelligent
 c. Some people are not intelligent
 b. No people are intelligent
 d. No people are not intelligent
2. What is the converse of $p \Rightarrow q$?
 a. $\neg p \Rightarrow \neg q$ b. $q \Rightarrow \neg p$ c. $\neg q \Rightarrow \neg p$ d. $q \Rightarrow p$
3. If the set has ' n ' elements then how many subsets can be formed?
 a. 2^n b. n^2 c. 2^n d. n^{2n}