If A and B are two disjoint (mutually exclusive) events then, P(A∪B) =

- P(A) + P(B) + P(A∩B)
- P(A) + P(B) + P(AUB)
- P(A) + P(B) - P(A∩B)
- P(A) + P(B) - P(A∩B)
- **P(A) + P(B) (Page 240)**

If p=It is red,
q=It is hot
Then, It is not red but hot is denoted by $\sim p \wedge \sim q$

- True
- **False**

If ($A \cup B$) = A, then ($A \cap B$) = B

- **True**
- False
- Cannot be determined

How many integers from 1 through 1000 are neither multiple of 3 nor multiple of 5?

- 333
- 467
- **533 (Page 245)**

- 497

The value of $\lceil x \rceil$ for -2.01 is

- -3
- 1
- **-2 (Page 249)**

If p = Nadia is hard working ,
q = Nadia is good in mathematics
"Nadia is hard working and good in mathematics" is denoted by

- $p \wedge q$ **Correct.**
- $p \wedge \sim q$
- $\sim (p \vee q)$
- $p \vee q$

A die is thrown twice. What is the probability that the sum of the number of dots shown is 3 or 11?

- $\frac{2}{3}$
- $\frac{1}{9}$ **Correct.**
- $\frac{1}{2}$

Outcomes with sum of $5 = (1,2)(2,1)$

Outcomes with sum of $11 = (5,6),(6,5)$

Total outcomes for $5 \& 11 = 4$

Total outcome for 2 *dice* $= 6 \times 6 = 36$

Probability $= \frac{4}{36} = \frac{1}{9}$

If A and B are independent events then $P(A/B) =$

- P (B)
- **P (A) (Page 272)**
- $P(A \cap B)$

What is the expectation of the number of heads when three fair coins are tossed?

- 1
- 1.34
- 2
- **1.5 (Page 277)**

Every relation is

- function

- **may or may not function**
- bijective mapping
- Cartesian product set

The statement $p \leftrightarrow q = (p \rightarrow q) \wedge (q \rightarrow p)$ describes

- Commutative Law
- Implication Laws
- Exportation Law
- **Equivalence**

Given $f(x) = x^3 - 2x^2 + 4x - 1$ *then the value of* $f(1-x)$ *is*

- $\frac{1}{x^3} - \frac{2}{x^2} + \frac{4}{x} - 1$
- $-x^3 + x^2 - 3x + 2$
- Zero
- $2 + x^2 - x^3$

$$f(1-x) = (1-x)^3 - 2(1-x)^2 + 4(1-x) - 1$$
$$= 1 - x^3 + 3x^2 - 3x - 2(1 + x^2 - 2x) + 4 - 4x - 1$$
$$= 1 - x^3 + 3x^2 - 3x - 2 - 2x^2 + 4x + 4 - 4x - 1$$
$$= -x^3 + 3x^2 - 2x^2 - 3x - 2 + 4$$
$$= -x^3 + x^2 - 3x + 2$$

The square root of every prime number is irrational

- **True**
- False
- Depends on the prime number given

A predicate is a sentence that contains a finite number of variables and becomes a statement when specific values are substituted for the variables

- **True (Page 202)**
- False
- None of these

If r is a positive integer then gcd(r,0)=

- r
- 0
- 1
- None of these

Associative law of union for three sets is

- A ∪ (B ∪ C) = (A ∪ B) ∪ C
- A ∩ (B ∩ C) = (A ∩ B) ∩ C
- A ∪ (B ∩ C) = (A ∪ B) ∩ (A ∪ B)

None of these

Values of X and Y, if the following order pairs are equal.
(4X-1, 4Y+5)= (3,5)
will be

- (x,y) = (3,5)
- (x,y) = (1.5,2.5)
- **(x,y) = (1,0)**
- None of these

$4X-1=3$ $\quad$ $4Y+5=5$

$4X=3+1$ $\quad$ $4Y=5-5$

$4X=4$ $\quad$ $4Y=0$

$X=\frac{4}{4}=1$ $\quad$ $Y=\frac{0}{4}=0$

The expectation of x is equal to

- Sum of all terms
- Sum of all terms divided by number of terms
- $\sum xf(x)$ **(Page 277)**

A line segment joining pair of vertices is called

- Loop
- **Edge (Page 283)**
- Node

The indirect proof of a statement p⇒q involves

- Considering ~q and then try to reach ~p
- Considering p and ~q and try to reach contradiction
- **Both 2 and 3 above (Not sure)**
- Considering p and then try to reach q

The greatest common divisor of 5 and 10 is

- **5**
- 0
- 1
- None of these

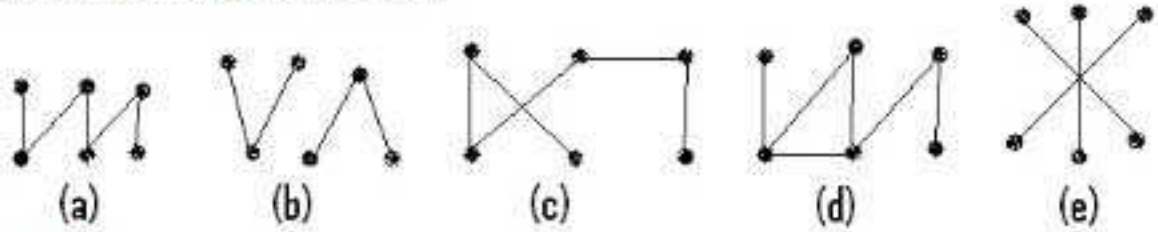
Suppose that there are eight runners in a race first will get gold medal the second will get siver and third will get bronze. How many different ways are there to award these medals if all possible outcomes of race can occur and there is no tie?

- P(8,3)
- P(100,97)
- P(97,3)
- None of these

The value of 0! Is

- 0
- 1 (Page 160)
- Cannot be determined

Which of the following graphs are tree?



- a, b, c
- b, c, d
- c, d, e
- a , c, e

A sub graph of a graph G that contains every vertex of G and is a tree is called

- Trivial tree
- empty tree
- Spanning tree (Page 329)

In the planar graph, the graph crossing number is

- 0 (Page 314)
- 1
- 2
- 3

A matrix in which number of rows and columns are equal is called

- Rectangular Matrix
- Square Matrix (Page 289)
- Scalar Matrix

Changing rows of matrix into columns is called

- Symmetric Matrix
- Transpose of Matrix (Page 299)
- Adjoint of Matrix

If A and B are finite (overlapping) sets, then which of the following must be true

- $n(A \cup B) = n(A) + n(B)$
- **$n(A \cup B) = n(A) + n(B) - n(A \cap B)$ (Page 240)**
- $n(A \cup B) = \emptyset$
- None of these

When 3^k is even, then $3^k+3^k+3^k$ is an odd.

- True
- **False**

When 5^k is even, then $5^k+5^k+5^k$ is odd.

- **True**
- False

5^n -1 is divisible by 4 for all positive integer values of n.

- **True**
- False

If r is a positive integer then gcd(r, 5) =

- **r**
- 5
- 0
- None of these

The product of the positive integers from 1 to n is called

- Multiplication
- **n factorial (Page 217)**
- Geometric sequence

The expectation μ for the following table is

x_i	1	3
$f(x_i)$	0.4	0.1

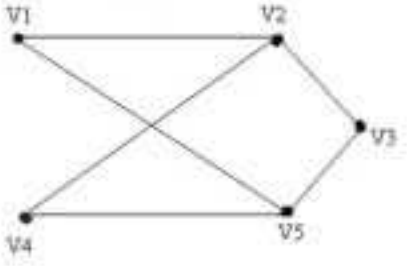
- 0.5
- 3.4
- 0.3
- **0.7**

$$\sum x f(x) = (1 \times 0.4) + (3 \times 0.1)$$
$$= 0.4 + 0.3$$
$$= 0.7$$

If p= A Pentium 4 computer,
q= attached with ups.
Then "no Pentium 4 computer is attached with ups" is denoted by

- $\sim (p \wedge q)$
- $\sim p \vee q$
- **$\sim p \wedge q$**
- None of these

The given graph is



- **Simple graph**
- Complete graph
- Bipartite graph
- Both (i) and (ii)
- Both (i) and (iii)

$P(n)$ **is called proposition or statement.**

- **True (Page 170)**
- False

An integer n is odd if and only if n = 2k + 1 for some integer k.

- **True (Page 187)**
- False
- Depends on the value of k

An integer n is called a perfect square if and only if $n = k^2$ for some integer k.

- **True (Page 187)**
- False
- Depends on the value of k

Question No: 1 (Marks: 1) - Please choose one

Let A = {a, b, c} and
R = {(a, c), (b, b), (c, a)} be a relation on A. Is R

- Transitive
- Reflexive
- **Symmetric**
- Transitive and Reflexive

Question No: 2 (Marks: 1) - Please choose one

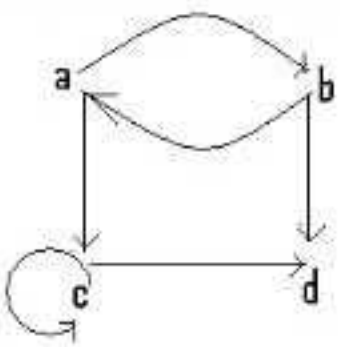
Symmetric and antisymmetric are

- Negative of each other
- Both are same
- **Not negative of each other (Page 90)**

Question No: 3 (Marks: 1) - Please choose one
The statement p q q p describes

- **Commutative Law:**
- Implication Laws:
- Exportation Law:
- Equivalence:

Question No: 4 (Marks: 1) - Please choose one
The relation as a set of ordered pairs as shown in figure is



- {(a,b),(b,a),(b,d),(c,d)}
- {(a,b),(b,a),(a,c),(b,a),(c,c),(c,d)}
- **{(a,b), (a,c), (b,a),(b,d), (c,c),(c,d)}**
- {(a,b), (a,c), (b,a),(b,d),(c,d)}

Question No: 5 (Marks: 1) - Please choose one
The statement p q (p ~q) c describes

- Commutative Law:
- Implication Laws:
- Exportation Law:
- **Reductio ad absurdum**

Question No: 6 (Marks: 1) - Please choose one
A circuit with one input and one output signal is called.

- **NOT-gate (or inverter) (Page 31)**
- OR- gate
- AND- gate
- None of these

Question No: 7 (Marks: 1) - Please choose one
If f(x)=2x+1, $g(x)=x^2-1$ then fg(x)=

- x^2-1
- $2x^2-1$
- $2x^3-1$

$$fg(x)=f\left(x^2-1\right)$$
$$f\left(x^2-1\right)=2\left(x^2-1\right)+1$$
$$=2x^2-2+1$$
$$=2x^2-2$$

Question No: 8 (Marks: 1) - Please choose one
Let g be the functions defined by
g(x)= 3x+2 then gog(x) =

- $9x^2+4$
- 6x+4
- **9x+8**

$$gg(x)=g(3x+2)$$
$$g(3x+2)=3(3x+2)+2$$
$$=9x+6+2$$
$$=9x+8$$

Question No: 9 (Marks: 1) - Please choose one
How many integers from 1 through 1000 are neither multiple of 3 nor multiple of 5?

- 333
- 467

► 533 (Page 245)
► 497

Question No: 10 (Marks: 1) - Please choose one

$$\left\lceil \frac{N}{6} \right\rceil = 9$$

What is the smallest integer N such that

► 46
► 29
► 49

$N = 6 \times (9-1) + 1$

$= 6 \times 8 + 1 = 49$

Question No: 11 (Marks: 1) - Please choose one
What is the probability of getting a number greater than 4 when a die is thrown?

➢ $\frac{1}{2}$
➢ $\frac{3}{2}$
➢ $\frac{1}{3}$

Number greater than $4 = 5, 6$

Probability $= \frac{2}{6} = \frac{1}{3}$

Question No: 12 (Marks: 1) - Please choose one
If A and B are two disjoint (mutually exclusive) events then P(A B) =

► P(A) + P(B) + P(A B)
► P(A) + P(B) + P(AUB)
► P(A) + P(B) - P(A B)
► P(A) + P(B) - P(A B)
► P(A) + P(B) Page (240)

Question No: 13 (Marks: 1) - Please choose one
If a die is thrown then the probability that the dots on the top are prime numbers or odd numbers is

➢ 1
➢ $\frac{1}{2}$

- $\frac{2}{3}$

Prime number or odd number =1,3,5
Total outcomes =6
Probability = 3/6=1/2

Question No: 14 (Marks: 1) - Please choose one
The probability of getting 2 heads in two successive tosses of a balanced coin is

- $\frac{1}{4}$
- $\frac{1}{2}$
- $\frac{2}{3}$

Question No: 15 (Marks: 1) - Please choose one
The probability of getting a 5 when a die is thrown?

- $\frac{1}{6}$
- $\frac{5}{6}$
- $\frac{1}{3}$

Question No: 16 (Marks: 1) - Please choose one:
If a coin is tossed then what is the probability that the number is 5

- $\frac{1}{2}$
- 0
- 1

Wrong Question

Question No: 17 (Marks: 1) - Please choose one
If A and B are two sets then The set of all elements that belong to both A and B , is

- A B
- **A B (Page 42)**
- A--B
- None of these

Question No: 18 (Marks: 1) - Please choose one
What is the expectation of the number of heads when three fair coins are tossed?

- 1

- 1.34
- 2
- **1.5 (Page 277)**

Question No: 19 (Marks: 1) - Please choose one
If A, B and C are any three events, then
P(A B C) is equal to

- P(A) + P(B) + P(C)
- **P(A) + P(B) + P(C)- P(A B) - P (A C) - P(B C) + P(A B C) (Page 264)**
- P(A) + P(B) + P(C) - P(A B) - P (A C) - P(B C)
- P(A) + P(B) + P(C) + P(A B C)

Question No: 20 (Marks: 1) - Please choose one
A rule that assigns a numerical value to each outcome in a sample space is called

- One to one function
- Conditional probability
- **Random variable (Page 274)**

Question No: 21 (Marks: 1) - Please choose one
The power set of a set A is the set of all subsets of A, denoted $P(A)$.

- False
- **True (Page 68)**

Question No: 22 (Marks: 1) - Please choose one
A walk that starts and ends at the same vertex is called

- Simple walk
- Circuit
- **Closed walk (Page 292)**

Question No: 23 (Marks: 1) - Please choose one
If a graph has any vertex of degree 3 then

- It must have Euler circuit
- It must have Hamiltonian circuit
- It does not have Euler circuit

Question No: 24 (Marks: 1) - Please choose one
The square root of every prime number is irrational

- **True**
- False
- Depends on the prime number given

Question No: 25 (Marks: 1) - Please choose one
A predicate is a sentence that contains a finite number of variables and becomes a statement when specific values are substituted for the variables

- **True (Page 202)**
- False

► None of these

Question No: 26 (Marks: 1) - Please choose one
If r is a positive integer then gcd(r,0)=

► r
► 0
► 1
► None of these

Question No: 27 (Marks: 1) - Please choose one
Combinatorics is the mathematics of counting and arranging objects

► True (Page 209)
► False
► Cannot be determined

Question No: 28 (Marks: 1) - Please choose one
A circuit that consist of a single vertex is called

► Trivial (Page 322)
► Tree
► Empty

Question No: 29 (Marks: 1) - Please choose one
In the planar graph, the graph crossing number is

► 0 (Page 314)
► 1
► 2
► 3

Question No: 30 (Marks: 1) - Please choose one
How many ways are there to select five players from a 10 member tennis team to make a trip to a match to another school?

► C(10,5)
► C(5,10)
► P(10,5)
► None of these

Solution: The answer is given by the number of 5-combinations of a set with ten elements. By Theorem 2, the number of such combinations is

$$C(10, 5) = \frac{10!}{5!\,5!} = 252.$$

Question No: 31 (Marks: 1) - Please choose one
The value of 0! Is

► 0
► 1

► Cannot be determined

Question No: 32 (Marks: 1) - Please choose one
If the transpose of any square matrix and that matrix are same then matrix is called

► Additive Inverse
► Hermition Matrix
► **Symmetric Matrix (Page 299)**

Question No: 33 (Marks: 1) - Please choose one

$$\frac{(n-1)!}{(n+1)!}$$

The value of is

► 0
► n(n-1)

► $\frac{1}{(n^2+n)}$ **(Page 217)**
► Cannot be determined

Question No: 34 (Marks: 1) - Please choose one
If A and B are two disjoint sets then which of the following **must be** true

► **n(A B) = n(A) + n(B) (Page 257)**
► n(A B) = n(A) + n(B) - n(A B)
► n(A B)= ø
► None of these

Question No: 35 (Marks: 1) - Please choose one
Any two spanning trees for a graph

► Does not contain same number of edges
► Have the same degree of corresponding edges
► **contain same number of edges (Page 329)**
► May or may not contain same number of edges

Question No: 36 (Marks: 1) - Please choose one
When P(k) and P(k+1) are true for any positive integer k, then P(n) is not true for all +ve Integers.

► True
► **False (Lecture 23)**

Question No: 37 (Marks: 1) - Please choose one
$n^2 > n+3$ for all integers n 3.

► True

► False

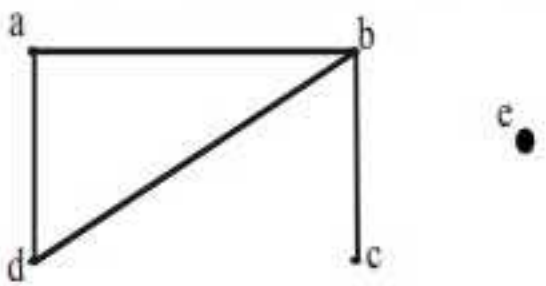
Question No: 38 (Marks: 1) - Please choose one
Quotient –Remainder Theorem states that for any positive integer d, there exist unique integer q and r such that _____ and 0≤r<d.

► **n=d.q+ r (Page 201)**
► n=d.r+ q
► n=q.r+ d
► None of these

Question No: 39 (Marks: 1) - Please choose one
Euler formula for graphs is

► f = e-v
► f = e+v +2
► f = e-v-2
► **f = e-v+2 (Page 317)**

Question No: 40 (Marks: 1) - Please choose one
The degrees of {a, b, c, d, e} in the given graph is



► 2, 2, 3, 1, 1
► 2, 3, 1, 0, 1
► 0, 1, 2, 2, 0
► 2,3,1,2,0 **Correct answer on Paper 307**

Question No: 1 (Marks: 1) - Please choose one
The negation of "Today is Friday" is

➢ Today is Saturday
➢ **Today is not Friday**
➢ Today is Thursday

Question No: 2 (Marks: 1) - Please choose one
An arrangement of rows and columns that specifies the truth value of a compound proposition for all

possible truth values of its constituent propositions is called

- **Truth Table (Page 6)**
- Venn diagram
- False Table
- None of these

Question No: 4 (Marks: 1) - Please choose one

Contra positive of given statement "***If it is raining, I will take an umbrella***" is

- **I will not take an umbrella if it is not raining.**
- I will take an umbrella if it is raining.
- It is not raining or I will take an umbrella.
- None of these.

Question No: 5 (Marks: 1) - Please choose one

Let A= {1, 2, 3, 4} and R = {(1, 1), (2, 2), (3, 3),(4,4)} then

- ► R is symmetric.
- ► R is anti symmetric.
- ► R is transitive.
- ► R is reflexive.
- **► All given options are true**

Question No: 6 (Marks: 1) - Please choose one

A binary relation R is called Partial order relation if

- It is Reflexive and transitive
- It is symmetric and transitive
- It is reflexive, symmetric and transitive
- **It is reflexive, anti symmetric and transitive**

Question No: 7 (Marks: 1) - Please choose one

How many functions are there from a set with three elements to a set with two elements?

- 6
- **8**
- 12

$n^m = 2^3 = 8$

Question No: 8 (Marks: 1) - Please choose one

$1,10,10^2,10^3,10^4,10^5,10^6,10^7,\ldots\ldots\ldots\ldots$ is

- Arithmetic series
- Geometric series
- Arithmetic sequence
- **Geometric sequence**

Question No: 9 (Marks: 1) - Please choose one

$\lceil x \rceil$ for x = -2.01 is

- -2.01
- -3
- **-2 (Page 249)**
- -1.99

Question No: 10 (Marks: 1) - Please choose one
If A and B are two disjoint (mutually exclusive)
events then P(AÈB) =

- P(A) + P(B) + P(AÇB)
- P(A) + P(B) + P(AUB)
- P(A) + P(B) - P(AÇB)
- P(A) + P(B) - P(AÇB)
- **P(A) + P(B)**

Question No: 11 (Marks: 1) - Please choose one
If a die is thrown then the probability that the dots on the top are prime numbers or odd numbers is

- 1
- $\frac{1}{2}$
- $\frac{2}{3}$

Question No: 12 (Marks: 1) - Please choose one
If $P(A \cap B) = P(A)P(B)$ then the events A and B are called

- **Independent (Page 272)**
- Dependent
- Exhaustive

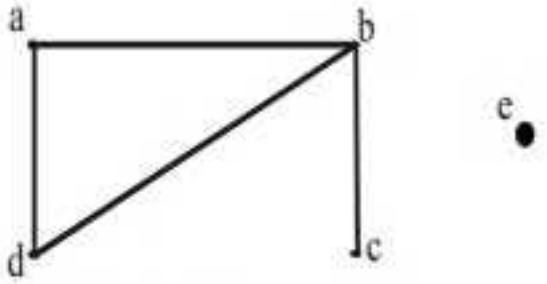
Question No: 13 (Marks: 1) - Please choose one
A rule that assigns a numerical value to each outcome in a sample space is called

- One to one function
- Conditional probability
- **Random variable (Page 274)**

Question No: 14 (Marks: 1) - Please choose one
The expectation of x is equal to

- Sum of all terms
- Sum of all terms divided by number of terms
- $\sum xf(x)$ (Page 277)

Question No: 15 (Marks: 1) - Please choose one
The degree sequence {a, b, c, d, e} of the given graph is

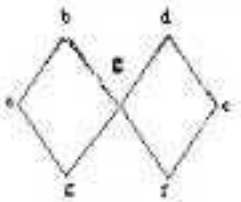


- 2, 2, 3, 1, 1
- 2, 3, 1, 0, 1 **(Page 307)**
- 0, 1, 2, 2, 0
- 2,3,1,2,0

Question No: 16 (Marks: 1) - Please choose one
Which of the following graph is not possible?

- **Graph with four vertices of degrees 1, 2, 3 and 4. (Page 287)**
- Graph with four vertices of degrees 1, 2, 3 and 5.
- Graph with three vertices of degrees 1, 2 and 3.
- Graph with three vertices of degrees 1, 2 and 5.

Question No: 17 (Marks: 1) - Please choose one
The graph given below



- Has Euler circuit
- Has Hamiltonian circuit
- **Does not have Hamiltonian circuit (Page 297)**

Question No: 18 (Marks: 1) - Please choose one
Let n and d be integers and d ' 0. Then n is divisible by d or d divides n If and only if

- **n= k.d for some integer k (Page 179)**
- n−d
- n.d−1
- none of these

Question No: 20 (Marks: 1) - Please choose one
An integer n is prime if, and only if, n > 1 and for all positive integers r and s, if n = r·s, then

- **r = 1 or s = 1. (Page 187)**
- r − 1 or s − 0.
- r − 2 or s − 3.

- None of these

Question No: 21 (Marks: 1) - Please choose one
The method of loop invariants is used to prove correctness of a loop with respect to certain pre and post-conditions.

- **True (Page 203)**
- False
- None of these

Question No: 22 (Marks: 1) - Please choose one
The greatest common divisor of 27 and 72 is

- 27
- **9**
- 1
- None of these

Solution:
1.Divide 72 by 27:
This gives $72 = 27 \cdot 2 + 18$
2.Divide 27 by 18:
This gives $27 = 18 \cdot 1 + 9$
3.Divide 18 by 9:
This gives $18 = 9 \cdot 2 + 0$
Hence greatest common divisor (72, 27) = 9.

Question No: 23 (Marks: 1) - Please choose one
If a tree has 8 vertices then it has

- 6 edges
- **7 edges**
- 9 edges

Question No: 24 (Marks: 1) - Please choose one
Complete graph is planar if

- n = 4
- n>4
- $n \leq 4$ **(Page 315)**

Question No: 25 (Marks: 1) - Please choose one
The given graph is