A

Instructions:

1. PLEASE MARK THE ANSWERS IN THE ANSWER SHEET BY SHADING THE APPROPRIATE CHOICE FOR ALL THE QUESTIONS
2. **THERE IS ONLY ONE CORRECT CHOICE FOR EACH MULTIPLE CHOICE QUESTION. EACH CORRECT ANSWER GETS 1 MARK.**
3. **EACH WRONG ANSWER FOR THE MULTIPLE CHOICE QUESTIONS GETS -0.5 MARKS.**
4. THIS PAPER NEEDS TO BE ANSWERED IN **1.5 HRS** SO PLEASE ALLOCATE YOUR TIME JUDICIOUSLY.
5. CALCULATORS ARE NOT ALLOWED.

NAME: _____

ROLL NUMBER: _____

DEPARTMENT: _____

DATE: _____

START TIME: _____

END TIME: _____

---------- **FOR EVALUATOR'S USE ONLY**----------

Maths & Logic	Technology	Finance/Comprehension	Total

SECTION 1: MATHEMATICS & LOGIC

1. Find the number of trailing zeros at the end of the following number:

$$\frac{5^1 \times 10^2 \times 15^3 \times \ldots\ldots 100^{20}}{1^1 \times 2^2 \times 3^3 \times \ldots 10^{10}}.$$

A) 245
B) 195
C) 160
D) 210

2. In how many ways, counting ties, can four racers cross the finishing line? (For example, two racers, A and B, can finish in three ways: A wins, B wins, A and B tie.)
A) 16
B) 36
C) 75
D) 96

3. A group of students decided to buy a cake, which costs above Rs.620 but below Rs.650, for their teacher's birthday. But at the last moment two students were absent, and the remaining students purchased that cake by contributing one rupee more per head. What was the price of the cake?
A) 642.5
B) 639
C) 647.5
D) 624

$$\frac{x}{n-2} = \frac{x}{n} + 1$$

4. You have a deck of n cards with cards labeled from 1 to n. Starting at any configuration, you repeat this: If the top card has number k, you reverse the order of top k cards. Choose the correct option(s)?
A) Each reversal brings a new card at the top
B) Every top card returns to the top again after some time
C) Eventually, no. 1 would be the top card
D) Card no. 'n' will always end up as the bottom

https://math.stackexchange.com/questions/33242/combinatorial-card-flip-game

5. You have 1000 coins out of which 1 of them has heads on both sides, and other 999 are regular unbiased coins. You pick a coin at random, toss it 10 times and all of them are heads. What is the probability that the coin selected is the faulty one.
A) 0.753
B) 0.5
C) 0.7
D) 0.769

Not Sure

https://sahandsaba.com/interview-question-fair-unfair-coins-bayes-theorem.html

6. What is the number of solutions of the equation a + b + c ≤ 7 where a, b, c are non-negative integers?

A) 36
B) 37
C) 119
D) 120

7. A crime is committed by one of the two suspects, A and B. Initially, there is equal evidence against both of them. In further investigation at the crime scene, it is found that the guilty party had a blood type found in 10% of the population. Suspect A does match this blood type, whereas the blood type of Suspect B is unknown. What is the probability that B's blood type matches that found at the crime scene?

Not Sure

A) 10/11
B) 9/10
C) 2/11
D) 1/10

https://tardigrade.in/question/a-crime-is-committed-by-one-of-two-suspects-a-and-b-initially-ucpvyflo

8. Sandy owns two coins, U, which is unbiased and B, which is biased towards heads (probability of getting a head, p >1/2). She wins a prize if she gets two heads in a row out of three trials, with the condition that she should toss the coins alternatively. What order of coin tosses should Sandy choose?

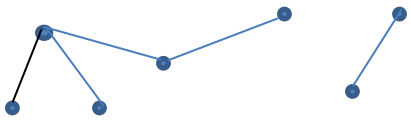
Not Sure

A) U, B, U
B) B, U, B
C) Both choices would be equally preferable
D) Depends on p

9. X believes that while tossing an unbiased coin, the probability that heads and tails will occur equal number of times will increase with increase in number of trials. i.e., for 2n trials, P(H=n and T=n) increases with increase in n. Y believes that the probability of an even split between heads and tails will decrease with increasing n.

Not Sure

A) Only X is correct
B) Only Y is correct
C) X and Y are both correct depending on whether n is odd or even
D) Both are wrong as probability first increases then decreases with increasing n

10. 

Data:
degree = d
vertices = n
Formula:
By handshaking Lemma:
$\sum_{i=1}^{n} Edi = 2 \times e$
Calculation:
For a regular graph,
$n \times d = 2 \times e$
$e = nd$

In the graph shown above with 7 vertices and 5 edges, how many minimum additional edges will need to be drawn so that it becomes a *regular* graph? (a graph with all vertices having the same degree)

A) 7
B) 9
C) 11
D) 16

Not Sure

The first theorem of graph theory says the sum of degrees is twice the number of edges.

11. An escalator is moving downwards. Ramesh takes 30 steps to reach the bottom of the escalator from the top and John takes 60 steps to reach the top from the bottom. Speed of both are equal. Number of stairs in the escalator when it is stationary are

A) 48
B) 40
C) 45
D) 42

12. Let a1,a2,a3,..... is a G.P. If 2, 5 are 2 geometric means inserted between a4 and a7, find the product of first 10 terms of the G.P.

A) 10^5
B) 10^4
C) 2×10^5
D) 2×10^4

a4, 2, 5, a7
2/a4 = 5/2 = a7/5

12

13. A 25 by 36 cm cereal box is lying on the floor on one of its 25 by 36 cm faces. An ant, located at one of the bottom corners of the box, must crawl along the outside of the box to reach the opposite bottom corner. What is the length of the shortest such path?
Note: The ant can walk on any of the five faces of the box, except for the bottom face, which is flush in contact with the floor. It can crawl along any of the edges. It cannot crawl under the box.

A) 60.6 cm
B) 60.8 cm
C) 65 cm
D) 45.44 cm

Not Sure

14. An inverted right circular cone has a radius of 9 cm. This cone is partly filled with oil which is dipping from a hole in the tip at a rate of 1cm2/hour. Currently the level of oil 3 cm from top and surface area is 36π cm2. How long will it take the cone to be completely empty?

A) 72π hours
B) 1 hour
C) 3 hours
D) 36π hours

SECTION 2: TECHNOLOGY

15. What is the time complexity of the function below

```
void test(int k) {
        int a= 1, b = 1;
        while ( b <= k ) {
            a++;
            b = b+a;
        }
}
```

A) O(n)
B) O(sqrt(n))
C) O(log(n))
D) O(n sqrt(n))

16. What is the output of the following java code?

```
public class test extends Thread
{
    public static void main(String[] args)
    {
        String a = "abc";
        String b = new String(a);
        int value = 0;
        value = (a==b) ? 1:2;
        if(value == 1)
        {
            System.out.println("abc");
        }
        else if(value == 2)
        {
            System.out.println("a b c");
        }
        else
        {
            System.out.println("ab c");
        }

    }
}
```

A) abc
B) a b c
C) ab c
D) Compilation error

17. What will be the output of the following java code?

```
public class test {
    public static void main(String[] args) {
                int p = 10;
                int $_ = '5';
                System.out.println("Result :"+ p+$_);
    }
}
```

Wrong Question

1053

A) Compilation Error
B) Result :105
C) Result :15
D) Runtime Error

18. Let A be a square matrix of size n x n. Consider the following program. What is the expected output?

```
C = 100
for i = 1 to n do

        for j = 1 to n do
        {
                Temp = A[i][j] + C
                A[i][j] = A[j][i]
                A[j][i] = Temp - C
        }

for i = 1 to n do

        for j = 1 to n do

                Output(A[i][j]);
```

A) The matrix A itself
B) Transpose of matrix A
C) Adding 100 to the upper diagonal elements and subtracting 100 from diagonal elements of A
D) None of the above

19. Which of the following statements about interfaces are accurate?

i. A class cannot implement multiple interfaces
ii. Instances of an interface can be created
iii. An interface can contain both static and final type of fields
iv. Multiple classes can implement the same interface

A) i and iv
B) ii and iv
C) iii and iv

D) All are correct

20. What is the output of the following java code?

```
public class parent
{
    public parent(String s)
    {
        System.out.print("A");
    }
}

class child extends parent
{
    public child(String s)
    {
        System.out.print("B");
    }
    public static void main(String[] args)
    {
        new child("C");
        System.out.println(" ");
    }
}
```

A) AB
B) B
C) CB
D) Compilation error

21. Let T be a binary search tree with 15 nodes. The minimum and maximum possible heights of T are (The height of a tree with single node is 0):

A) 4 and 15 respectively
B) 3 and 14 respectively
C) 4 and 14 respectively
D) 3 and 15 respectively

22. What is the output of the following program?

```
public class Test {
        private static int one = 10;
        int two = 20;
        public static void main(String []args) {
                Test test = new Test();
                int today = 20, two = 40;
                System.out.println(today + test.two + test.one);
        }
}
```

A) 50
B) 70
C) 80
D) Runtime Error

23. Consider the following program written in pseudo-code. Assume that x and y are integers:

```
Count (x, y) {
        if (y ! = 1) {
                if (x ! = 1) {
                        print("*");
                        Count (x/2, y);
                }
                else {
                        y = y – 1;
                        Count (1024, y);
                }
        }
}
```

The number of times that the print statement is executed by the call Count (1024, 1024) is:

A) 10230
B) 1024
C) 10240
D) 1023

24. Determine the maximum no of comparisons required for binary search in a sorted list of 'n' numbers?

A) N
B) ⌊log2n⌋ +1; where ⌊.⌋ is the floor function
C) (N+1)/2
D) ⌈log2n⌉+1; where ⌈.⌉ is the ceiling function

Not sure

SECTION 3: FINANCE/COMPREHENSION

Not Sure

Answer Q25 to Q28 based on below comprehension:

Currencies are traded based on an exchange rate. For example, USDINR = 69.52 means USD 1 can be bought at INR 69.52. The price at which banks are willing to buy a currency is called a bid quote and the price at which they are willing to sell the same currency is called an ask quote. The difference between the two is called bid-ask spread. Marked to market profit or loss is the amount gained or lost if someone re-values the held position at market rates. Closing a position of USDINR 1 million would mean selling USD 1 million after having bought USD 1 million earlier. The profit or loss in this case would be in INR and would be calculated based on the difference of the buy and the sell price.

Based on this information, answer the questions below:

25. EURUSD moved from 1.16 to 1.17 during the day. A trader bought a million EUR at 1.165 sometime during the day. What is the marked to market profit at the end of the day?

A) EUR 5,000
B) USD 5,000
C) EUR 10,000
D) USD 10,000

26. A European bank is quoting bid ask of EURUSD at 1.1601/1.1603. If markets did not move, how much profit/loss would they make if they bought and sold EUR 3 million?

A) Profit USD 600
B) Profit EUR 600
C) Loss EUR 600
D) Loss USD 600

27. On a volatile trading day, a trader bought USD 1 million against INR 3 times and sold USD 1.5 million 2 times. He bought at 69.51, 69.43, 69.62 and sold at 69.50 and 69.54. What is the total profit or loss at the end of the day?

A) Profit INR 3,000
B) Loss INR 3,000
C) Profit INR 6,000
D) Zero Profit, zero loss

28. As an Indian importer of goods for which I need to pay in USD, I would be happy when USDINR

A) Rises
B) Falls
C) Remains unchanged
D) Cannot be determined

Answer Q29 to Q31 based on below comprehension:

Present value (PV) is the current value of a future sum of money or stream of cash flows given a specified rate of return. Future cash flows are discounted at the discount rate, and the higher the discount rate, the lower the present value of the future cash flows. Determining the appropriate discount rate is the key to properly valuing future cash flows, whether they be earnings or debt obligations.

Present value is the concept that states an amount of money today is worth more than that same amount in the future. In other words, money received in the future is not worth as much as an equal amount received today.

Receiving Rs 1,000 today is worth more than Rs 1,000 five years from now. Why? An investor can invest the Rs 1,000 today and presumably earn a rate of return over the next five years. Present value takes into account any interest rate an investment might earn.

The discount rate is the investment rate of return that is applied to the present value calculation.

For a future value (FV) to be received at the end of one year over which the prevailing interest rate is r, the present value (PV) (as per the **annual compounded** model) is given by

$$PV = {}^{FV}/_{(1+r)}$$

29. A company is planning to undertake a project, expected cashflows are as follows. The CEO believes that they should go ahead with the project if rate of return is at least 10%. What is the minimum value of x at which the project should be taken up?

Time	T=0	T=1	T=2
Cashflow (in million Rs)	-200	110	? (x)

A) 90
B) 110
C) 121
D) 131

30. A new scheme is announced by the government where you need to pay a certain amount, after which the government will give you INR 1000 every year. The annual rate of interest is 7%. What is the maximum amount you will be willing to pay from the below options for the scheme?
A) 12000
B) 14000
C) 16000
D) 20000

Cowshal to A aur B bol rha

31. Your friend gives you a savings bond that pays Rs.500 three years from now. If the relevant interest rate for you is 3%, what is the present value of the bond?
A) 485.44
B) 515
C) 546.36
D) 457.57