Nirdesh 2024
Yukti Kala Prelims Round

Annual Tech Fest of RKMVCC

Organised by Department of Computer Science, RKMVCC

> Tick ✓ the correct answer in given circle. Each question carries 3 marks. There is negative marking of 1 for every wrong answer. No question has multiple correct answer.

Name: _____

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1. The digit in the unit position of the integer $1! + 2! + 3! + 4! + \ldots 99! + 100!$ is

   ◯ a. 1   ◯ b. 2   ◯ c. 3   ◯ d. 0

2. Alice and Bob speaks truth in 60% and 70% cases respectively. Find the probability that they contradict each other in a statement.

   ◯ a. 0.13   ◯ b. 0.46   ◯ c. 0.7   ◯ d. 0.48

3. Consider the following pseudo code:

```
function(n){
  final = 0
  i = 1
  while n > 0:{
   remain = n % 2
   n = n / 2
   final = final + (remain * 10)
  i = i * 10
  }
  return final
}
```

   What is the value of function(49)??

   ◯ a. 100011   ◯ b. 110010   ◯ c. 101010   ◯ d. 110001

4. Two sets A and B contain a and b elements respectively. If power set of A contains 16 more elements than that of B, value of a and b are

   ◯ a. 5, 4   ◯ b. 3, 2   ◯ c. 7, 6   ◯ d. None of the above

5. Let A and B be two 3x3 matrices such that $(A + B)^2 = A^2 + B^2$. Then which of the following is true.

   ◯ a. A and B are zero matrices   ◯ b. $(A - B)^2 = A^2 + B^2$

   ◯ c. $(A - B)^2 = A^2 - B^2$ ◯ d. AB is the zero matrix

6. Let $(n_1, n_2, ..., n_{12})$ be a permutation of the numbers 1, 2, ... 12. The number of arrangements with $n_1 > n_2 > n_3 > n_4 > n_5 > n_6$ and $n_6 < n_7 < n_8 < n_9 < n_{10} < n_{11} < n_{12}$ equals:

   ○ a. $\binom{12}{5}$ ○ b. $\binom{12}{6}$ ○ c. $\binom{11}{6}$ ○ d. $\frac{11!}{2}$

7. The probability that there will be 53 sundays in a year of 20th century that is chosen randomly is

   ○ a. $\frac{3}{28}$ ○ b. $\frac{2}{28}$ ○ c. $\frac{1}{7}$ ○ d. $\frac{5}{28}$

8. In a dataset of student test scores, the mean score is 75. If one student's score of 95 is added to the dataset, what happens to the mean?

   ○ a. Increases ○ b. Decreases ○ c. Stays the same ○ d. Cannot be determined

9. If all snails are slow and some slow creatures are insects, what can you conclude about insects?

   ○ a. All insects are slow ○ b. Some insects are snails ○ c. Some insects are slow ○ d. Insects are not slow

10. Complete the following sequence: 16, 23, 28, 38, 49, ...

    ○ a. 52 ○ b. 62 ○ c. 55 ○ d. 60

11. n a coded language, "DOCTOR" is coded as "OOCDRT", and "BETTER" is coded as "EEBRTT". Then how "RABBIT" will be written in the same language?

    ○ a. IBBART ○ b. RTIABB ○ c. ABBIRT ○ d. AIBBRT

12. 5: Point A is 15m towards the south of B. Point C is 8m towards East of Point B. Point D is 15m towards the south of Point C. Point E is 3m towards the west of D. Point F is 6m towards the south of Point E. Point G is 2m towards the east of F. What is the shortest distance between A and D?

    ○ a. 8m ○ b. 5m ○ c. 6m ○ d. 9m

13. Consider the following pseudo code.

```
def function(string str)
{
  reverse(str, 0, length(str)-1);
  append(str, ' ');
  n = length(str);
  j = 0;
  for( i = 0; i < n; i = i + 1){
   if(str[i] is ' '){
    reverse(str, j, i-1);
    j = i + 1;
   }
  }
 trim(str);
 return str;
}
```

   In the following pseudocode, reverse(str, i, j) reverses the string str from i^{th} index to j^{th} index, append(s1, s2) concatenates string s1 with string s2, trim(str) removes the trailing spaces at the end of the string str and length(str) returns the length of the string.
   What will be the value of the function("DRAW LIVE")?

   ○ a. DRAW LIVE ○ b. EVIL WARD ○ c. LIVE DRAW ○ d. WARD EVIL

14. How many pairs of letters are there in the word "RELATIVE" each of which has as many letters between them as in the English alphabetical series (both forward and backward direction) as they have between them in the English alphabetical series?

    ○ a. Two ○ b. More than Four ○ c. Three ○ d. Four

15. How many three digit numbers can be formed such that all the digits are even?

    ○ a. 60   ○ b. 40   ○ c. 20   ○ d. 30

16. There are two circles X and Y. The radius of circle X has $\frac{1}{4}$th of the radius of Y. Circle X rolls around circle Y. At the end of how many revolutions of X will the center of the circle first reach at its starting point?

    ○ a. 4   ○ b. 2   ○ c. 8   ○ d. 5

17. What is the 7th number of the sequence: 2, 2, 12, 12, 30, 30, ...

    ○ a. 30   ○ b. 42   ○ c. 56   ○ d. 60

18. In a family, there are nine members J, K, L, M, N, O, P, Q, and R. L is the brother of N, N is the sister of Q. O is the daughter of P's son. J is the son of M. M is the wife of Q. N is unmarried. R is K's mother-in-law. N is K's sister-in- law. L has a child. How many female members are there in the family?

    ○ a. Two   ○ b. Four   ○ c. Three   ○ d. Five

19. The coefficients of rth and $(r+4)^{th}$ term is equal in the expansion of $(1+x)^{20}$ are the same. Find the value of r.

    ○ a. 8   ○ b. 7   ○ c. 10   ○ d. 9

20. If the difference between mean and mode is 48 and the value of median is 12. Find the mean.

    ○ a. 38   ○ b. 28   ○ c. 42   ○ d. None of the above

Rough Work