

# RAMAKRISHNA MISSION VIDYAMANDIRA

Belur Math, Howrah – 711 202

## UG, ADMISSION TEST – 2023 COMPUTER SCIENCE

Date : 17-07-2023

Full Marks : 50

Time: 01·00 p.m. – 2·00 p.m.

### Instructions for the candidates

Answer all the questions given below. Each question carries 2 marks for correct answer and –1 mark for wrong answer. Tick (✓) the correct option on the **OMR SHEET**. The Tick must be very clear — if it is smudgy or not clear, no marks will be awarded. Unanswered questions will not be awarded. Multiple answers will be considered as wrong answer. **Calculator is not allowed.**

1. Value of  $\lim_{x \rightarrow 0} \frac{\log(1+x)^{-x}}{x^2}$  is

- a) 1                                      b) -1                                      c)  $\frac{1}{2}$                                       d)  $\infty$

2.  $\lim_{n \rightarrow \infty} \left[ \frac{1}{n^3+1} + \frac{4}{n^3+1} + \frac{9}{n^3+1} + \dots + \frac{n^2}{n^3+1} \right]$  is equal to

- a)  $\frac{2}{3}$                                       b)  $\frac{1}{3}$                                       c) 1                                      d) 0

3. If  $y = \tan^{-1} \left( \frac{a \cos(x) - b \sin(x)}{b \cos(x) + a \sin(x)} \right)$ , then  $\frac{dy}{dx} =$

- a)  $\frac{-a}{b}$                                       b)  $\frac{-b}{a}$                                       c) 1                                      d) -1

4. The period of oscillation of a simple pendulum is directly proportional to the square root of its length. If there is an error of 2% in measuring its length, the percentage error in the period will be:

- a) 2                                      b) 1                                      c)  $\sqrt{2}$                                       d) 4

5. A stone is projected vertically upward from a height of 112ft from the earth and the stone moves according to the law  $S = 96t - 16t^2$ . Then the greatest height it reaches from the earth is:

- a) 144ft                                      b) 118ft                                      c) 256ft                                      d) 230ft

6. The  $n^{\text{th}}$  derivative of  $\frac{3x+5}{x+2}$  is

- a)  $\frac{(-1)^n n!}{(x+2)^{(n+1)}}$                                       b)  $\frac{(-1)^{(n+1)} n!}{(x+2)^{(n+1)}}$                                       c)  $\frac{(-1)^n n!}{(x+2)^{(n+2)}}$                                       d) none of these

7. The value of  $\int \frac{dx}{(1+x)\sqrt{(1-x^2)}}$  is
- a)  $\sqrt{\frac{1-x}{1+x}} + c$       b)  $\sqrt{\frac{1+x}{1-x}} + c$       c)  $-\sqrt{\frac{1-x}{1+x}} + c$       d)  $-\sqrt{\frac{1+x}{1-x}} + c$
8. The area bounded by the parabola  $y^2 = 2x$  and the ordinates  $x = 1$  and  $x = 4$  is given by,-
- a)  $\frac{\sqrt{2}}{3}$       b)  $\frac{\sqrt{3}}{2}$       c)  $\frac{14\sqrt{3}}{13}$       d)  $\frac{28\sqrt{2}}{3}$
9.  $\int_{-\pi/2}^{\pi/2} \log\left(\frac{2-\sin\theta}{2+\sin\theta}\right) d\theta$  is equal to
- a) 1      b) 0      c) 2      d) none of these
10. Value of  $\lim_{x \rightarrow 0} \frac{x+|x|}{2x}$  is
- a) 1      b) 0      c) does not exist      d) none
11. A train having length 500 m crossed a man standing on the platform in 20 seconds. And the same train crosses the platform in 90 seconds. Then find the length of the platform in meters.
- a) 1550      b) 1750      c) 1050      d) 950
12. A basket contains 4 red, 5 blue, and 3 green marbles. If three marbles are picked at random, what is the probability that at least one is blue?
- a) 1/44      b) 1      c) 1/37      d) 37/44
13. Six bells commence tolling together and toll at intervals of 2,4,6,8,10 and 12 seconds respectively. In 30 minutes how many times do they toll together?
- a) 12      b) 10      c) 16      d) 24
14. The average weight of 4 men is increased by 3 kg when one of them who weighs 120 kg is replaced by another man. What is the weight of the new man?
- a) 130      b) 136      c) 144      d) None
15. A political party orders an arch for the entrance to the ground in which the annual convention is being held. The profile of the arch follows the equation  $y = 2x - 0.1x^2$ , where  $y$  is the height of the arch in meters. The maximum possible height of the arch is:
- a) 8 meters      b) 10 meters      c) 12 meters      d) 14 meters
16. An automobile plant contracted to buy shock absorbers from two suppliers X and Y. X supplies 60% and Y supplies 40% of the shock absorbers. All shock absorbers are subjected to a quality test. The ones that pass the quality test are considered reliable. Of X's shock absorbers, 96% are reliable. Of Y's shock absorbers, 72% are reliable. The probability that a randomly chosen shock absorber, which is found to be reliable, is made by Y is:
- a) 0.288      b) 0.334      c) 0.667      d) 0.720

17. 5 skilled workers can build a wall in 20 days; 8 semi-skilled workers can build a wall in 25 days; 10 unskilled workers can build a wall in 30 days. If a team has 2 skilled, 6 semi-skilled and 5 unskilled workers, how long will it take to build the wall?
- a) 20                                      b) 10                                      c) 16                                      d) 15
18. Consider the following statements:
- i) If  $P=\{m, n\}$  and  $Q=\{n, m\}$ , then  $P \times Q = \{(m,n), (n,m)\}$ .
- ii) If A and B are non-empty sets, then  $A \times B$  is a non-empty set of ordered pairs  $(x, y)$  such that  $x \in A$  and  $y \in B$ .
- iii) If  $A=\{1, 2\}$ ,  $B=\{3, 4\}$ ; then  $A \times (B \cap \phi) = \phi$
- Which of the above statements are correct?
- a) 1 and 2 only                              b) 2 and 3 only                              c) 1 and 3 only                              d) 1, 2 and 3
19. Select the option in which the numbers share the same relationship as that shared by the given pair of numbers. 76:171
- a) 24:39                                      b) 52:115                                      c) 28:63                                      d) 62:135
20. How many letters are there in the word 'MONKEY' which remain the same in its position, if the letters are arranged in descending order alphabetically?
- a) One                                      b) Two                                      c) Three                                      d) More than three
21. At what angle the hands of a clock are inclined at 15 minutes past 5?
- a)  $72\frac{1}{2}$  degree                              b)  $67\frac{1}{2}$  degree                              c)  $58\frac{1}{2}$  degree                              d) 64 degree
22. If 'GRASP' is coded as 'TIZHK', what will be coded as 'OVTZXB'?
- a) LEGATE                                      b) LEAGUE                                      c) LEGACY                                      d) LEDGER
23. Six persons A, B, C, D, E and F sit in two rows of three persons each. If E is not at any end of rows, D is second to the left of F, C is the neighbour of E and is sitting diagonally opposite to D and B is the neighbour of F, then who will sit opposite of B?
- a) A                                      b) E                                      c) C                                      d) D
24. If R is a relation on a finite set A having n elements, then the number of relations on A is
- a)  $2^n$                                       b)  $2^{n^2}$                                       c)  $n^2$                                       d)  $n^n$
25. Suppose  $A_1, A_2, \dots, A_{30}$  are thirty sets each with five elements and  $B_1, B_2, \dots, B_n$  are n sets each with three elements such that

$$A_1 \cup A_2 \cup \dots \cup A_{30} = B_1 \cup B_2 \cup \dots \cup B_n = S.$$

If each element of S belongs to exactly ten of the  $A_i$ 's, where  $i= 1$  to 30 and exactly 9 of the  $B_j$ 's, where  $j = 1$  to n, then the value of n is

- a) 15                                      b) 135                                      c) 45                                      d) 90

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