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PO Belur Math, Howrah, West Bengal 711 202  
School of Mathematical Sciences  
Department of Computer Science

ENTRANCE TEST FOR MSc IN BIG DATA ANALYTICS (A)

Date: 20 May 2018

Max Marks: 160

Time: 2 hrs

Student's Name (in block letters):

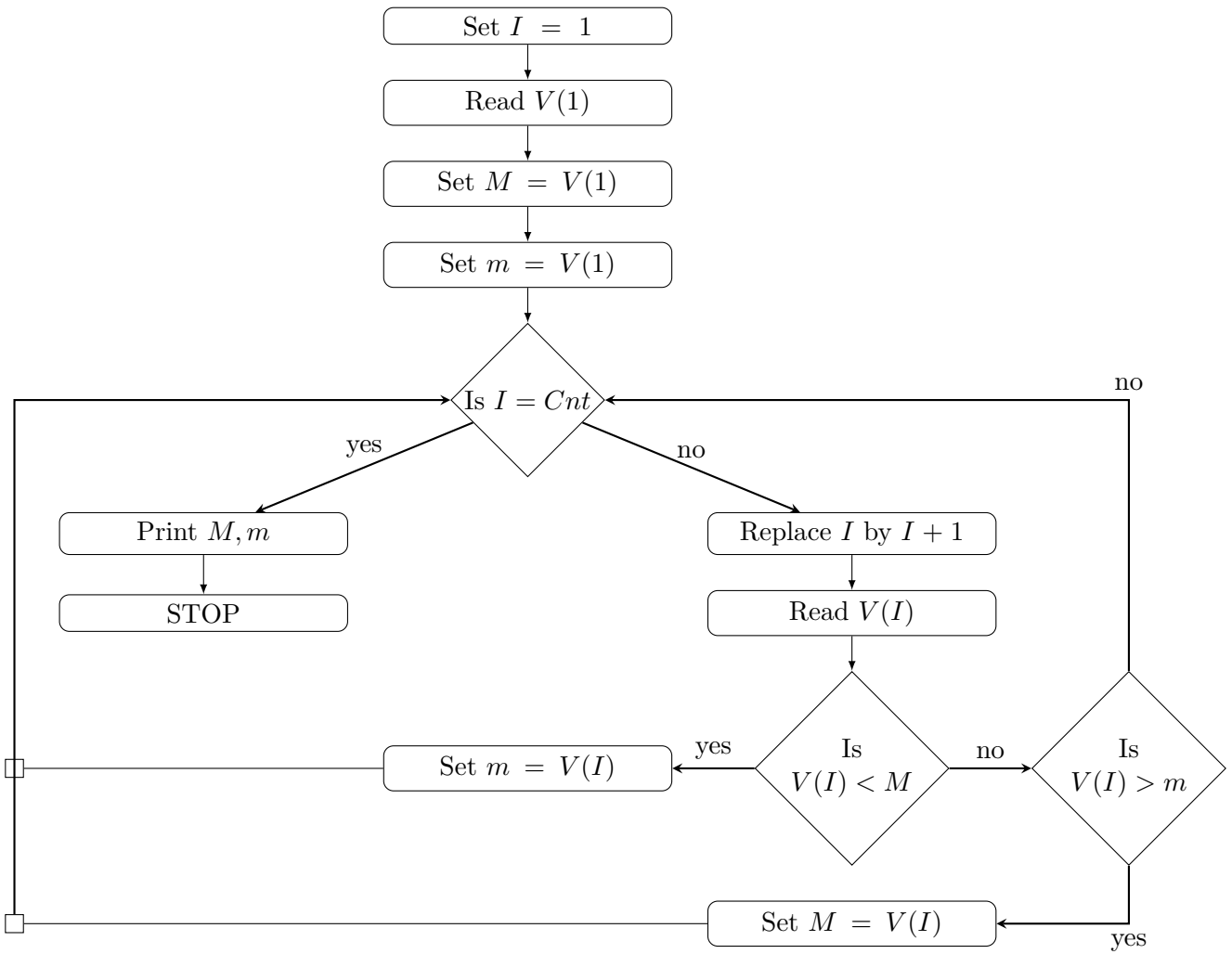
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The questions have exactly one correct answer. Marking scheme for each question: 4 points - correct answer, 1 point - non-attempts, 0 point - incorrect answer.

- There are three boxes: 1 with 10 red balls, 1 with 10 blue balls, 1 with 5 red and 5 blue balls. Box 1 has a sticker label that says "Red balls", Box 2 has a sticker label that says "Blue balls", Box 3 has a sticker label that says "Mixed colored balls", It is known that all the boxes are incorrectly labeled. If a randomly selected ball from Box 3 is red, then what is the probability of picking a blue ball from Box 1?  
a. 1                      b. 0                      c.  $\frac{1}{2}$                       d.  $\frac{1}{4}$
- The interior angles of a polygon are in A.P. The smallest angle is  $120^\circ$  and the common difference is  $5^\circ$ . Then the number of sides of the polygon is  
a. 5                      b. 9                      c. 15                      d. 20
- The largest interval for which the series  $1 + (1 - x) + (1 - x)^2 + \dots$  can be summed is  
a.  $0 < x < 1$               b.  $0 < x < 2$               c.  $-1 < x < 1$               d.  $-2 < x < 2$
- The coefficient of  $x^{203}$  in the expansion of  $(x - 1)(x^2 - 2)\dots(x^{20} - 20)$  is  
a. -35                      b. 28                      c. 13                      d. -20
- Consider that two circles will always intersect at two points. So two circles will generate 3 regions. This way how many regions will be generated with 4 circles if all pairs intersect with each other  
a. 16                      b. 15                      c. 14                      d. 13
- Is it possible to find a point within a trapezoid so that lines drawn from it to all the 4 vertices will divide the trapezoid into 4 triangles of equal areas  
a. always possible                      b. never possible                      c. Sometimes possible  
d. triangles cannot be formed
- If a triangle has 3 sides of length 5, 6 and 8 units, the triangle  
a. cannot be formed              b. has all angles acute              c. has one obtuse angle              d. is right angled

8. The value of  $\sin 15^\circ$  is
- a.  $\frac{\sqrt{6}+\sqrt{2}}{4}$       b.  $\frac{\sqrt{6}-\sqrt{2}}{4}$       c.  $\frac{\sqrt{6}}{2}$       d.  $\frac{\sqrt{6}+1}{2}$
9. If  $Cnt = 6$  and  $V(1) = 7, V(2) = 4, V(3) = 9, V(4) = 3, V(5) = 0, V(6) = 1$ . Using the following algorithm, find the values of  $M$  and  $m$ .



- a.  $M=7, m=0$       b.  $M=9, m=0$       c.  $M=7, m=1$       d.  $M=9, m=1$
10. The number of roots of the equation  $\cos^8 \theta - \sin^8 \theta = 1$  in the interval  $[0, 2\pi]$  is
- a. 5      b. 4      c. 2      d. 3
11. The number of roots of the equation  $\sin 2x - 2 \sin x - \cos x + 1 = 0$  in the range  $0 \leq x \leq \frac{\pi}{2}$  is
- a. 2      b. 3      c. 1      d. None of the others
12. A,B,C,D,E are 5 distinct numbers. B is greater than all except A. C is less than all except E. Arrange the numbers in descending order
- a. ABCDE      b. ABDCE      c. DABCE      d. ECDBA

13. Facing East I move 5 meters, then I turn left and move 5 meters again, then I turn left again and move 5 meters more. I then turn right and and move 5 meters more. What is my final direction and distance from the starting point
- a. North, 10 meters  
 c. East, 15 meters
- b. North, 20 meters  
 d. South, Back to the starting point

14. Which of the following function is differentiable at  $x = 0$ ?

- a.  $|x| - e^{|x|}$       b.  $|x| - e^{-|x|}$       c.  $|x| + e^{|x|}$       d.  $|x| + e^{-|x|}$

15. If  $f : \mathcal{R} \rightarrow \mathcal{R}$  be a continuous function satisfying  $f(x) + f(4 - x) = 3$ , then

$$\int_0^4 f(x) dx$$

is equal to

- a. 3                      b. 4                      c. 6                      d. 12

16. The point of reflection of the point  $(5, -7)$  with respect to the straight line  $2x - 3y = 18$  is

- a.  $(3, -4)$               b.  $(1, -1)$               c.  $(-3, -4)$               d.  $(-1, 1)$

17. The locus of a point, sum of whose distances from two point  $(c, 0)$  and  $(-c, 0)$  is constant and greater than  $2c$  is

- a. Circle              b. Parabola              c. Ellipse              d. Hyperbola

18. Let

$$f(x) = \begin{cases} 10x + 3, & \text{when } x \text{ is an integer} \\ 0, & \text{othersiwe.} \end{cases}$$

be a real function. Then  $\int_0^{100} f(x) dx =$

- a. 50803                      b. 50800                      c. 0  
 d. can not be determined

19. Let  $[x]$  denote the greatest integer not greater than  $x$ . Then  $\lim_{x \rightarrow 9.99} [x] =$

- a. 10                      b. 9                      c. 0                      d. 9.99

20. What is the maximum number of intersections possible of  $n$  straight lines?

- a.  $\frac{n(n+1)}{2}$               b.  $\frac{n^2}{2}$               c.  $\frac{n^4}{4}$               d.  $\frac{n(n-1)}{2}$

21. A 13-foot ladder slides down a wall at 12 ft/sec. At what speed is the bottom sliding out (in ft/sec) when the top is 5 feet from the floor?

- a. 13                      b. 12                      c. 8                      d. 5

22. What is  $2^{11} \cos x \cdot \cos 2x \cdots \cos 2^{10}x =$

- a.  $\frac{\cos 2^{11}x}{\cos x}$               b.  $\frac{\sin 2^{11}x}{\sin x}$               c.  $\frac{\sin 2^{11}x}{\cos x}$               d.  $\frac{\cos 2^{11}x}{\sin x}$

23. The number of perfect cubes among first 4000 positive integers  
 a. 14                      b. 15                      c. 16                      d. 13
24. In how many ways can you select 30 men to occupy 30 chairs in a row so that a certain man is never on an extreme chair.  
 a.  $30!$                       b.  $28! \times 2!$                       c.  $28 \times 29!$                       d.  $30! - 29!$
25. Assume number of days in a year is 365 (nit a leap year). Find the number of ways there is at least one repeated birthday of 100 people.  
 a.  $365^{100} - 365!$     b.  $364! \times 2!$                       c.  $100^{365} - 100!$     d.  $100^{365} - 365!$
26. In how many ways can 3 women and 7 men stand in a row so that no two women stand side by side.  
 a.  $7! \times 3!$                       b.  $10! - 3!$                       c.  $10! - 7!$                       d.  $8! \times 7 \times 6$
27. The number of roots of the equation  $z^2 + |z|^2 = 0$ , where  $z$  is a complex number is  
 a. 0                      b. 1                      c. 2                      d. infinitely many
28. The number of roots of the equation  $x = e^x$ , is  
 a. 0                      b. 1                      c. 2                      d. infinitely many
29. The equation  $|f(x) + g(x)| = |f(x)| + |g(x)|$  is same as  
 a.  $f(x) > 0, g(x) > 0$     b.  $f^2(x) + g^2(x) = 0$     c.  $f(x)g(x) > 0$                       d.  $f(x)g(x) < 0$

### Directions for questions 30-32:

Refer to the following information to answer the questions that follow.

$S_1, S_2, S_3, S_4, S_5, S_6, S_7, S_8, S_9$  and  $S_{10}$  are 10 students from RKMVERI. They all went for an internship into particular fields A, B, C, D and E. Four of them worked in two fields each in such a way, that none of them was doing internships in the same set of fields.

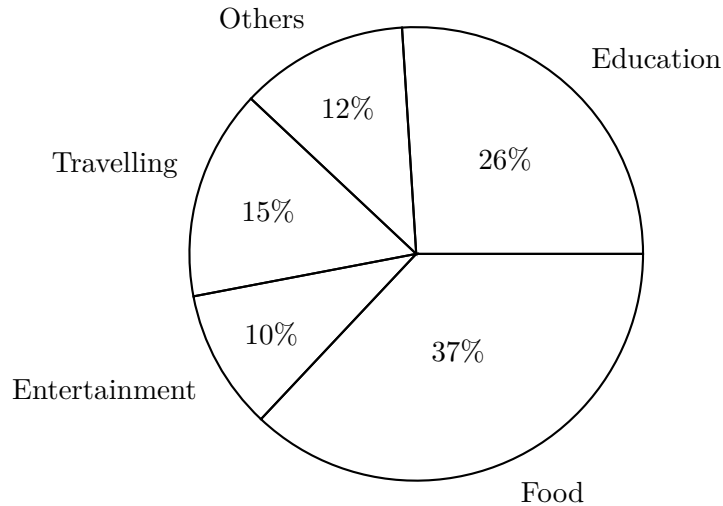
- 2 students had D as their field.
- $S_1$  interned in A and E and earned the least.
- All the students had different earnings.
- $S_5$  and  $S_9$  interned in A.
- C and D were not taken together by any student.
- $S_3$  worked in C, earned more than  $S_{10}, S_2$  and  $S_7$  and had the third highest earning.
- $S_8$  interned in B and earned less than only  $S_6$ , who had two internships.
- $S_2$  earned more than  $S_7$  but less than  $S_{10}$ .
- $S_7$  worked in A and earned more than  $S_4$ , who interned with B and E.
- $S_5$  and  $S_9$  did not intern in the fields that  $S_6$  interned in.

30. Which 2 fields did  $S_6$  intern in?  
 a. B, E                      b. A, E                      c. A, B                      d. None of these
31. The highest earner among the students is  
 a.  $S_3$                       b.  $S_6$                       c.  $S_{10}$                       d. None of these
32. Which of the following fields had the most number of interns?  
 a. B                      b. E                      c. B or E                      d. None of these

**Directions for questions 33-36:**

Refer to the following information to answer the questions that follow.

Study the following pie-chart and table carefully to answer the questions given below: The following pie-chart shows the distribution of the monthly family budget of a person.



The following table shows the further distribution (in percent) of the above-mentioned items among the four family members i.e Prabir (the person himself), Sanchita (his wife), Rohit (son), and Srishti (his daughter). His monthly family budget is Rs. 80,000.

	Education	Food	Entertainment	Travelling	Others
Prabir	10	30	15	40	20
Sanchita	5	25	30	10	35
Rohit	40	25	25	25	20
Srishti	45	20	30	25	25

33. What is the average expenses of Prabir?  
 a. 17,880                      b. 17,770                      c. 18,880                      d. 18,770
34. What is the approximate percentage increase in the amount which Srishti enjoys for entertainment as compared to Rohit for the same?

- a. 17%                      b. 20%                      c. 23%                      d. 26%

35. The average expenses of Rohit is approximately what percent of the average expenses of Sanchita?

- a. 143%                      b. 147%                      c. 150%                      d. 154%

36. Find the difference (in percentage of the budget) between the average expenses of Education and the average expenses on Entertainment of the couple?

- a. 0.6%                      b. 0.4%                      c. 0.2%                      d. 0.8%

### Directions for questions 37-40:

Refer to the following information to answer the questions that follow.

Consider the following table that contains the information regarding the change of price for some products of a pharmaceutical company. The prices of all the products are the prices of 10 tablets.

Table 1: Change of Price of Some Drugs of a Company

Drug (10 Tablets)	Existing Price (Rs.)	Revised Price (Rs.)
Antacid	1.50	2.50
Anti Hypertensive	10.00	12.50
Anti Ashmatic	20.00	26.00
Anti pyretic	5.00	8.00
Anti Flatulent	7.50	9.00

37. What is the percentage increase in the expenditure of a person for one year if he consumes 10 tablets of Anti Pyretic in one week?

- a. 70%                      b. 65%                      c. 55%                      d. 60%

38. If a family has a hypertensive and an asthmatic patient, where the person with hypertension has to take three Anti Hypertensive tablets per day and the ashmatic patient has to take two Anti Ashmatic tablets every alternate day. What will be the increase in expenditure on the two patients for 30 days?

- a. Rs. 38.70                      b. Rs. 33.40                      c. Rs. 40.50                      d. Rs. 44.20

39. A man is prescribed a combination of Antacid and Anti Hypertensive in the ratio 2:3 for the first month and of Anti Hypertensive and Anti Flatulent in the ratio 3:4 for the second month. He purchased all the medicines under the existing price. His expenditure in the second month increased by what percentage more than in the first month?

- a. 25%                      b. Data Inadequate                      c. 30%                      d. 10%

40. In Question 39 average cost per tablet for the first week is what percentage less than the average cost per tablet for the second week?

- a. 22.35%                      b. 30.45%                      c. 24%                      d. 18.65%

