SciQuest

CLASS IX

by Zaariya

16th November, 2019. TIME ALLOTTED: 2 HOURS

INSTRUCTIONS TO CANDIDATES

1. The Answer Sheet is kept inside this Test Booklet. When you are directed to open the Test Booklet, take out the Answer Sheet and fill in the particulars carefully.
2. This examination paper contains **EIGHTY(80)** questions and comprises **TWENTY SEVEN(27)** printed pages. The maximum marks are 200.
3. There are **FIVE(5)** parts in this question paper A, B, C, D and E having 20, 15, 15, 15 and 15 questions respectively.
4. The **last 5 questions** of each part (except A-MAT) are worth **+FOUR(4)** marks each and a wrong answer will result in deduction of **ONE(1)** mark.
5. The remaining questions are worth **+TWO(2)** marks and a wrong answer will result in deduction of **HALF(1/2)** mark from the total score.
6. Unattempted questions will not affect your score.
7. There is only one correct response to each question. Filling up more than one response in any question will be treated as a wrong response.
8. No candidate is allowed to carry any textual material, printed or written, bits of papers, pager, mobile phone, any electronic device, etc. inside the examination room/hall.

Personal Details

Name of the Candidate

Registration Number | | | | | | | | | | |

Centre Code | | | |

Part A - MAT

1. After a meeting between four colleagues, everyone shook hands with everyone else. What is the total number of handshakes?

   (a) 3 (b) 6 (c) 9 (d) 12

2. If Nepal : Kathmandu :: Australia : ?

   (a) Sydney (b) Melbourne (c) Canberra (d) Brisbane

   Read this paragraph carefully and answer questions 3-4, which are based on this.

   Adesh, Aniruddha, Ashwin, Nikhil and Soumik are sitting on a bench. Ashwin is left to Nikhil, but right to Aniruddha. Adesh is in right direction of Nikhil. Soumik is sitting between Nikhil and Adesh.

3. Who is to the immediate right to Aniruddha?

   (a) Adesh (b) Ashwin (c) Nikhil (d) Soumik

4. Who is the second left in this sitting arrangement?

   (a) Adesh (b) Ashwin (c) Nikhil (d) Soumik

5. What does the nearest meaning of the idiom “Speak of the Devil”?

   (a) Ancient stories and mythologies on monsters
   (b) Bad things can happen to good people
   (c) Good things can happen to bad people
   (d) When the person about whom you were just talking shows up

Space for rough work

6. If sequence of last half of English alphabet is reversed, then which of these pairs has exactly 10 letters in between?

   (a) E and P (b) E and Z (c) E and X (d) None of these

7. Letters R to X stand for different notations as indicated below:

   (a) R: Addition (c) T: Multiplication (e) V: Is equal to (g) X: Is less than.
   (b) S: Subtraction (d) U: Division (f) W: Is greater than

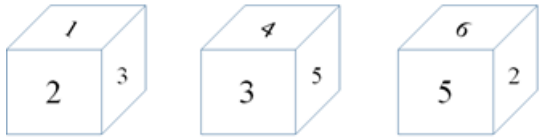
   Based on these four alternatives given below, only one is correct according to the given letter symbols. Choose the correct one.

   (a) 15U5R3V2T3 (b) 15U5W3R2T3 (c) 15S5T3W2R3 (d) 15R5U3V2R3

8. Starting from the main gate of NISER, Suraj walked 20m towards South. He then turned left and walked 30m. He then turned left, walked 20m, again turned left and walked 40m to reach a point Y. How far and in which direction is the place Y from NISER main gate?

   (a) 20m East (b) 10m East (c) 20m West (d) 10m West

9. A dice with six faces is marked with six numbers 1, 2, 3, 4, 5 and 6 respectively. This dice is rolled three times and three positions are shown as:-

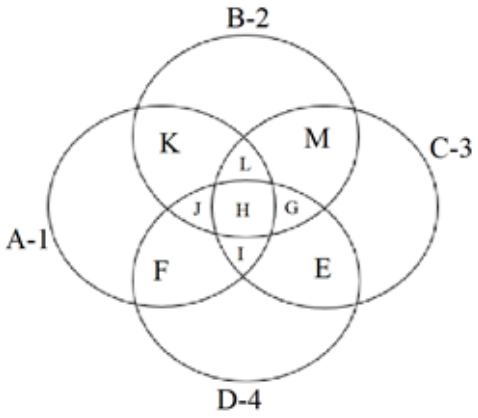


   What is the number opposite to 1?

   (a) 4
   (b) 5
   (c) 6
   (d) Data Insufficient

Space for rough work

Study the following diagram and instruction carefully to answer questions 9-10, which are based on this diagram. Circles A-1, B-2, C-3 and D-4 respectively stands for peripherals having Graphics Card, peripherals having a RAM, peripherals having a Hard drive and peripherals having a USB



10. Which of the regions represent peripherals having Graphics Card, RAM and Hard drive, and not USB?

    (a) L

    (b) K

    (c) Union of L and D

    (d) Unions of K, L and M

Space for rough work

11. Which of the regions represents peripherals having a USB and Hard drive only?

    (a) C

    (b) D and E

    (c) E

    (d) None of these

12. Fibonacci series is a series, in which each number is the sum of the two preceding numbers. The simplest example of a Fibonacci series is: 0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55... From the following observations of numbers of Fibonacci series, which decision can you take instantly?

    34 + 13 = 47
    34 - 13 = 21
    5 + 3 = 8
    5 - 3 = 2
    21 + 8 = 29
    21 - 8 = 13
    55 + 34 = 89
    55 - 34 = 21

    (a) Addition or subtraction of any prime number with a Fibonacci number gives a prime number

    (b) Any prime number can be achieved either by adding or subtracting Fibonacci numbers

    (c) Either addition or subtraction of two Fibonacci numbers gives a prime number

    (d) All of these

13. Find the next number of the following series:

    131, 137, 139, 149, 151, 157, 163,

    (a) 167 (b) 169 (c) 171 (d) 173

Space for rough work

14. A special coding system applies only to English words with odd number of letters. In that system, EDUCATION is coded into NDICATUOE and RIVER is coded into RIVER. Then how is IRONMAN coded in the similar system?

(a) IRONMAN (b) NAMNORI (c) MANNIRO (d) NRMNOAI

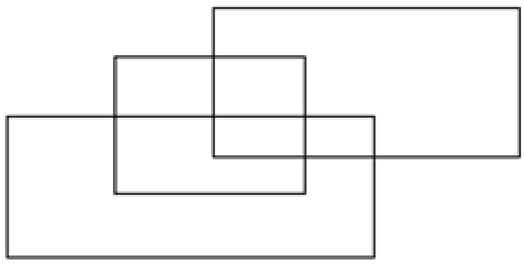
15. DNA is an important biochemical structure. It is made up with two parallel strands. These strands are made up with four types of Nitrogen bases- A, T, G and C. Every A and G of one strand is bonded with respectively T and C of another strand. If a scientist finds that a DNA molecule contains 20% of T in terms of number, then what is the percentage of C?

(a) 30% (b) 60% (c) 20% (d) Data Insufficient

16. If a mirror is placed in place of ||, then how would the following sequence look like in that mirror?

|| #8$G9J9QGSK$

17. What is the total number of rectangles in this image?



(a) 7 (b) 9 (c) 11 (d) 13

Space for rough work

18. In a coding system, English alphabets are coded into numbers. In that system, A, B, C, D, E and F are coded as 5, 12, 21, 32, 45 and 60. What will be C + H + O in this system?

(a) 418 (b) 411 (c) 409 (d) 402

19. The problem figure shows the top view of an object. Identify the correct elevation (view from the arrow side) from the four options given below.

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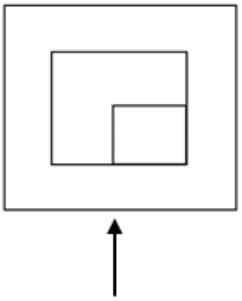
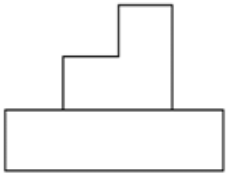
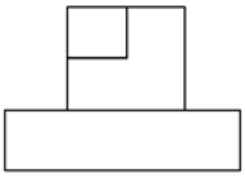


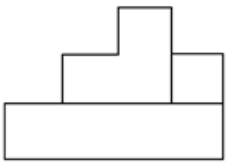
(a)



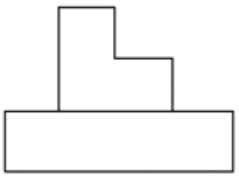
(b)



(c)



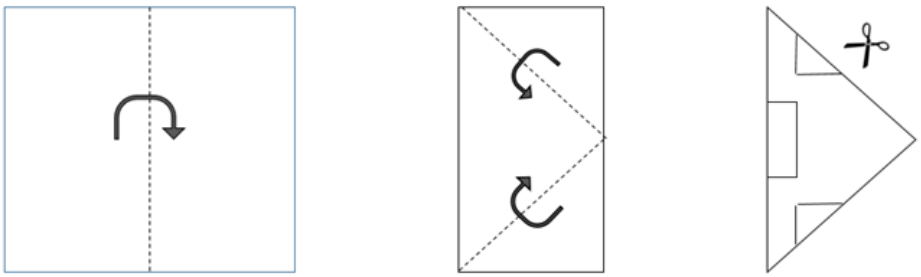
(c)



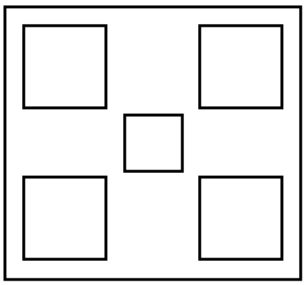
3

Space for rough work

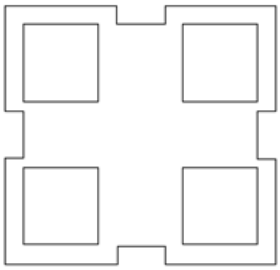
20. The following figures show the sequence of folding and then cutting a piece of paper. Which of the four options below would most closely resemble the unfold form of the paper after cutting?



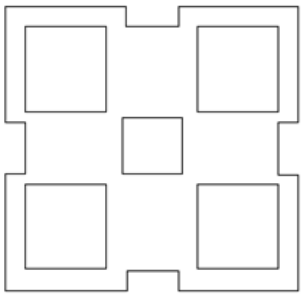
(a)



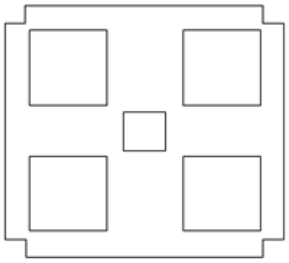
(b)



(c)



(d)



Space for rough work

21. You're going to the market which is $30km$ away from your home. The first $10km$, you went at a speed of $20km/hr$ and the rest at $40km/hr$. What should be the constant speed if you were to travel the whole distance in the same time?

    (a) $20km/hr$ (b) $30km/hr$ (c) $40km/hr$ (d) $50km/hr$

22. Assume you're trying to push a box on a rough surface. The box doesn't move when you try to push with a force of 10N. Now you push it with a 5N force and the box is still at rest. At this moment what is the opposing force and what is its magnitude?

    (a) Gravitation, 5N

    (b) Gravitation, 10N

    (c) Friction, 5N

    (d) Friction, 10N

23. A bus starts to move steadily and attains 50m/s in 10s. Then the bus decreases its speed uniformly and stops in 10s. What is the average acceleration of the bus in the last 10s?

    (a) $5m/s^2$ (b) $-5m/s^2$ (c) $500m/s^2$ (d) $-500m/s^2$

24. The weight of an object is W at earth where acceleration due to gravity is g. Now that object is taken to another planet where acceleration due to gravity is $9g$. What is the mass of that object at the new planet?

    (a) $9W$ (b) $\frac{W}{g}$ (c) $81W$ (d) $9\frac{W}{g}$

Space for rough work

25. Which are true for Uniform Circular motion –

    i. speed remains constant
    ii. velocity remains constant
    iii. angular velocity is constant

    (a) ii and iii (b) i and ii (c) i and iii (d) All of the above

26. Both the mechanical waves - transverse and longitudinal, can be produced in:

    (a) Only in solid (b) Only in liquid (c) Both in solid and liquid (d) Solid, liquid, gas

27. Ram throws a ball upward to a height H in time t. Considering the motion of the ball till the height H, what is the work done by gravity in this period if the mass of the ball is m?

    (a) $-mgH$ (b) $\frac{mgH}{2}$ (c) $\frac{-mgH}{2t}$ (d) mgH

28. A pumpkin and a berry are released from a tall building. Assuming the surface is plain everywhere and neglecting the effect of air resistance which of the following true?

    (a) Pumpkin will touch the surface first
    (b) Both will hit the surface simultaneously
    (c) Berry will touch the surface first
    (d) Depends on mass distribution

29. What happens to the inertia of an object when its velocity is doubled?

    (a) The inertia will be halved
    (b) The inertia will be doubled
    (c) The inertia will remain same
    (d) None of the above

Space for rough work

30. Two bike riders Virat and Sachin are in a race. At a certain point on the track, both have the same velocity but Sachin moves with that constant speed and Virat has a decreasing rate of acceleration. Who will win the race?

    (a) Virat

    (b) Sachin

    (c) Both will cross the finish line simultaneously

    (d) Virat might not reach the finish line

31. If your weight on the surface of the earth is W then at what height from the surface will you weight $W/2$? (Given: R is the radius of Earth)

    (a) $\sqrt{2}R$ (b) $(\sqrt{2}-1)R$ (c) $(\sqrt{2}+1)R$ (d) R

32. Suppose you are traveling at a constant speed of $5m/s$. Suddenly you notice a friend of yours at a distance of $0.52km$ moving at a speed of $3m/s$. You wanted to over cross him as soon as possible so you gave your vehicle an acceleration of $10m/s^2$. At what time will you just overcome your friend?

    (a) 6 seconds (b) 10 seconds (c) 20 seconds (d) 8 seconds

33. A man of weight $60N$ is standing on a weighing machine inside a lift. And the lift starts to accelerate with the value of g in an upward direction. What would the person experience while in the lift?

    (a) Will experience an extra weight due to the upward acceleration of lift

    (b) Will experience a loss of weight due to upward acceleration of lift

    (c) Will experience weightlessness

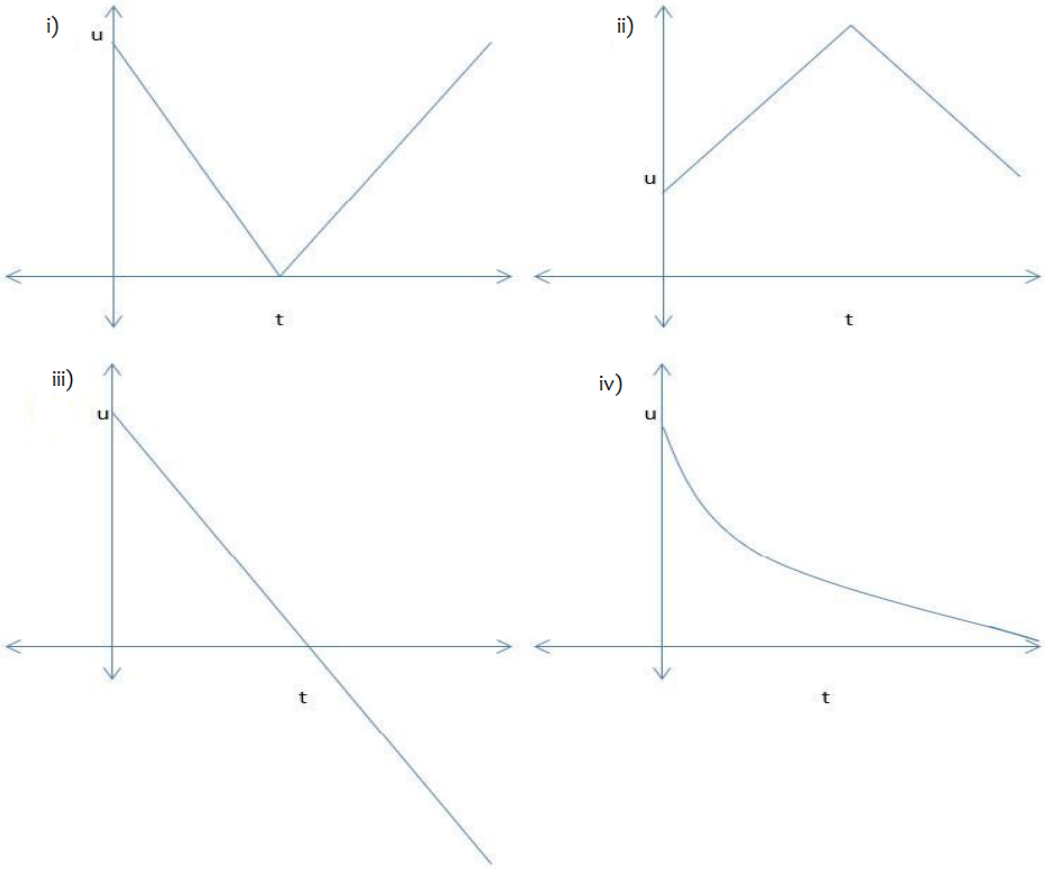
    (d) There won't be any difference

Space for rough work

34. An object is projected vertically upwards from the ground and rises to a height of 20 m. Calculate the time the ball will take to hit the ground again after the time of projection. (Note: Acceleration due to gravity is $10m/s^2$)

    (a) 2 seconds (b) 4 seconds (c) 5 seconds (d) 6 seconds

35. Ram throws a ball high up into the sky to a height H and it took t time to reach there with initial velocity u. Which is the correct $v - t$ graph for this motion?



Space for rough work

Part C- MATHEMATICS

36. If a and b are non-zero real numbers such that $ab = a - b$. Then $\frac{a}{b} + \frac{b}{a} - ab =$

(a) 0 (b) 1 (c) 2 (d) -1

37. $f(x) = x^6 - x^5 - x^3 - x^2 - x$ and $g(x) = x^4 - x^3 - x^2 - 1$. Then, if a, b, c and d are the roots of $g(x)$, what is $f(a) + f(b) + f(c) + f(d)$?

(a) 3
(b) -3
(c) 2
(d) 0

38. Let A and B refer to two regular polygons with interior angles 'a' and 'b' respectively. If $a + b$ is 15 less than 120 and $3b - 2a$ is 15. What are the polygons B and A?

(a) Triangle, Octagon
(b) Triangle, Hexagon
(c) Hexagon, Triangle
(d) None

39. A data set has 7 elements from which there are 4 distinct elements 10,20,30 and 40. 20 is both the median and the mode and 10 occurs at least twice in the data set. If one of the 20's was mistaken for a 60, what is the difference between the mistaken mean and the actual mean?

(a) $\frac{-40}{7}$ (b) $\frac{40}{7}$ (c) $\frac{-60}{7}$ (d) $\frac{60}{7}$

Space for rough work

40. If $a+b+c=0$, then $\frac{a^3}{bc}+\frac{b^3}{ac}+\frac{c^3}{ab}=?$. Here, $a,b,c\neq 0$.

(a) 1

(b) 2

(c) 3

(d) 4

41. $ABCD$ is a quadrilateral that just encloses a circle. Then, which of the following is true?

(a) $AB+AD=BC+BD$

(b) $AB:CD=AD:BC$

(c) $AB+CD=AD+BC$

(d) $AB:AD=BC:CD$

42. If a is a natural number greater than 1, how many solutions are there for $\frac{3a^2}{a^2-1}$ to be a natural number?

(a) 1 (b) 3 (c) Infinite (d) None

43. How many natural numbers n exist for which $\frac{3^n+1}{n^2}$ is a whole number?

(a) 1 (b) 2 (c) 3 (d) 0

Space for rough work

44. A sphere and a right cylinder have the same volume and radius. What is the ratio of the height to radius of the cylinder?

    (a) $4 : 3$
    (b) $3 : 4$
    (c) $1 : 2$
    (d) None

45. Which of the following numbers cannot be written as a sum of two squares?

    (a) 2019
    (b) 2018
    (c) 2017
    (d) 2016

46. $x + y = 12$ and $xy = 35$. What is $x^4 + y^4$?

    (a) 2592
    (b) 4352
    (c) 3026
    (d) 6561

47. What is the last digit of $2^9 + 3^{11} + 4^{15}$?

    (a) 3
    (b) 5
    (c) 7
    (d) 9

48. In a kingdom, there are 10 cities and 4 roads out of each city. Every road ends at a city different from the one it originates from. How many roads are there in total?

    (a) 10000
    (b) 40
    (c) 20
    (d) 32

Space for rough work

49. $|x-5|=7$. Then $x=$?

(a) $12,-2$

(b) $12,-12$

(c) $2,-2$

(d) None

50. If a, b and c are sides of a triangle, then the greatest integral value of $\frac{a}{b+c}+\frac{b}{a+c}+\frac{c}{a+b}$ is atmost

(a) 2

(b) 3

(c) 4

(d) None

Space for rough work

Part D- BIOLOGY

51. We often hear that plants can make their own food while animals cannot. Which of the following observations DOES NOT prove this statement?

    (a) Plants utilize sunlight directly to make their food

    (b) Photosynthesis is generally performed by plants

    (c) Animals indirectly depend on sunlight for their food

    (d) Animals can perform photosynthesis

52. Viruses are so unique in their life cycle in a way that it is hard to tell whether they are living or not. What makes viruses different from other microbes?

    (a) They cause diseases

    (b) They reproduce only outside their hosts

    (c) They behave like a living organism only inside their hosts

    (d) They can be seen with naked eyes

53. It is quite unfortunate that hundreds of species go extinct every day. Human activities have disturbed ecosystems. Which of the following statement(s) support this fact?

    (a) Deforestation and habitat destruction are causing mass extinction

    (b) Extinction of a species disturbs the food chain which causes furth

    (c) er extinctions

    (d) Climate change is not responsible for the mass extinction

    (e) All except c

54. All organisms can be classified into Prokaryotes or Eukaryotes. Which structure(s) of the cell is taken into consideration while grouping organisms into the above two categories?

    (a) Nucleus size

    (b) Nucleus number

    (c) Nuclear membrane

    (d) All of the above

Space for rough work

55. At the age of 12, Sheetal observes unfamiliar changes in her body, such as acne breakouts and enlargement of hips and breasts. The origin of these changes is:

    (a) Psychological

    (b) Hormonal

    (c) Environmental

    (d) Parental

56. Oral Polio Vaccine has saved millions of lives in our country. World Health Organisation has declared India a polio-free country. Keeping the working principle of vaccines in mind, identify the correct statement(s):

    (a) Vaccines contain dead or weakened microbes

    (b) Our bodies kill microbes by producing suitable antibodies and keeps the antibodies for future use

    (c) Vaccines are only for adults

    (d) a and b are both correct

57. Living organisms show variety in cell shape, size, and number. Which of the following is common to all living beings?

    (a) All of them start as a single-celled organism

    (b) The cell number is the same for all

    (c) Cell shapes are not linked to cell function

    (d) All of the above

58. Which of the following is/are true for the test-tube babies?

    (a) These babies develop inside test tubes

    (b) Fertilization takes place only inside the body

    (c) Fertilization takes place inside a test tube

    (d) All of the above

Space for rough work

59. Which of the following lists contains items all of which are produced by microbial activity?

    (a) Milk, curd, bread

    (b) Wine, curd, silk

    (c) Antibiotics, sugar, cotton

    (d) Vinegar, curd, antibiotics

60. Endemic species are organisms exclusively found in a specific area. Which of the following does not endanger their existence?

    (a) Destruction of their habitat

    (b) Introduction of a new species in their habitat

    (c) Destruction of their food source

    (d) None of the above

61. Somali is a mother of two. One day, she buys two cartons of milk from the supermarket - one with a label that reads 'pasteurized', and another of the same brand which reads 'raw milk'. She then does the following:

    A - Feeds milk in the 'pasteurized' carton to her kids without boiling it.
    B - Declares that milk in both cartons has the same chemical composition.
    C - Leaves the open cartons with leftover milk on the counter-top. After several hours, she feeds the milk in 'pasteurized' carton to her kids, but not the raw one.
    D - As there is not enough to drink, Somali boils the 'raw milk'. She immediately transfers this milk to an empty carton that reads 'pasteurized', and stores it in the refrigerator for the rest of the family to consume.

    All but which of her actions/claims would you appreciate?

    (a) A (b) B (c) C (d) D

Space for rough work

62. Suppose you are an astrobiologist on a spaceship, looking for life on different planets. The spaceship approaches an Earth-like planet R132, where water is present. Some samples of the water at different places on the planet were taken and observed under a microscope. The samples contain small organisms. Five members of your crew ended up being sick and experienced severe diarrhea and dehydration. What do you think is the probable cause, from the information given?

    (a) A virus was attacking the bodies of different hosts

    (b) Invisible alien races were trying to control humans by making them sick

    (c) A bacterial infection was contracted through contaminated water samples

    (d) Both a and c are probable events

63. Bhitarakanika national park of Odisha hosts thousands of Olive Ridley Turtles every year who visit the place to lay eggs. Fortunately, these wonderful creatures don't feature on the Red Data Book. With reference to this text mark the correct option.

    (a) Olive Ridley turtles are endemic to Bhitarakanika

    (b) Olive Ridley turtles are an endangered species

    (c) Olive Ridley turtles are a migratory species

    (d) None of the above

Space for rough work

64. Water is essential for the proper growth and development of living beings. Plants contain nearly 90

I. Water helps in the transport of minerals in plants.
II. Seed germination requires water.
III. Water protects plants from frost and hot air currents.
IV. There is no limit to the amount of watering the plants.
V. In summer, the frequency of watering increases due to a decreased rate of evaporation from leaves.

Which of the above statements about water is/are true?

(a) I, II, III
(b) All except IV
(c) IV, V
(d) All except III

65. Tina is from Rajnagar. Rajnagar's weather allows good production of Rabi crops but not Kharif crops. Which of the following may be the menu for a dinner at Tina's house. (Assume Tina's father buys only local produce.)

(a) Wheat Roti and Mutter(peas) Paneer
(b) Rajma(beans)-Chawal(Rice)
(c) Spinach fry with crunchy groundnuts
(d) Rice and Mustard-Fish

Space for rough work

66. All states of matter have intermolecular spaces. But only gases has variable volume, why? (choose the most appropriate option)

    (a) Gases have the highest inter molecular spaces and these spaces can vary, but the inter molecular space between other forms of matter are fixed

    (b) The inter molecular attraction is absent in gases

    (c) Intra molecular attractions are absent in gases

    (d) The inter-molecular distance in gases can vary over a large range, which is very high when compared to that of solids and liquids

67. Solids present in liquids can be separated by distillation but still, we use crystallization to separate solid impurities from liquids, why?

    (a) To specifically separate targeted solid compound without the decomposition of any compound present in the mixture

    (b) It is easier to crystallize the solid present, irrespective of the composition of the mixture

    (c) Distillation is a harder process than crystallization since it requires continuous heating

    (d) All of the above statements are wrong

68. Valency and oxidation state of Nitrogen in NH4+ is

    (a) 3 and +1

    (b) 4 and -1

    (c) 3 and -1

    (d) 4 and +1

Space for rough work

69. Identify option with correct coal product and its uses:-

(a) Coke, manufacturing of steel

(b) Coal tar, manufacturing of paints

(c) Coke, manufacturing of paints

(d) Coal Tar, extraction of metals from ore

70. Acidity in sugarcane juice is reduced by:-

(a) $Ca(OH)_2$

(b) CO_2

(c) SO_2

(d) H_2O

71. Why did Ernest Rutherford use gold foil for his alpha ray scattering experiment?

(a) Gold is highly malleable.

(b) Gold is easy to obtain.

(c) Gold conducts electricity well.

(d) Gold has a very high atomic mass.

72. Chalk powder in water is a :-

(a) Homogeneous solution

(b) Heterogeneous solution

(c) Not a solution

(d) Colloid

73. In the compound $K_2Cr_2O_7$, the cation and the anion respectively are

(a) ${K_2}^+$ and ${Cr_2O_7}^-$

(b) K^- and ${Cr_2O_7}^+$

(c) K^+ and ${Cr_2O_7}^{2-}$

(d) KCr^{2-} and ${KCr_2O_7}^{2-}$

Space for rough work

74. Which one of the following is a chemical change?

    (a) Melting down an iron statue

    (b) Melting of ice

    (c) Breaking a piece of cardboard

    (d) Passing electricity through saturated salt solution

75. What is the temperature at which all the forms of state for a given substance coexist called?

    (a) Triple point

    (b) Quadruple point

    (c) Point of coexistence

    (d) Sublimation point

76. Calculate the average atomic mass of the given hypothetical Element Bq

    $^{74}\mathrm{Bq}_{34}$ constituting 30 percentage of naturally occuring Bq
    $^{78}\mathrm{Bq}_{34}$ constituting 40 percentage of naturally occuring Bq
    $^{69}\mathrm{Bq}_{34}$ constituting 25 percentage of naturally occuring Bq
    $^{65}\mathrm{Bq}_{34}$ constituting 5 percentage of naturally occuring Bq

    (a) 70u

    (b) 74u

    (c) 78u

    (d) 80u

77. Suritra left a box containing $NiCl_2$ open on a rainy day inside the lab. When he returned the next day he found a green liquid instead of crystals. This is because Nickel Chloride is:-

    (a) Hygroscopic

    (b) Deliquescent

    (c) Hydrophobic

    (d) Fissile

Space for rough work

78. Smruti was performing an experiment with Canal rays, however when she switched on the discharge tube, she got a very less intensity of canal rays at the receiver. What can be the reason?

    (a) A magnetic field was present in the room

    (b) The room was open to sunlight

    (c) She was talking, creating acoustic disturbances

    (d) The light was switched off

    The concept of atomic mass is very important for nuclear studies. The difference in the masses calculated theoretically by adding up the masses of the constituents of the nucleus of the atom and the experimental mass is responsible for providing the energy ($E = MC^2$) holding the atom together. Consider that, in a hypothetical world, a proton weighs the same as a neutron, equal to 1 unit mass. An element $^{60}\mathrm{Ad}_{30}$ is quite abundant in this world, having 31 neutrons.(C is the speed of light = 3 x 10^8 m/s)

79. What amount of energy goes into holding $^{60}\mathrm{Ad}_{30}$ stable?

    (a) 4.5 x 10^8 unit mass-m^2/s^2

    (b) 3 x 10^{16} unit mass-m^2/s^2

    (c) 9 x 10^{16} unit mass-m^2/s^2

    (d) 4.5 x 10^{10} unit mass-m^2/s^2

80. Consider the following Reaction

    $^{60}\mathrm{Ad}_{30} \longrightarrow {}^{20}\mathrm{Bu}_{10}$ + $^{22}\mathrm{Pl}_{11}$ + $^{16}\mathrm{Ap}_{9}$

    (a) 18 x 10^{15} unit mass-m^2/s^2

    (b) 9 x 10^{17} unit mass-m^2/s^2

    (c) 9 x 10^{16} unit mass-m^2/s^2

    (d) 0.9 x 10^{17} unit mass-m^2/s^2

Space for rough work

Space for rough work

Space for rough work

Space for rough work

END OF QUESTIONS