



Indian Institute of Technology Madras
Zanzibar Campus

IIT Madras Zanzibar Campus Screening Test (IITMZST)

BS in Data Science & AI

2023 Screening Test - Question Paper

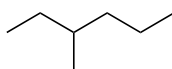
Chemistry

1. The ionic compound(s) from the list given below is/are **[MSQ 1 mark]**

- a. NaCl
- b. CCl₄
- c. H₂O
- d. CuSO₄

Correct Option: a & d

2. The correct IUPAC name of the following compound is **[MCQ 1 mark]**



- a. 3-Methylhexane
- b. 4-Ethylpentane
- c. 4-Methylhexane
- d. 2-Ethylpentane

Correct Option: a

3. The number of valence electrons of carbon is **[MCQ 1 mark]**

- a. 2
- b. 4
- c. 6
- d. 8

Correct Option: a

4. The temperature (in K) for 20 moles of He in a 10 L vessel at 120 atm is calculated using van der Waals and ideal gas equations. The difference in the value of temperature is [van der Waals constants for helium: $a = 0.0341 \text{ L}^2 \text{ at mol}^{-2}$; $b = 0.0237 \text{ L mol}^{-1}$; and $R = 0.0821 \text{ L atm/ mol K}$] **[MCQ 1 mark]**

- a. 30
- b. 35
- c. 40
- d. 45

Correct Option: b



5. The correct match between column A and B from the options given below is [MCQ 1 mark]

Column A	Column B
(i) Isotope	(p) Ice
(ii) Isobar	(q) CO ₂
(iii) Hydrogen bonding	(r) $^{35}_{17}\text{Cl}; ^{37}_{17}\text{Cl}$
(iv) Linear molecule	(s) Boyle's law
(v) Ideal gas	(t) same number of nucleons

- a. (i)-(t); (ii)-(p); (iii)-(r); (iv)-(s); (v)-(q)
- b. (i)-(r); (ii)-(p); (iii)-(t); (iv)-(s); (v)-(q)
- c. (i)-(r); (ii)-(t); (iii)-(p); (iv)-(q); (v)-(s)
- d. (i)-(t); (ii)-(r); (iii)-(p); (iv)-(q); (v)-(s)

Correct Option: c



Mathematics

1. The sum of three numbers, which are consecutive multiples of 7, is 63. Then the largest of the three numbers is ____.

[NAT 1 mark]

Answer: 28

2. Which of the following equations is represented by a line perpendicular to the line represented by the equation $\frac{1}{2}x + \frac{1}{5}y = 12$?

[MCQ 1 mark]

- a. $5x+2y=-77$
- b. $2x+5y=-77$
- c. $2x-5y=-77$
- d. $5x-2y=-77$

Correct Option: c

3. If three vertices (corners) of a regular hexagon are randomly joined, what is the probability of those three vertices forming an equilateral triangle?

[MCQ 1 mark]

- a. 0.1
- b. 0.9
- c. 0.5
- d. 0.2

Correct Option: a

4. A set of four numbers that begins with the number 32 is arranged from smallest to largest. If the median is 35, which of the following could possibly be the set of numbers? [MCQ 1 mark]

- a. 32, 32, 36, 38
- b. 32, 35, 38, 41
- c. 32, 34, 36, 40
- d. 32, 36, 40, 44

Correct Option: c



5. Suppose 1 represents the truth value TRUE (or T) and 0 represents the truth value FALSE (or F). Suppose statement X and Y have truth value 1, and statement Z has truth value 0, then the truth value of the statement "(X and Z) or (Y and (not Z))" is _____ [NAT 1 mark]

Answer: 1

6. For what values of x are the vectors $(x, x^2 + 13x + 24)$ and $(2, 6)$ scalar multiples of each other? [MSQ 1 mark]

- a. -4
- b. 1
- c. -6
- d. 0
- e. -3
- f. 3

Correct options: a, c

7. Let f be a function such that $f(1) = 19$ and $f(n + 1) = \sqrt{6 + f(n)}$ when n belongs to the set of natural numbers. Assuming $\lim_{x \rightarrow \infty} f(x)$ exists, compute the limit. [NAT 2 marks]

Answer: 3

8. The area of the region in the plane bounded by the X -axis, the Y -axis, the line $x=2$ and the graph of the function $f(x) = 20x^4 + \sin(\pi x)$ is _____ [NAT 2 marks]

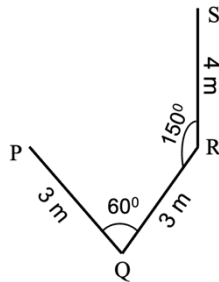
Answer: 128



Physics

1. An object moves from point P to point S through points Q and R as shown in the figure. The time taken by it while moving from P to Q, Q to R, and R to S are 2, 1, and 2 seconds, respectively.

[MCQ 1 mark]



The average velocity of the object is

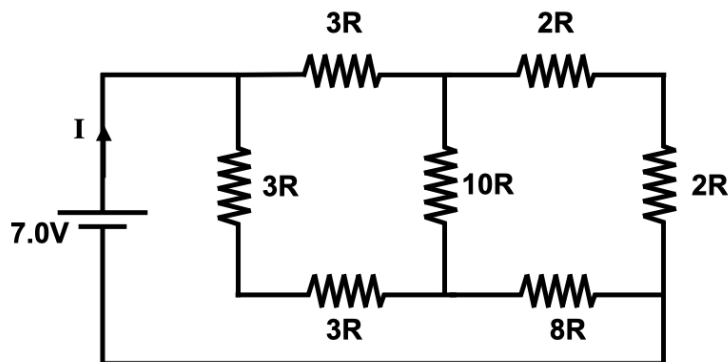
- a. 2 m/s
- b. 1 m/s.
- c. $13/6$ m/s
- d. $13/2$ m/s

Correct Option: b

2. Consider the following circuit and $R = 3\Omega$ (see figure).

Find the current I, in Amperes, flowing in the circuit

[NAT 2 marks]



Answer: 0.5



3. A planet is orbiting in a circular orbit around the Sun. If the mass of the Sun suddenly decreases by half, then identify the correct statement: **[MCQ 1 mark]**

- a. The orbit of the planet will remain circular, and the radius will decrease by half
- b. The orbit of the planet will remain circular, and the radius will increase by half
- c. The planet will escape the solar system
- d. The mass of the planet will decrease by half

Correct Option: c

4. A marble of mass 20 g was moving inside a straight pipe at a speed of 10 m/s. On its way, it collided with a marble of mass 10 g at rest. After the collision, the first marble stopped moving. What is the speed (in m/s) of the second marble? Assume the collision to be elastic. **[NAT 1 mark]**

Answer: 20



Analytical Ability

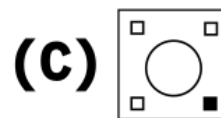
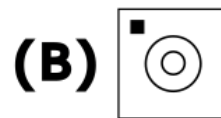
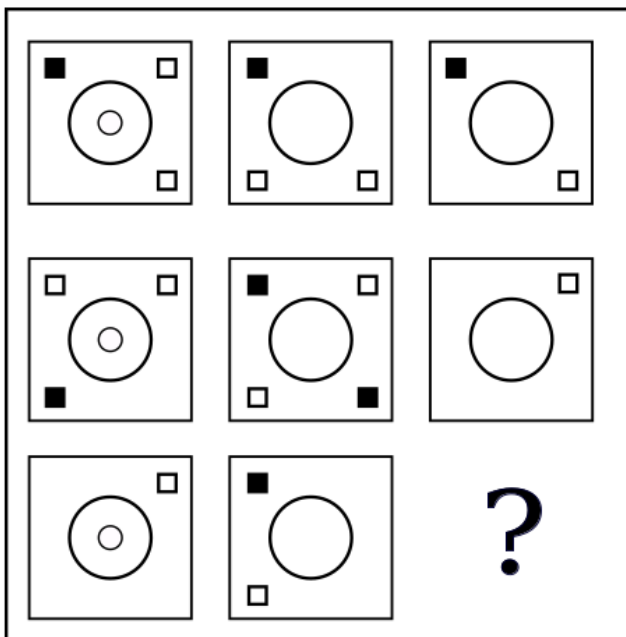
1. A construction project requires 10 workers to complete the work in 15 days. However, after 5 days of work, 4 workers leave the project and the remaining 6 workers continue till the end. How many days in total will it take to finish the entire project? (rounded to the nearest integer) [MCQ 2 marks]
- 20
 - 17
 - 22
 - 19

Correct Option: c

2. A train 100m long is running at a speed of 30km/hr. Find the time taken by the train to pass a man standing near the railway line? [MCQ 1 mark]
- 1 min
 - 12s
 - 0.2 hr
 - 30s

Correct Option: b

3. Which is the missing tile? [MCQ 2 marks]



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

Correct Option: a

4. What is the next number in the sequence: 1, 5, 14, 30, 55, 91, __ [NAT 1 mark]

Answer: 140

5. Five persons are standing in one line. One of the two persons at extreme end is a Dentist and the other is a Businessman. A Lawyer is to the immediate right of a Student. An Accountant is to the immediate left of the Businessman. What is the position of Lawyer from the left? [MCQ 1 mark]
- a. 2nd
 - b. 4th
 - c. 1st
 - d. 3rd

Correct Option: d

Common Dataset for Questions 6 & 7

Consider the following table showing the number of books read by five students over a month:

Student	Week 1	Week 2	Week 3	Week 4
Aparna	4	3	5	6
Raj	6	5	7	4
Shweta	5	4	4	5
Derik	5	6	4	3
Usha	4	5	6	5

6. Which student read the most books over the four weeks? [MCQ 1 mark]
- a. Raj
 - b. Usha
 - c. Aparna
 - d. Derik

Correct Option: a

7. The average number of books read per week by all the students is _____ [NAT 2 marks]

Answer: 24



English and Comprehension (All MCQs 1 mark each)

A) Read the passage given below and answer the following questions:

Climate change is a pressing global issue that demands immediate attention. Rising global temperatures, melting ice caps, and extreme weather events are clear indications of the impact of human activities on the environment. Urgent action is required to mitigate these effects and transition to a more sustainable future. Sustainable practices such as renewable energy adoption, reducing carbon emissions, and promoting eco-friendly lifestyles are crucial steps in combating climate change.

1. What is the main focus of the passage?
 - a) The importance of environmental conservation
 - b) The impact of climate change on wildlife
 - c) The urgency to address climate change
 - d) The role of technology in combating climate change

Correct Option: c

2. What does the passage emphasize as crucial steps in combating climate change?
 - a) Non-renewable energy sources
 - b) Carbon-intensive industries
 - c) Eco-friendly lifestyles
 - d) Impact of human activities on the environment

Correct Option: c

B) Find the relationship between the given pair of words and select the option that exhibits a similar relationship.

1. Book : Author : Movie : ?
 - a) Playwright
 - b) Director
 - c) Actor
 - d) Producer

Correct Option: b



2. Teacher: Classroom : Actor : ?

- a) Stage
- b) Movie
- c) Audience
- d) Rehearsal

Correct Option: a

C) To answer the following questions, select the one word that has most likely the same meaning as the **italicized word in the context of the sentence.**

1) Maria is often the source of *piquant* gossip.

- a) Spicy
- b) Vain
- c) Ill-planned
- d) Insipid

Correct Option: a

2) My *credulity* led me to believe that the world is flat.

- a) Cynicism
- b) Gullibility
- c) Authority
- d) Sanguinity

Correct Option: b

3) The opposition criticized government *parsimony* on defence procurement.

- a) Austerity
- b) Generosity
- c) Reliance
- d) Sanctity

Correct Option: a



D) To answer the following questions, choose the word that, when substituted for the blank space, best completes the meaning of the sentence.

1) His manners drew others towards him.

- a) Affable
- b) Sapid
- c) Grim
- d) Tractable

Correct Option: a

2) My professor's voice had a effect on me that led me to dream about the Swiss Alps.

- a) Succinct
- b) Idiomatic
- c) Soporific
- d) Supine

Correct Option: c

3) One could gaze farther and farther, only to encounter the rocky soil of that landscape.

- a) Arid
- b) Verdant
- c) Parse
- d) Insolvent

Correct Option: a



Note: The last year questions represents only the type of questions that will be asked during the screening test. It is not indicative of the exam pattern or number of questions that will be asked during the screening test.

For queries related to questions

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IITMZ Admission Committee

IIT Madras

