MATRIX OLYMPIAD

CSR Initiative of Matrix Education, Sikar to motivate and reward young talent.

☑ **Total Questions : 60** ☑ **Maximum Marks : 240** ☑ **Duration : 2 Hrs.**

PAPER PATTERN

Part	(I) Physics	(II) Chemistry	(III) Biology	(IV) Mathematics	(V) Logical Reasoning & IQ
Number of Questions	7	6	7	30	10

Marking Scheme: +4 For Each Correct Answer (There is no negative for wrong answer)

Instructions :

1. This Booklet is your **Question Paper.** DO NOT **break seal** of Booklet until the invigilator instructs to do so.
2. The Answer Sheet is provided to you separately which is a machine readable Optical Response Sheet (ORS). You have to mark your answer in the ORS by darkening bubble, as per your answer choice , by using **Black** /**Blue** ball point pen only.
3. If you are found involved in **cheating** or disturbing others then your ORS will be cancelled.
4. Do not **damage** the ORS sheet in any manner. If ORS is damaged or not completed properly, your results will not be prepared.
5. If you have any **confusion** in filling-up ORS sheet, please **contact** your invigilator. Incomplete ORS will be not be evaluated.
6. You can take the question paper home once the ORS is submitted.

Answer Key and Video Solutions Kindly Scan QR Code and subscribe Matrix youtube channel

PART I : PHYSICS

*This section contains **07 Multiple Choice Questions (Q : 01 to Q : 07)**. Each question has four choices **(A), (B), (C) and (D)** out of which **ONLY ONE** is correct.*

1. Equal forces 'F' act on isolated bodies 'A' and 'B'. The mass of 'B' is three times that of 'A'. The magnitude of the acceleration of 'A' is :
   (A) 3 times that of 'B'
   (B) $\frac{1}{3}$ times that of 'B'
   (C) 9 times that of 'B'
   (D) $\frac{1}{9}$ times that of 'B'

2. A block of mass 4 kg and dimensions 10 cm × 20 cm × 30 cm rests on the floor. If g = 10 m/s^2, then the maximum pressure the block can exert on the floor is :
   (A) 2000 Pa
   (B) 1000 Pa
   (C) 4000 Pa
   (D) 1333 Pa

3. When a body floats in water (density = 1 g/cc), $\left(\frac{1}{3}\right)^{rd}$ of its volume remains outside, whereas $\left(\frac{3}{4}\right)^{th}$ of its volume remains outside when it floats in a liquid. The density of the liquid, in g/cc, is :
   (A) $\frac{4}{3}$
   (B) 4

   (C) $\frac{9}{4}$
   (D) $\frac{8}{3}$

4. During the paddling of a bicycle the force of friction exerted by ground on wheel :
   (A) Backward direction on the both wheel.
   (B) Backward direction on the front wheel and in the forward direction on the rear wheel.
   (C) Forward direction the both wheel.
   (D) Backward direction on the rear wheel and in the forward direction on the front wheel.

5. Which of the following statement/s is/are **True(T)** or **False(F)** ?
   (i) Weight of a body is always constant.
   (ii) Sliding friction always greater than static friction.
   (iii) Friction force depends on the area of contact.
   Code :

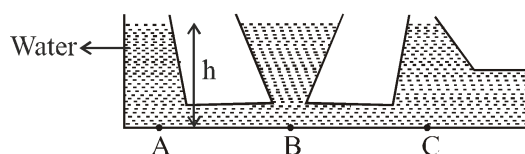 | | (i) | (ii) | (iii) |
   | --- | --- | --- | --- |
   | (A) | T | F | F |
   | (B) | T | T | T |
   | (C) | F | F | F |
   | (D) | F | T | F |

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6. Match **Column – I** with **Column – II** and select the correct answer using the codes given below.

Column – I	Column – II
P. 1 N	**1.** 10^5 Pa
Q. 1 bar	**2.** 10^{-5} kgm/s²
R. 1 dyne	**3.** 10^5 gcm/s²

Code :

	P	Q	R
(A)	2	3	1
(B)	3	1	2
(C)	3	2	1
(D)	1	2	3

7. Fluid is a substance which has no fixed shape and has the ability to flow. All liquids and gases are regarded as fluids. Whenever any pressure is applied anywhere on a confined fluid, it transmitted equally in all direction through-out the fluid. Pressure due to fluids depends on the density of fluid, depth of the point from free surface and acceleration due to gravity. Three points 'A', 'B' and 'C' are shown in figure below. Which of the following is correct about the pressure at these points ?

(A) $P_C > P_A > P_B$

(B) $P_B > P_A > P_C$

(C) $P_A = P_B = P_C$

(D) $P_A > P_B > P_C$

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"Be passionate and bold. Always keep learning. You stop doing useful things if you don't learn." **Page No. : 2**

PART II : CHEMISTRY

*This section contains **06 Multiple Choice Questions (Q : 08 to Q : 13)**. Each question has four choices **(A), (B), (C) and (D)** out of which **ONLY ONE** is correct.*

8. The polymer used in making non-stick cookwares is:

(A) Rayon

(B) Teflon

(C) Nylon

(D) Polymers

9. Which of the following has the same monomer unit?

(A) Nylon and cellulose

(B) Polyester and nylon

(C) Rayon and nylon

(D) Cellulose and rayon

10. Copper Sulphate solution can be safely kept in a container made of :

(A) Aluminium

(B) Lead

(C) Silver

(D) Zinc

11. Which of the following Statement/s is/are **True(T)** or **False(F)** ?

(i) Copper cannot displace hydrogen from acids.

(ii) Iron is found in free state in nature.

(iii) Aluminium oxide is amphoteric in nature.

Code :

	(i)	*(ii)*	*(iii)*
(A)	T	F	T
(B)	T	F	F
(C)	F	F	T
(D)	F	T	F

12. Match **Column – I** with **Column – II** and select the correct answer using the codes given below.

Column – I	Column – II
P. Raincoats	**1.** Melamine
Q. Thermoplastic	**2.** PVC
R. Flame resistant	**3.** Polystyrene

Code :

	P	*Q*	*R*
(A)	2	3	1
(B)	1	2	3
(C)	3	1	2
(D)	2	1	3

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13. Tina sets up apparatus for an experiment as shown in the figure. She performed the same experiment by changing threads (P, Q and R). She found that weight required to break the thread is in order x > y > z, where x = weight required to break P, y = weight required to break Q, z = weight required to break R. P, Q and R can be :
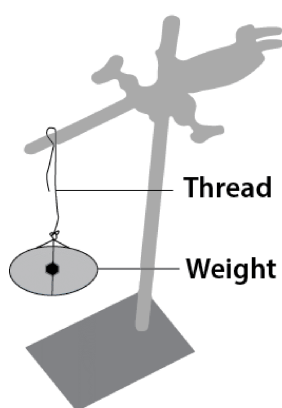
(A) P-Nylon, Q-Wool, R-Cotton

(B) P-Nylon, Q-Cotton, R-Wool

(C) P-Wool, Q-Cotton, R-Nylon

(D) P-Cotton, Q-Nylon, R-Wool

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PART III : BIOLOGY

This section contains 07 Multiple Choice Questions (Q : 14 to Q : 20). Each question has four choices (A), (B), (C) and (D) out of which ONLY ONE is correct.

14. Which of the following is not used as food preservatives ?
    (A) Salt
    (B) Sugar
    (C) Vinegar
    (D) Methane

15. The cutting and gathering of crops after maturation is known as _____ .
    (A) Harvesting
   (B) Threshing
    (C) Broadcasting
    (D) Tilling

16. Which microorganism is responsible for the formation of curd from milk ?
    (A) Fungi
    (B) Lactobacillus
    (C) Cyanobacteria
    (D) Salmonella

17. Which of the following is Rabi crop ?
    (A) Wheat
    (B) Maize
    (C) Paddy
    (D) Cotton

18. Bacteriophage are composed of protein that encapsulate a DNA or RNA genome, and may have structures that are either simple or elaborate.
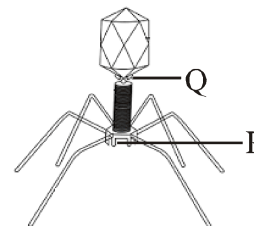
    (A) P-Tail pins, Q-Collar
    (B) P-Tail fibres, Q-collar
    (C) P-Collar, Q-Head
    (D) P-Sheath, Q-Til fibres

19. Which of the following statements is/are **True(T)** or **False(F)** ?
    (i) Drip system is a traditional method of irrigation.
    (ii) Yeast is unicellular fungus.
    (iii) The method of loosening the soil is called weeding.
    Code :

	(i)	(ii)	(iii)
(A)	T	F	F
(B)	T	T	T
(C)	F	F	T
(D)	F	T	F

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20. Match **Column – I** with **Column – II** and select the correct answer using the codes given below.

Column – I	Column – II
P. Rhizobium	**1.** AIDS
Q. Organic manure	**2.** Cow dung
R. Virus	**3.** Nitrogen fixation

Code :

	P	Q	R
(A)	2	3	1
(B)	3	1	2
(C)	3	2	1
(D)	2	1	3

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PART IV : MATHEMATICS

*This section contains **30 Multiple Choice Questions (Q : 21 to Q : 50)**. Each question has four choices **(A), (B), (C) and (D)** out of which **ONLY ONE** is correct.*

21. Multiplicative inverse of '0' is :
    (A) −1
    (B) 0
    (C) 1
    (D) Does not exists

22. Product of two numbers is $25\frac{3}{8}$. If one of them is $15\frac{9}{40}$, then other number is :
    (A) $\frac{2}{3}$
    (B) $1\frac{2}{3}$
    (C) $5\frac{2}{3}$
    (D) $\frac{9}{7}$

23. $\left|\frac{2}{3} - \frac{3}{4}\right|$ is equal to :
    (A) $\frac{-7}{12}$
    (B) $-\frac{1}{12}$
    (C) $\frac{1}{12}$
    (D) $\frac{17}{12}$

24. If $-8 + n = \frac{5n}{4}$, then the value of n is :
    (A) −40
    (B) −32
    (C) −10
    (D) −4

25. When 75% of a number is added to 75, then resultant number is the original number. Find the number.
    (A) 150
    (B) 300
    (C) 100
    (D) 45

26. Solve : $\frac{y+6}{4} + \frac{y-3}{5} = \frac{5y-4}{8}$
    (A) 7
    (B) 8
    (C) 6
    (D) 5

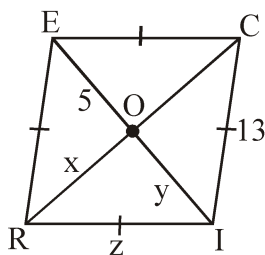27. The angles of a quadrilateral are in the ratio 1 : 2 : 3 : 4. Find the value of smallest angle.
    (A) 36º
    (B) 72º
    (C) 144º
    (D) None of these

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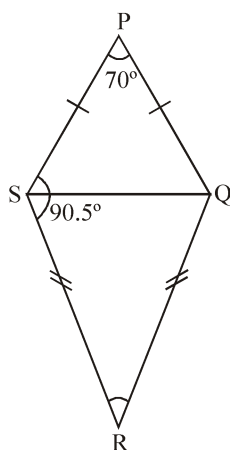
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28. In given figure RICE is a Rhombus. Find x + y + z.

(A) 30

(B) 35

(C) 25

(D) 20

29. In figure, PQRS is kite. If $\angle P = 70°$ and $\angle S = 90.5°$, then value of $\angle R$ is :
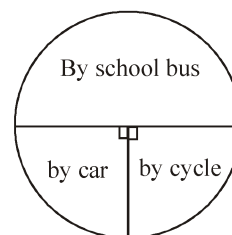

(A) 90°

(B) 91°

(C) 111°

(D) 109°

30. A coin is tossed 74 times and head is obtained 32 times. Now a coin is tossed randomly. What is probability of getting a tail ?

(A) $\dfrac{16}{37}$

(B) $\dfrac{1}{2}$

(C) $\dfrac{21}{37}$

(D) 3

31. The given pie diagram shows the students using different mode of transport for going to school. If 513 students use car, then the number of students who use school bus are :

(A) 1539

(B) 1026

(C) 513

(D) 2052

32. Evaluate $\sqrt{0.121}$ up to three place of decimal.

(A) 0.011

(B) 0.11

(C) 0.347

(D) 1.1

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33. Solve: $\sqrt[3]{0.125} + 3 \cdot$

(A) 8

(B) 3.5

(C) 2

(D) 0.35

34. Which of the following is not a perfect square ?

(A) 612

(B) 529

(C) 144

(D) 10000

35. Find the smallest square number divisible by each one of the numbers 8, 9 and 10.

(A) 360

(B) 480

(C) 720

(D) 3600

36. Simplify : $\sqrt[3]{2197} \times \sqrt{2025}$

(A) 585

(B) 325

(C) 425

(D) 625

37. If $\sqrt{\sqrt[3]{x \times 0.000009}} = 0.3$, then the value of $\sqrt{x}$ is :

(A) 27

(B) 81

(C) 9

(D) 18

38. If the difference between selling a shirt at profit 10% and 15% is Rs 10, then the cost price of shirt is :

(A) Rs 110

(B) Rs 115

(C) Rs 150

(D) Rs 200

39. If every side of a right angled triangle is doubled, then what is the percentage increase in the area of the triangle ?

(A) 100%

(B) 200%

(C) 300%

(D) 400%

40. If $a : b = 3 : 5$ and $a : c = 5 : 7$. What is the value of $(b - c) : (b + c)$?

(A) 4 : 46

(B) 49 : 4

(B) 5 : 48

(D) 48 : 5

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41. Which of the following statement/s is/are **True(T)** or **False(F)** ?

(i) Rational number can be expressed in fraction form not as decimal expression.

(ii) The square root of rational number may be irrational.

(iii) The fraction $\dfrac{5}{7}$ is equivalent to $\dfrac{15}{21}$.

Code :

	(i)	(ii)	(iii)
(A)	T	F	F
(B)	F	T	T
(C)	F	F	T
(D)	F	T	F

42. Which of the following statement/s is/are **True(T)** or **False(F)** ?

(i) A bar graph is suitable for displaying continuous data.

(ii) The mode is most frequent value is data base.

(iii) A line graph is best for showing trends or change over time.

Code :

	(i)	(ii)	(iii)
(A)	T	F	F
(B)	T	T	T
(C)	F	F	F
(D)	F	T	T

43. Which of the following statement/s is/are **True(T)** or **False(F)** ?

(i) The ratio 5:8 is greater then the ratio 2 : 3.

(ii) 20% of 18 is equal to 16.

(iii) The cube of a number is always greater than the number it self.

Code :

	(i)	(ii)	(iii)
(A)	F	F	F
(B)	T	T	T
(C)	F	F	T
(D)	F	T	F

44. Match **Column – I** with **Column – II** and select the correct answer using the codes given below.

Column – I	Column – II
P. $\dfrac{2}{3}$ of a number is 20 less than the original number then the number is :	**1.** 60
Q. $5x - 7 = 2x + 8$, then x is :	**2.** 30
R. A number whose double is 45 greater than its half, then the number is :	**3.** 05

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Code :

	P	Q	R
(A)	2	3	1
(B)	3	1	2
(C)	2	1	3
(D)	1	3	2

45. Match **Column – I** with **Column – II** and select the correct answer using the codes given below.

Column – I	Column – II
P. $\sqrt[3]{343}$	**1.** 9
Q. $\sqrt[3]{729}$	**2.** 7
R. $\sqrt[3]{512}$	**3.** 8

	P	Q	R
(A)	1	2	3
(B)	2	3	1
(C)	1	3	2
(D)	2	1	3

46. Match **Column – I** with **Column – II** and select the correct answer using the codes given below.

Column – I	Column – II
P. $\sqrt{10+\sqrt{25+\sqrt{121}}}$	**1.** $5\sqrt{29}$
Q. If $3a = 4b$ and $a + b = 7\sqrt{29}$, then $\sqrt{a^2 + b^2}$	**2.** 30
R. $\sqrt{45} \times \sqrt{20}$ equals	**3.** 4

Code :

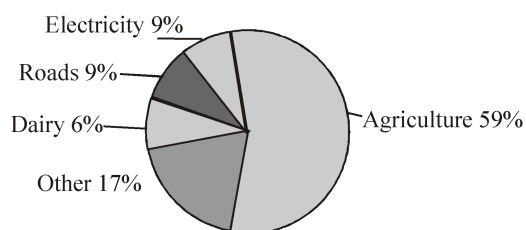|	P	Q	R
(A)	3	1	2
(B)	3	2	1
(C)	2	1	3
(D)	1	3	2

Space for rough work

Paragraph for Questions 47 & 48

Go through the following pie chart and answer the questions that follows :

Electricity 9%
Roads 9%
Dairy 6%
Other 17%
Agriculture 59%

[Central govt. budget 2022-23]

47. Approximately how many degrees should be there in the central angle of the sector for agriculture expenditure ?

(A) 220°

(B) 212°

(C) 210°

(D) 208°

48. If Rs. 90 millions were spent is 2022-23 on dairy. What would have been the total expenses in that year in million ?

(A) 1500

(B) 1400

(C) 160

(D) 130

Paragraph for Questions 49 & 50

A farmer, having a square field of area 2304 m^2, want to grow some crops in the field. He decided to fence the field. Help him by solving the following questions.

49. If area of square is incresed by 3172 m^2. Then perimeter of square will be :

(A) 74 m

(B) 304 m

(C) 288 m

(D) 296 m

50. The area of square with side 1.12 m will be :

(A) 1.2544 m

(B) 1.2454 m^2

(C) 1.2544 m^2

(D) 4.48 m^2

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PART V : LOGICAL REASONING & IQ

*This section contains **10 Multiple Choice Questions (Q : 51 to Q : 60)**. Each question has four choices (A), (B), (C) and (D) out of which **ONLY ONE** is correct.*

51. Find the next term :

6, 15, 35, 77, 143, ?

(A) 171

(B) 181

(C) 191

(D) 221

52. Which sequence of letters when placed at the blanks one after the other will complete the given letter series ?

_x_y_xyxx_yxy_xyyx

(A) xxxyy

(B) xyxyy

(C) yxyxy

(D) yxyyx

53. What comes in place of question mark in the following letter series?

WFB, TGD, QHG, ?

(A) NIJ

(B) NIK

(C) NJK

(D) OIK

54. Y is in the East of X, which is in the North of Z. If P is in the South of Z, then in which direction of P with respect to Y ?

(A) North

(B) South

(C) South-East

(D) None of these

55. Choose the alternative which is closely resembles the water-image of the give combination.

NUCLEAR

(A) ИИⴍⴥⴉ⅄ᴚ

(B) Иⴍⴥⴉ⅄ᴚ

(C) Иⴍⴥⴉᴚ

(D) ᴚᴀⴉ⅄ⴍⴥN

56. In a row of 56 people, A is 17th place from left and B is 25th place from right side. Find the number of people between A and B ?

(A) 29

(B) 14

(C) 21

(D) 18

Space for rough work

57. In a row of students, Ashish is 15th place from the right end and Neha is 10th place from the left end. If in this row, Neha is 12th place from the right end, then what is the position of Ashish from left end ?

(A) 8th

(B) 7th

(C) 10th

(D) 12th

58. If '>' denotes '+', '<' denotes '–', '+' denotes '÷', '–' denotes '=', '=' denotes '< ' and '×' denotes '>'. Find which of the following is a correct statement :
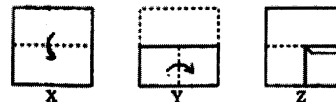
(A) $3 + 2 > 4 = 9 + 3 < 2$

(B) $3 > 2 > 4 = 18 + 3 < 1$

(C) $3 > 2 < 4 × 8 + 4 < 2$

(D) $3 + 2 < 4 × 9 + 3 < 3$

59. If '+' means '×', × means '–', '÷' means '+' and '–' means '÷', then what is the value of :

$625 – 25 ÷ 5 + 20 × 3 + 10$?

(A) 77

(B) 95

(C) 88

(D) 137

60. A sheet has been folded in the manner as shown in X, Y and Z respectively and punched. You have to choose from the alternatives how it will look when unfolded :

(A)

(B)

(C)

(D)

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