

VISTO - 2016 - 17

(VELAMMAL INTER SCHOOL SCIENCE TALENT OLYMPIAD)

SEASON - I (MOCK TEST 1)

CLASS - X

Duration : 2hrs

Max.Marks : 100

Instructions To the Candidate

- Write your **NAME** and **CLASS** in the space provided on **OMR** Response sheet.
 - You have to mark the answers on the **OMR** Response sheet only.
 - You have to handle the **OMR** Response sheet with utmost care.
 - Do not fold/mutilate or make any unnecessary markings on the **OMR** Response sheet.
 - Use **BLUE** or **BLACK BALL POINT PEN** only to darken the appropriate circles in **OMR** Response sheet.
- Answers marked with **PENCIL** will not be considered for evaluation.
- This Question Paper consists of **100 QUESTIONS**, under four subjects heads, **MATHEMATICS (40 Questions)**, **PHYSICS (20 Questions)**, **CHEMISTRY (20 Questions)** and **BIOLOGY (20 Questions)**.
- Each question has four alternative responses marked a, b, c, d. You have to darken the appropriate circle provided in the OMR Response sheet against each question.
- 1 MARK** will be awarded for every correct response for all the questions in **ALL THE FOUR SUBJECTS**.
- NO** mark will be deducted for incorrect response.
- Usage of Calculators, Log tables and Electronic gadgets is strictly prohibited in the examination hall.
- Return the OMR Response sheet to the Invigilator at the end of Examination, before leaving the examination hall.

MATHEMATICS

Single Response Type :

- If L.C.M of 4 and 52 is 52 then their HCF is _____
A) 10 B) 4 C) 6 D) 8
- If the HCF of 657 and 963 is expressible in the form of $657x + 963y - 15$ then x is
A) 26 B) 24 C) 22 D) 28
- Every positive even integer is of the form _____ for some integer 'q'
A) $2q - 1$ B) $2q + 1$ C) $2q$ D) none

4. For any positive integer 'a' and 3, there exist unique integers 'q' and 'r' such that $a = 3q + r$ where 'r' must satisfy
- A) $0 \leq r < 3$ B) $1 < r < 3$ C) $0 < r < 3$ D) $0 < r \leq 3$
5. By Euclid's division lemma $x = qy + r$, $x > y$. The value of q and r for $x = 27$ and $y = 5$ are
- A) $q = 5, r = 3$ B) $q = 3, r = 5$ C) $q = 2, r = 5$ D) $q = 5, r = 2$
6. If $a - b$ and $a + b$ are zeros of the polynomial $x^3 - 3x^2 + x + 1$ then the value of $a + b$ is
- A) $1 + \sqrt{2}$ B) $1 \pm \sqrt{2}$ C) $-1 \pm \sqrt{2}$ D) $-1 - \sqrt{2}$
7. Which of the following expressions is not a polynomial?
- A) $5x^3 - 3x^2 - x + \sqrt{2}$ B) $5x^2 - \frac{2}{3}x^2 + 2\sqrt{5}$
- C) $\sqrt{5}x^3 - \frac{3}{5}x + \frac{1}{7}$ D) $5x^3 - 3x^2 - \sqrt{x} + 2$
8. A polynomial of degree 'n' has
- A) n zeos B) at most 'n' zeros
- C) at least 'n' zeros D) one zero
9. A polynomial of degree _____ is called a cubic polynomial
- A) 0 B) 1 C) 2 D) 3
10. The polynomial to be added to the polynomial $x^4 + 2x^3 - 2x^2 + x - 1$ so that the resulting polynomial is exactly divisible by $x^2 + 2x - 3$ is
- A) $x - 2$ B) $x + 2$ C) $2 - x$ D) $-x - 2$
11. If $2x - 3y = 11$ and $(a + b)x - (a + b - 3)y = 4a + b$ has infinite number of solutions then
- A) $a = -9, b = 3$ B) $a = 9, b = 3$ C) $a = 9, b = -3$ D) $a = -9, b = -3$
12. The system of equations $6x + 3y = 6xy$ and $2x + 4y = 5xy$ has
- A) one solution B) two solutions C) many solutions D) no solution
13. The system of linear equations $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ has a unique solution if
- A) $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$ B) $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$ C) $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$ D) none
14. The solution of $px + qy = p - q$ and $qx - py = p + q$ is
- A) $x = -1, y = 1$ B) $x = 1, y = -1$ C) $x = 1, y = 1$ D) $x = -1, y = -1$
15. Solution of $\frac{x}{a} + \frac{y}{b} = 2$ and $ax - by = a^2 - b^2$ is
- A) $x = a^2, y = b^2$ B) $x = -a^2, y = b^2$ C) $x = -a, y = -b$ D) $x = a, y = b$

16. Two isosceles triangles have equal angles and their areas are in the ratio 16 : 25, then the ratio of their corresponding heights is
- A) $\frac{4}{5}$ B) $\frac{5}{4}$ C) $\frac{3}{5}$ D) $\frac{5}{7}$
17. If $\triangle ABC \cong \triangle PQR$ such that $AB = 1.2$ cm, $PQ = 1.4$ cm then $\frac{\text{ar}(\triangle ABC)}{\text{ar}(\triangle PQR)}$ is
- A) $\frac{3}{7}$ B) $\frac{6}{7}$ C) $\frac{36}{49}$ D) $\frac{49}{36}$
18. A semicircle is drawn on AC, two chords AB and BC of length 8cm and 6cm respectively are drawn in the semicircle. What is the measure of the diameter of the circle?
- A) 12 cm B) 10 cm C) 14 cm D) 16 cm
19. A man goes 15 m due west and then 8 m due north. How far is he from the starting point?
- A) 23 m B) 7 m C) 20 m D) 17 m
20. The length of the hypotenuse of an isosceles right triangle whose one side is $4\sqrt{2}$ cm is
- A) 8 cm B) $8\sqrt{2}$ cm C) $12\sqrt{2}$ cm D) 12 cm
21. If $x = a\cos\theta$ and $y = b\sin\theta$ then the value of $b^2x^2 + a^2y^2$ is
- A) $a + b$ B) $a - b$ C) a^2b^2 D) $a^2 + b^2$
22. If $\sec\theta + \tan\theta = p$ then the value of $\sin\theta$ is
- A) $\frac{p^2 + 1}{p^2 - 1}$ B) $\frac{p^2 - 1}{p^2 + 1}$ C) $\frac{-1 - p^2}{p^2 - 1}$ D) $\frac{p^2 + 1}{-p^2 + 1}$
23. If $\sin\theta + \cos\theta = P$ and $\sec\theta + \text{cosec}\theta = q$ then $q(p^2 - 1)$ is
- A) $2p$ B) 2 C) $2q$ D) $\frac{p}{q^2}$
24. If $\sin\theta + \cos\theta = \sqrt{2}\cos\theta$ then the value of $\cos\theta - \sin\theta$ is
- A) $\sin\theta$ B) $2\sin\theta$ C) $\sqrt{2}\sin\theta$ D) None
25. If $\cot\theta + \frac{1}{\cot\theta} = 2$ then $\cot^2\theta + \frac{1}{\cot^2\theta} =$
- A) 1 B) 0 C) -1 D) 2

26. Median of a data is given by

A) $l + \left(\frac{\frac{n}{2} - cf}{f} \right) h$ B) $l - \left(\frac{\frac{n}{2} - cf}{f} \right) h$ C) $l + \left(\frac{\frac{n}{2} + cf}{f} \right) h$ D) $l - \left(\frac{\frac{n}{2} + cf}{f} \right) h$

27. The abscissa of the point of intersection of the less than type and of the more than type o gives of a grouped data gives its

- A) mean B) median C) mode D) all

28. $\text{Mode} + \frac{2}{3}(\text{Mean} - \text{Mode}) =$

- A) Mean B) Median C) Mode D) none

29. If the mode of the data is 45 and the median is 33 then the mean is

- A) 27 B) 30 C) 33 D) 45

30. If $\sum f_i x_i = 625$ and $\sum f_i = 25$ then the value of \bar{x} is

- A) 35 B) 20 C) 25 D) 30

Assertion and Reasoning Type:

31. **Statement 1** : Let x be rational number whose decimal expansion terminating, then x

can be expressed in the form $\frac{p}{q}$ where p, q are co-primes and $q = 2^m \times 5^n$ m, n are non-negative integers.

Statement 2 : $\frac{13}{3125}$ is a terminating decimal

- A) Statement 1 is true, Statement is false
 B) Statement 1 is true, Statement is true
 C) Statement 1 is false, Statement is false
 D) Statement 1 is false, Statement is true

32. **Statement 1** : If a line is drawn parallel to one side of a triangle intersecting the other two sides then its divides the two sides in the same ratio.

Statement 2 : In $\triangle KMN$ $PQ \parallel MN$. If $\frac{KP}{PM} = \frac{4}{13}$ and $KN = 20.4$ then $KQ = 8.4$

- A) Statement 1 is true, Statement is false
 B) Statement 1 is true, Statement is true
 C) Statement 1 is false, Statement is false
 D) Statement 1 is false, Statement is true

Linked Comprehensive Type:

- I. $\sin^2 \theta + \cos^2 \theta = 1$, $\sec^2 \theta - \tan^2 \theta = 1$
 $\operatorname{cosec}^2 \theta - \cot^2 \theta = 1$ use formulae then find
33. The value of $(1 - \sin^2 \theta)\sec^2 \theta =$ _____
 A) 1 B) 0 C) $\sin \theta$ D) $\cos \theta$
34. The value of $\cos^2 \theta(1 + \tan^2 \theta) =$ _____
 A) $\sin \theta$ B) $\cos \theta$ C) 1 D) 0
35. The value of $\cos^2 \theta + \frac{1}{1 + \cot^2 \theta} =$ _____
 A) $\sin \theta$ B) $\cos \theta$ C) 0 D) 1

Linked Comprehensive Type:

- II. If $a_1x + b_1y + c_1 = 0$, $a_2x + b_2y + c_2 = 0$ will have,

$$\frac{a_1}{a_2} \neq \frac{b_1}{b_2} \text{ unique solution,}$$

$$\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2} \text{ infinitely many solutions}$$

$$\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2} \text{ no solution}$$

36. The system of equations $6x + 5y = 11$, $9x + \frac{15}{2}y = 21$ will have
 A) unique solution B) no solution
 C) infinitely many solutions D) none
37. The system of equations $2x + 3y = 7$, $6x + 5y = 11$ will have
 A) unique solution B) no solution
 C) infinitely many solutions D) none
38. The system of equations $-3x + 4y = 5$, $\frac{9}{2}x - 6y + \frac{15}{2} = 0$ will have
 A) unique solution B) no solution
 C) infinitely many solutions D) none

Matrix Matching :39. **Column - I**

1) $\frac{23}{2^3 \times 5}$

2) $\frac{6}{2\sqrt{3}}$

3) $(3 + \sqrt{3})(3 - \sqrt{3})$

4) $11 \times 13 \times 17 + 17$

A) 1 - p, 2 - r, 3 - q, 4 - s

C) 1 - t, 2 - p, 3 - q, 4 - s

Column - II

p) rational number

q) composite number

r) 1

s) irrational number

t) terminating decimal

B) 1 - r, 2 - p, 3 - q, 4 - t

D) 1 - r, 2 - p, 3 - s, 4 - q

40. **Column - I**a) value of a for which $ax + 3y = a - 3$ and $12x + ay = a$ has no solutionb) solution of $x - y = 0$ & $2x - y = 2$ c) value of k for which line represented by $2x - ky = 9$ pass through the point $(-1, -1)$ d) point of intersection represented by the equation $7x + y = -2$ with y-axis

A) a - r, b - t, c - q, d - p

C) a - p, b - q, c - r, d - t

Column - II

p) (0, 2)

q) 11

r) (0, -2)

s) -6

t) (2, 2)

B) a - p, b - t, c - q, d - r

D) a - s, b - t, c - q, d - r

PHYSICS**Single Response Type :**

41. When the distance between the charged particles is halved, the force between them becomes
 A) One-fourth B) Half C) Double D) Four times
42. There are two charges $+1\mu\text{C}$ and $+5\mu\text{C}$ respectively. The ratio of the forces acting on them will be
 A) 1 : 5 B) 1 : 1 C) 5 : 1 D) 1 : 25
43. The electrostatic force between charges of $200\mu\text{C}$ and $500\mu\text{C}$ placed in free space is 5×10^{-2} N. Find the distance between the two charges.
 A) 2.34×10^4 m B) 1.34×10^2 m C) 6×10^4 m D) 1.34×10^{-4} m

52. Why does short circuit lead to the fuse wire burning?
- When current in the circuit abruptly increases
 - When live wire comes in contact with the neutral line
 - Both of these
 - None of these
53. The phenomenon of electromagnetic induction is
- The process of charging a sphere.
 - The process of producing magnetic field in a coil
 - The process of producing induced current in a coil whenever there is a relative motion between the coil and the magnet
 - The process of producing cooling effect.

Matrix Matching Type :

54. **Column - I** **Column - II**
- | | |
|---|--|
| a) Direction of induced current produced by motion of conductor in a magnetic field is given by b) Direction of force acting on a current carrying conductor kept in a magnetic field is given by c) Production of electricity from magnetism d) High powered electrical appliances are connected to the earth | p) Fleming's left hand rule q) Earthing r) Electromagnetic induction s) Fleming's right hand rule |
| A) a - s, b - p, c - r, d - q C) a - s, b - q, c - r, d - p | B) a - p, b - s, c - r, d - q D) a - p, b - q, c - r, d - s |
55. For the nuclear fusion reaction to occur, the temperature should be of the order of
- 107kto108k
 - 105kto106k
 - 108kto109k
 - 106kto106.5k
56. Non-renewable sources of energy should not be preferred because they
- are noteconomical
 - cannot be easily ignited
 - take a very long time to replenish
 - cannot be easily carried from one place to another
57. Hydroelectric energy is generated by
- Moving water that is used to turn an electric turbine
 - Moving air that is used to turn an electric turbine
 - The heat energy present below Earth's surface
 - The fusion of hydrogen molecules

Matrix Matching Type :58. **Column - I**

- a) Fuel burns without smoke
 b) Material suitable for producing biogas
 c) Production of biogas by biomass
 d) Manure

A) a - s, b - p, c - r, d - q

C) a - s, b - q, c - r, d - p

Column - II

- p) Anaerobic fermentation
 q) Coke
 r) Spent slurry
 s) Paper scrap

B) a - q, b - s, c - p, d - r

D) a - p, b - q, c - r, d - s

Single Response Type :

59. What fraction of total electrical power produced in India generated by nuclear reactors?

A) $\frac{4}{100}$ B) $\frac{3}{25}$ C) $\frac{5}{75}$ D) $\frac{3}{100}$

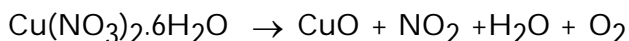
60. For the nuclear fusion reaction to occur, the temperature should be of the order of

A) 107 K to 108 K

B) 105 K to 106 K

C) 108 K to 109 K

D) 106 K to 106.5 K

CHEMISTRY**Single Response Type :**61. Identify the ratio of the coefficients of the products CuO, NO₂ and H₂O formed respectively when hydrated copper nitrate is thermally decomposed.

A) 2:3:1

B) 1:2:3

C) 1:1.5:1

D) 3:2:1

62. $\text{CuSO}_4 + \text{X} \rightarrow \text{XSO}_4 + \text{Cu}$; $\text{CuSO}_4 + \text{Y} \rightarrow \text{YSO}_4 + \text{Cu}$;
 $\text{XSO}_4 + \text{Y} \rightarrow \text{No reaction}$; $\text{CuSO}_4 + \text{Z} \rightarrow \text{No reaction}$; Arrange Cu, X, Y and Z in the ascending order of reactivity.

A) X, Y, Z, Cu

B) Cu, Y, X, Z

C) Cu, X, Z, Y

D) Z, Cu, Y, X

63. $\text{Pb}(\text{NO}_3)_2 + 2\text{HCl} \rightarrow \text{PbCl}_2 + 2\text{HNO}_3$.In the above reaction the product PbCl₂ is

A) Soluble in cold water only

B) Soluble in cold & hot water

C) Soluble in hot water

D) Insoluble in water

64. Statement-I :In neutralisation reactions, salt is formed.

Statement-II: Acid and base exchange their radicals and get neutralised.

A) Both Statement-I, and Statement-II are true.

B) Both Statement-I, and Statement-II are false.

C) Statement I is true, Statement II is false.

D) Statement I is false, Statement II is true.

65. 2 moles of potassium nitrate on decomposition gives 2 moles or molecules of potassium nitrite and oxygen. Then calculate the weight of potassium nitrite formed when 5.05 grams of potassium nitrate decomposes completely.
- A) 16.125 g B) 5.375 g C) 4.25 grams D) 8.50 grams
66. An oxidising agent is a substance which can _____
- A) Accept electrons B) Donate electrons C) Accept protons D) Donate protons
67. The reaction, $\text{Zn}^{2+}(\text{aq}) + 2\text{e}^- \rightarrow \text{Zn}(\text{s})$ is :
- A) Oxidation B) Reduction C) Redox reduction D) None
68. At certain temperature the hydrated salt of MgSO_4 exists as $\text{MgSO}_4 \cdot x\text{H}_2\text{O}$. On strong heating it loses its water of crystallization and becomes anhydrous MgSO_4 . If 6.15g of the hydrated salt on heating gives 3g of anhydrous salt then the value of 'x' is [Atomic weights: Mg = 24, S = 32, O = 16, H = 1]
- A) 5 B) 7 C) 10 D) 8
69. Among the following identify an extremely corrosive alkali is:
- A) Ammonium hydroxide B) Calcium hydroxide
C) Potassium hydroxide D) Magnesium hydroxide
70. 'X' reacts with oxygen to form a compound 'Y'. 'Y' on reaction with water forms a new substance 'Z' that turns blue litmus red. Identify X, Y and Z respectively.
- A) Metal, metallic oxide, base B) Non-metal, non-metallic oxide, acid
C) Metal, metallic oxide, neutral solution D) Metalloid, metalloid oxide, neutral solution
71. Statement-I : The residue left when a hydrated salt loses its water of crystallisation is called anhydrous salt.
- Statement-II: A salt formed by the partial neutralisation of hydroxyl ions of a base by an acid is called basic salt.
- A) Both Statement-I, and Statement-II are true.
B) Both Statement-I, and Statement-II are false.
C) Statement I is true, Statement II is false.
D) Statement I is false, Statement II is true.
72. When you test the solutions of sodium bicarbonate, sodium hydroxide, hydrochloric acid and acetic acid with universal indicator, in which case would you get a red colour?
- A) sodium bicarbonate B) hydrochloric acid
C) sodium hydroxide D) acetic acid
73. Zinc reacts with an acid as well as with a base to liberate hydrogen. On the basis of this what should be the nature of the zinc metal?
- A) basic B) acidic C) amphoteric D) neutral
74. You are given four unknown solutions I, II, III, and IV. The pH values of these solutions are found to be 3, 7, 8, and 10 respectively. Among the given solutions, which solution has the highest hydrogen ion concentration?
- A) I B) II C) III D) IV

75. Column-I
 a) Purest form of iron is
 b) Commercial form of iron is
 c) Pig iron is
 d) The most abundant element in the earth crust is
- Column-II
 p) Wrought iron
 q) Pig iron
 r) Hard and brittle
 s) Oxygen
- A) a-p;b-q;c-r;d-s B) a-q;b-p;c-r;d-s C) a-s;b-q;c-p;d-r D) a-r;b-q;c-p;d-s
76. Zinc is used to extract silver by:
 A) Carbon monoxide reduction in Mond's process
 B) Solvent extraction from molten iron in the LD process
 C) Solvent extraction from molten lead in Parke's process
 D) Solvent extraction from molten gold in the cyanide process
77. All materials shown property of malleability expect
 A) Iron B) Graphite C) Aluminium D) Silver
78. Which non-metal catches fire if it is exposed to air?
 A) Na B) P C) O D) U
79. Of these, the least dense metal is :
 A) Hg B) Au C) Cu D) Na
80. Which of the following metals does not displace H_2 gas from dilute HCl or dilute H_2SO_4 ?
 A) Mg B) Cu C) Zn D) All

BIOLOGY

Single Response Type :

81. What is the science that deals with the study of life processes ?
 A) Psychology B) Physiology C) Biochemistry D) Morphology
82. Chlorophyll is present
 A) in the grana of chloroplasts B) on the surface of chloroplasts
 C) in the stroma D) dispersed throughout the chloroplasts.

Assertion and Reasoning Type:

83. Assertion : Mitochondria helps in photosynthesis.
 Reason : Mitochondria have enzyme for dark reaction.
 A) If both assertion and reason are true and reason is the correct explanation of assertion.
 B) If both assertion and reason are true but reason is not the correct explanation of assertion.
 C) If assertion is true but reason is false.
 D) If assertion is false but reason is true.

Match the following/ Matrix Matching:

84. **Column I**
- a) Nutrition
b) Synthesis
c) Growth
d) Transport
- Column II**
- p) The increase in cell size and/or number
q) The movement of materials within the cell or within the organism.
r) The process of obtaining food.
s) Combining small molecules to create larger more complex molecules.
- A) a - p, b - q, c - r, d - s
B) a - q, b - p, c - r, d - s
C) a - r, b - s, c - p, d - q
D) a - s, b - r, c - p, d - q
85. Digestion of food in human starts from
A) Duodenum B) Small intestine C) Mouth D) Large intestine
86. Large intestine in man mainly carries out
A) absorption B) assimilation
C) digestion of fats D) digestion of carbohydrates-
87. It is the common passage for air and food
A) Pharynx B) Larynx C) Nasal cavity D) Trachea
88. Complete oxidation of 1 gm mole of glucose gives rise to
A) 6860000 cal B) 686000 cal C) 68600 cal D) 6860 cal.
89. Total oxidation of 1 glucose molecule during aerobic respiration produces
A) 38 ATP molecules B) 30 ATP molecules C) 36 ATP molecules D) 32 ATP molecules.
90. Name the organism which lacks nervous system.
A) grasshopper B) Hydra C) human being D) plant.
91. Plant hormones also called as
A) Phytohormones B) Plant growth substance
C) Plant growth regulators D) All of the above
92. In Plants, growth occurs by
A) Meristematic tissue B) Permanent tissue
C) Ground tissue D) Bark

Match the following/ Matrix Matching:93. **Column - I**

- a) Auxin
- b) Gibberelin
- c) Cytokinin
- d) Dormin

- A) a - p, b - q, c - r, d - s
- C) a - p, b - q, c - s, d - r

Column - II

- p) GA₃
- q) IAA
- r) ABA
- s) Zeatin

- B) a - q, b - p, c - s, d - r
- D) a - s, b - r, c - p, d - q

Assertion and Reasoning Type:

94. Assertion : Auxins are found in the growing tips of the plants.

Reason : The concentration of auxin is highest at the tip of the root.

- A) If both assertion and reason are true and reason is the correct explanation of assertion.
- B) If both assertion and reason are true but reason is not the correct explanation of assertion.
- C) If assertion is true but reason is false.
- D) If assertion is false but reason is true.

95. The directional movement or orientation of a plant part in response to light is termed

- A) chemotropism
- B) phototropism
- C) thigmotaxis
- D) photoperiodism.

96. Efferent nerves are also called as _____.

- A) motor nerves
- B) sensory nerves
- C) mixed nerves
- D) association nerves

97. At the synapses, the impulses are always passed from the _____.

- A) axon to the dendrites
- B) dendrites to the axon
- C) either way is possible
- D) cyton to the dendrites

98. Select the mis - matched pair.

- A) adrenaline - pituitary gland
- B) testosterone - testes
- C) estrogen - ovary
- D) thyroxine - thyroid gland.

99. The hormone which increases the fertility males is called

- A) oestrogen
- B) testosterone
- C) insulin
- D) growth hormone.

100. Electrical impulse travels in a neuron from

- A) dendrite → axon → axon end → all body
- B) cell body → dendrite → axon → axonal end
- C) dendrite → cell body → axon → axonal end
- D) axonal end → axon → cell body → dendrite

***** ALL THE BEST *****