SRI SAIVIJETHA SCHOOL

IIT - FOUNDATION PROGRAMME :: GRAND TEST-1

CLASS 6

IMPORTANT INSTRUCTIONS :

All Questions are compulsory. Each correct answer carries 4 marks. No negative marks,

No mark is deducted if not attempted. All are single correct answers only.

Total number of Question : 45   Time duration : 90M Max.Marks :180

Syllabus:

MATHEMATICS	: Number system, Numbers, Ratio & Proportion
PHYSICS	: Mathematical tools in physics
CHEMISTRY	:

MATHEMATICS

1. **"My life is over ". One student write this statement in every line of the book havin 20 pages. Each page has 20 lines. How many times this statement is repeated**

   A) 400 　　　 B) 390 　　　 C) 399 　　　 D) we can't say.

2. **The successor of 1000 in Natural numbers**

   A) 999 　　　 B) 1001 　　　 C) 1002 　　　 D) does not exist

3. **The equivalent of LXXV is**

   A) 75 　　　 B) 55 　　　 C) 45 　　　 D) 85

4. **Predecessor of 1 in whole numbers**

   A) 0 　　　 B) 1 　　　 C) 2 　　　 D) does not exist

5. $i^{4n+1} + i^{4n} + i^{4n+2} + i^{4n+3} = \underline{\qquad} \left(n \in N \right)$

   A) i 　　　 B) -i 　　　 C) -1 　　　 D) 0

6. **If the digits 2, 1, 3, 5, 6, 7, 0 and 2 are rearranged to form a largest number, then the largest number is**

   A) 76532210 　 B) 76532201 　 C) 23615207 　 D) None

7. **The Roman numeral corresponding to 509 is**

   A) DXI 　　　 B) CIX 　　　 C) DIX 　　　 D) None

8. **Which of the following number is real number**

A) -5   B) $\dfrac{1}{0}$ C) $\sqrt{-3}$ D) $\Pi + \sqrt{-3}$

9. **If A : B = 3 : 2 and B : C = 5 : 4, then A : B : C is**

A) 15 : 10 : 7   B) 15 : 10 : 6   C) 15 : 10 : 4   D) 15 : 10 : 8

10. **e is called _____ number**

A) Rational number   B) Whole number

C) Integer   D) Irrational number

11. **Successor of O is Rational number.**

A) -1   B) 1   C) 0.0001   D) does not exists

12. **If A gets 5 times as much as B and B gets 4 times as much as C, then if you divide as 1000/- the share A and B are**

A) 800/-, 170/-   B) 800/-, 140/-   C) 800/-, 160/-   D) 800/-. 150/-

13. **1-2+3-4+5-6+7-8+..........-2016+2017=**

A) 2017   B) 2016   C) 1008   D) 999

14. **Non negative integers denoted by**

A) z^- B) z^+ C) $z - z^-$ D) w

15. **The only digit whose place value does not change depending on its place in the numeral is**

A) 0   B) 1   C) 9   D) None

16. **The difference of the number of 4 digit numbers and the number of 3 digit numbers in base 10 system is**

A) 9900   B) 9000   C) 8100   D) None

17. **The number of zeros in 1000 crores is_____**

A) 8   B) 10   C) 11   D) 9

18. **Sum of first 10 whole number**

   A) 55   B) 45   C) 35   D) can't say

19. **If 42 : 56 = 51 : x, then the value of x is**

   A) 85   B) 34   C) 68   D) 136

20. **The successor of 36,79,999 is :**

   A) 36,80,000   B) 3,68,00,000

   C) 3,68,00,000   D) 3,68,00,00,000

21. **Predecessor of zero in rational number_____**

   A) -1   B) +1   C) 0   D) does not exist.

22. **If $2\frac{1}{2} : x = 12\frac{1}{2} : 6\frac{1}{4}$, then the value of x is**

   A) $\frac{5}{8}$ B) $\frac{5}{2}$ C) $\frac{5}{4}$ D) $\frac{5}{16}$

23. **Successor of "zero" in the set of whole numbers is**

   A) –1   B) 2   C) 1   D) 0

24. **In a Roman number, if the smaller digit is placed before the greater digit, the value of the smaller digit is**

   A) added to that of the greater digit

   B) subtracted from that of the greater digit.

   C) multiplied by the greater digit

   D) None

25. **The numerical value of VVVVV_____**

   A) 15   B) 10   C) 25   D) invalied format

26. **20 students plan for a picture and collect Rs.800. If 5 more students joined, then the amount of money to be collected is**

   A) 1100/-   B) 1200/-   C) 1000/-   D) 1500/-

27. The Roman Numeral CDXLVI in Indo-Arabic System is

    A) 444   B) 456   C) 446   D) 442

28. Length of a road is 3620 m. If RF = $\dfrac{1}{100000}$, then the length of the road in the map is

    A) 36.2 cm   B) 0.362 cm   C) 3.62 cm   D) 362 cm

29. Additive identity in natural number

    A) 0   B) 1   C) -1   D) does not exist

30. The number 64 is written in binary system as

    A) $1,000s000_{(2)}$ B) $1,0000_{(2)}$ C) $1,00000_{(2)}$ D) None of these

PHYSICS

31. $\dfrac{d}{dx}\left(x^{10}\right) = $ _____

    A) $10x^9$ B) $10x^8$ C) $9x^7$ D) $9x^8$

32. $\dfrac{d}{dy}\left(x^{15}\right) = $ _____

    A) $14x^{13}\dfrac{d}{dx}$ B) $15x^{14}\dfrac{d}{dx}$ C) $15x^{13}\dfrac{d}{dx}$ D) $14x^{15}\dfrac{d}{dx}$

33. $\dfrac{d}{dx}\left(\sin\theta\right) = $ _____

    A) $\sin\theta$ B) $\cos\theta$ C) $\sin\theta\dfrac{d\theta}{dx}$ D) $\cos\theta\dfrac{d\theta}{dx}$

34. $\dfrac{d}{dx}\left(x^2 + 5x^3 + \dfrac{1}{x}\right) = $ _____

    A) $2x + 5x^2 - \dfrac{1}{x^2}$ B) $2x + 15x^2 - \dfrac{1}{x^2}$

    C) $3x + 15x^2 - \dfrac{1}{x^2}$ D) $2x + 15x^2$

35. If A = 3i – 4j and B =– i – 4j, calculate $\vec{A} + \vec{B}$ and $\left|\vec{A} + \vec{B}\right|$.

    A) 2i–8j, 8.1   B) 2i–4j, 4.2   C) 2i, 3   D) 4j, 6

36. A vector is not changed if

    A) it is rotated through an arbitary angle

    B) it is multiplied by an arbitary scalar

    C) it is cross multiplied by a unit vector

    D) it is slide parallel to itself

37. The magnitude of a vector cannot be

    A) unity   B) positive   C) negative   D) zero

38. If $\vec{A} = \vec{B}$, then

    A) $A = B$ and $\hat{A} \neq \hat{B}$ B) $A \neq B$ and $\hat{A} = \hat{B}$

    C) $A \neq B$, $\hat{A} \neq \hat{B}$ D) $A = B$, $\hat{A} = \hat{B}$

39. If magnitude of the resultant of two vectors equal of magnitude, is equal to the magnitude of either of the vectors, what is the angle between them ?

    A) 120^0 B) $45°$ C) $60°$ D) $30°$

40. Volume is

    A) Scalar   B) Vector   C) both   D) Tensor

41. The addition of two vectors will be maximum, if they are

    A) Non coplanar vectors   B) parallel vectors

    C) orthogonal vectors   D) coplanar vectors.

42. If $\vec{A} = 3\,\hat{i} + 4\,\hat{j}$ and $\vec{B} = 7\,\hat{i} + 24\,\hat{j}$, find a vector having the same magnitude as $\vec{B}$ and parallel to $\vec{A}$

   A) $15\hat{i} + 20\hat{j}$ B) $15\hat{i} - 20\hat{j}$ C) $20\hat{i} + 15\hat{j}$ D) $20\hat{i} - 15\hat{j}$

43. A vector PQ has the initial point P(1,2,–1) and terminal point Q(3,2,2). Write the displacement vector of PQ and its magnitude.

   A) $3\,\vec{i} + 2\,\vec{j}; \sqrt{13}$ B) $2\,\vec{i} + 3\,\vec{k}; \sqrt{13}$

   C) $6\,\vec{i} + 5\,\vec{j}; \sqrt{20}$ D) $3\,\vec{i} + 3\,\vec{k}; \sqrt{26}$

44. If angle between $\vec{a}$ and $\vec{b}$ is $\dfrac{\pi}{3}$, then angle between $2\vec{a}$ and $-3\vec{b}$ is

   A) $\dfrac{\pi}{3}$ B) $\dfrac{2\pi}{3}$ C) $\dfrac{\pi}{6}$ D) $\dfrac{5\pi}{3}$

45. If $\left|\vec{P} + \vec{Q}\right| = \left|\vec{P} - \vec{Q}\right|$, then the vectors $\vec{P}$ and $\vec{Q}$ are

   A) parallel to each other   B) inclined at 45^0 to each other

   C) perpendicular to each other   D) inclined at 60^0 to each other

46. If $\left|\vec{P}\right| = \left|\vec{Q}\right|$ and if $\theta = 120^0$ between them, then select the true answer from the following

   A) $P = Q \neq R$ B) $P = Q = R$

   C) Both (1) & (2)   D) None of these

47. If $\vec{P} + \vec{Q} = \vec{R}$ and $\vec{P} - \vec{Q} = \vec{S}$, then $R^2 + S^2$ is equal to

   A) $P^2 + Q^2$ B) $2(P^2 - Q^2)$ C) $2(P^2 + Q^2)$ D) 4 PQ

48. **Which one of the following is a null vector ?**

A) Net displacement of a particle moving once around, a circle

B) velocity of a body projected vertically up, when the body is at the highest point

C) acceleration of a particle executing S.H.M. at the mean position

D) all the above

49. **Three concurrent forces of the same magnitude are in equilibrium. What is the angle between the forces.**

A) 60^0 B) 120^0 C) 30^0 D) 45^0

50. $\dfrac{d}{dx}(\log \sin x) = \underline{\hspace{1cm}}$

A) $\cot x$ B) $\tan x$ C) $\cos x$ D) $\sin x$

51. $\int \dfrac{1}{x} dx = \underline{\hspace{1cm}}$

A) $\log x$ B) $\log x^2$ C) $2\log x$ D) $\log x^3$

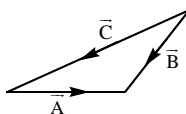**52.** $\int x^3 + 3x^2 - 5x = \underline{\hspace{2cm}}$

A) $\dfrac{x^4}{4} + x^3 - \dfrac{5x^2}{2}$ B) $\dfrac{x^3}{4} + x^3 - \dfrac{5x^2}{2}$ C) $\dfrac{x^4}{4} + x^3 + \dfrac{5x^2}{2}$ D) $\dfrac{x^4}{4} - x^3 + \dfrac{5x^2}{2}$

53. Evaluate $\int_0^6 (2x^2 + 3x + 5)dx$

A) 238   B) 228   C) 282   D) 822

54. **From the figure,**

A) $\vec{A} + \vec{B} = \vec{C}$ B) $\vec{B} + \vec{C} = \vec{A}$

C) $\vec{C} + \vec{A} = \vec{B}$ D) $\vec{A} + \vec{B} + \vec{C} = \vec{O}$

55. If $A = 3\hat{i} + 4\hat{j}$ and $B = 7\hat{i} + 24\hat{j}$, the vector having the same magnitude as B and parallel to A is

A) $5\hat{i} + 20\hat{j}$ B) $15\hat{i} + 10\hat{j}$ C) $20\hat{i} + 15\hat{j}$ D) $15\hat{i} + 20\hat{j}$

56. The expression $\left(\dfrac{1}{\sqrt{2}}\hat{i} + \dfrac{1}{\sqrt{2}}\hat{j} \right)$ is a

A) Unit vector   B) Null vector

C) Vector of magnitude $\sqrt{2}$ D) Scalar

57. If $\vec{P} = \vec{Q}$ Then which of the following is NOT correct

A) $\hat{P} = \hat{Q}$ B) $|\vec{P}| = |\vec{Q}|$ C) $P\hat{Q} = Q\hat{P}$ D) $\vec{P} + \vec{Q} = \hat{P} + \hat{Q}$

58. How many minimum number of coplanar vectors having different magnitudes can be added to give zero resultant

A) 2   B) 3   C) 4   D) 5

59. A particle moves along a circle with uniform speed V. When it has moved through an angle $60°$, change in its velocity is

A) zero   B) $\sqrt{3}$ V   C) 3V   D) V

60. Which of the following set of forces law keep an object in equilibrium

A) 5N, 6N, 1N   B) 5N, 4N, 7N   C) 1N, 2N, 5N   D) 5N, 6N, 20N

CHEMISTRY

61. Which of the following is more compressible

A) wood   B) H_2O C) CO_2 gas   D) Iron

62. In Which of the following inter molecular forcess are strong

A) water   B) Iron   C) N_2 gas   D) CO_2 gas

63. Ice floats on water it is due to

A) Density of water is more than Ice   B) Density of Ice is more than water

C) Density of Ice is equal to water   D) None

64. **In which state distance between constituent particals are more**

A) Solid   B) liquid   C) gas   D) All

65. **Which of the following has neither definite volume nor definite shape**

A) CO_2 gas   B) water   C) wood   D) Iron

66. **Dry ice is –**

A) Water in solid state   B) Water in gaseous state

C) CO_2 in liquid state   D) CO_2 in solid state

67. **At what temperature H_2O excist as solid**

A) $25°C$ B) $0°C$ C) $100°C$ D) $.10°C$

68. **Fluids are –**

A) Liquids and gases   B) Solids and gases

C) Liquids and solids   D) Only solids

69. **Identify correct statement**

A) liquids have definite shape   B) gases have definite volume

C) gases have definite shape   D) gases have definite mas

70. **What is volume of gases?**

A) Definite   B) Almost Nil

C) Large   D) Take the volume of container

71. **Name the process by which a drop of ink spreads in a beaker of water–**

A) Diffusion   B) Vaporization

C) Condensation   D) Sublimation

72. **Convert the temperature of $373°C$ to the kelvin scale?**

(A) 646 K   (B) 546 K   (C) 300 K   (D) 500 K

73. Plasma is the.......... state of matter –

A) First   B) Second   C) Third   D) Fourth

74. On increasing the temperature of the liquid the rate of evaporation is –

A) Increase   B) Decreases   C) No change   D)None of these

75. The melting point of ice is –

A) 0°C   B) 4°C   C) 5°C   D) None of these

76. Symbol 'Sb' stands for the element :

a) Strontium   b) Silicon   c) Antimony   d) Selenium

77. The symbols for the elements selenium and silicon are :

a) Si and Se   b) S and Si   c) Se and Si   d) S and Sl

78. Super oxide ion is :

a) O_2^{2-} b) O^{-2} c) O_2^- d) O_2

79. Carbonate and bicarbonate ions are :

a) CO_2^{3-} and HCO_2^- b) HCO_2^- and CO_2^{3-}

c) HCO_3^- and CO_3^{2-} d) CO_3^{2-} and HCO_3^-

80. Chromate and dichromate ions are :

a) CrO_4^{2-} and $Cr_2O_7^{2-}$ b) $Cr_2O_7^{2-}$ and CrO_4^{2-}

c) CrO_4^{2-} and $Cr_2O_5^{2-}$ d) $Cr_2O_5^{2-}$ and CrO_4^{2-}

81. An example of Alum is

a) $Al_2(SO_4)_3 . Na_2SO_4 . 12H_2O$ b) $FeSO_4 . (NH_4)_2SO_4 . 6H_2O$

c) $K_2SO_4 . Al_2(SO_4)_3 . 24H_2O$ d) $Fe_2(SO_4)_3 . Al_2(SO_4)_3 . 24H_2O$

82. **Formula of chromic acid is H_2CrO_4. Formula of divalent metal chromate is**

   a) $MCrO_4$ b) M_2CrO_4 c) $M_2(CrO_4)_3$ d) M_3CrO_4

83. **Which of the following symbol belongs to "Tungsten" ?**

   a) Tl   b) Ta   c) W   d) Tu

84. **Which of the following is the molecular formula of salt formed by sodium with halogen?**

   a) NaBr   b) NaCl   c) a & b   d) Na_2S

85. **Which of the following pair of ionic compounds contain dipositive anion ?**

   a) Nacl and Na_2SO_4 b) Na_2SO_4 and $BaCO_3$

   c) a & b   d) Na_2CO_3 and Na_3PO_4

86. **Which of the following species is electrically neutral ?**

   a) Na^+, O^{2-} b) $Na_{(3)}$ and $Fe_{(3)}$ c) Cl^- and Br^- d) none of these

87. **Which of the following is the polyatomic unipositive ioin**

   a) Chloride   b) phosphate   c) Ammoniam   d) Kadium

88. **Which of the following combination is incorrect ?**

   a) $K_2(SO_4)_2$ b) KSO_4 c) KCl_2 d) All

89. **The molecular formula of oxide formed from a dipositive metal and dinegative non-metal among the following is**

   a) $MnSO_4$ b) $MgSO_4$ c) MgO d) $MgCl_2$

90. **The symbols of elements gold, bead , polonium respectively are**

   a) Go,Ld,Po   b) Al,Pb,Pu   c) Au,Pb,Po   d) none of these

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IIT FOUNDATION ACADEMY

6TH CLASS :: GT:: KEYSHEET
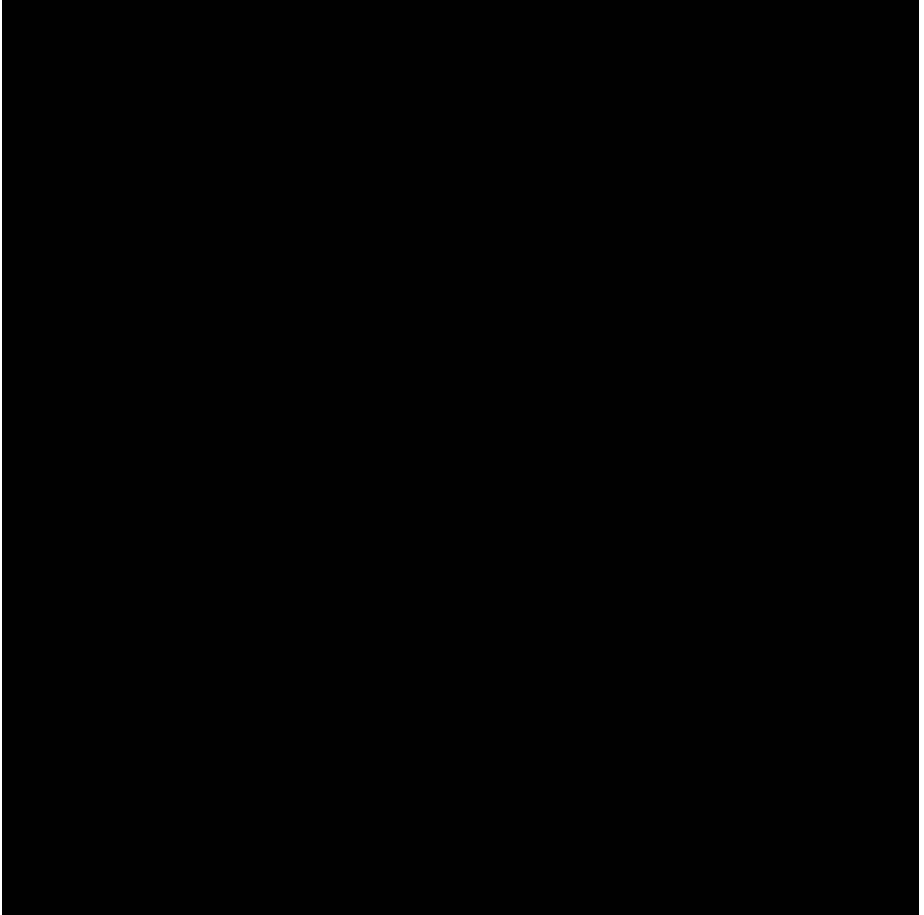
PHYSICS

38. **(D)** If two vectors are equal, i.e., $\vec{A} = \vec{B}$ they have same magnitude and direction hence, $A = B$ and $\hat{A} = \hat{B}$.

39. **(A) Hint :** $R = 2P\cos\dfrac{\theta}{2}$

42. **(A)** The vector parallel to $\vec{A}$ and having magnitude of $\vec{B}$ is

$$\vec{C} = \left|\vec{B}\right|\dfrac{\vec{A}}{\left|\vec{A}\right|} = \left|\vec{B}\right|\hat{A}$$

$$B = \sqrt{7^2 + 24^2} = 25$$

and $\hat{A} = \dfrac{\vec{A}}{A} = \dfrac{3\hat{i} + 4\hat{j}}{\sqrt{3^2 + 4^2}} = \dfrac{1}{5}\left(3\hat{i} + 4\hat{j}\right)$

$$\vec{C} = 25 \times \dfrac{1}{5}\left(3\hat{i} + 4\hat{j}\right) = 15\hat{i} + 20\hat{j}$$

55. (d) $|B| = \sqrt{7^2 + (24)^2} = \sqrt{625} = 25$

Unit vector in the direction of A will be $\hat{A} = \dfrac{3\hat{i} + 4\hat{j}}{5}$

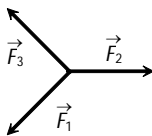So required vector $= 25\left(\dfrac{3\hat{i} + 4\hat{j}}{5}\right) = 15\hat{i} + 20\hat{j}$

56. (a) $\vec{P} = \dfrac{1}{\sqrt{2}}\hat{i} + \dfrac{1}{\sqrt{2}}\hat{j} \setminus |\vec{P}| = \sqrt{\left(\dfrac{1}{\sqrt{2}}\right)^2 + \left(\dfrac{1}{\sqrt{2}}\right)^2} = 1$

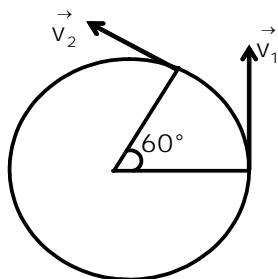$\therefore$ It is a unit vector.

57. (d) $\vec{P} + \vec{Q} = P\hat{P} + Q\hat{Q}$

58. (b) $\vec{F_3} = \vec{F_1} + \vec{F_2}$

There should be minimum three coplaner vectors having different magnitude which should be added to give zero resultant

59.

$$\Delta \vec{V} = \vec{V}_2 - \vec{V}_1 \Rightarrow \vec{V}_2 + \left(-\vec{V}_1 \right)$$

The angle between $\vec{V}_1$ and $\vec{V}_2$ is 120°

$$\Delta V^2 = V^2 + V^2 + 2V^2 \cos 120°$$

$$= 2V^2 \left[1 - \frac{1}{2} \right] = V^2 \text{ or } \Delta V = V$$