FIITJEE VIZAG CENTRE

NTSE 2019 SOLUTIONS – Stage I (Andhra Pradesh State)
(For class X Students)

SCHOLASTIC APTITUDE TEST

HISTORY

1.	1	2.	2	3.	4	4.	4
5.	4	6.	3	7.	1	8.	2
9.	3	10.	3	11.	3	12.	3

PHYSICS

13.	2	14.	4	15.	3	16.	2
17.	2	18.	3	19.	1	20.	1 & 3
21.	3	22.	1	23.	3	24.	4
25.	4						

ECONOMICS

26.	1	27.	1	28.	2	29.	3
30.	4	31.	4	32.	4	33.	2

POLITICAL SCIENCE

34.	3	35.	2	36.	3	37.	1
38.	3	39.	4	40.	2	41.	1

CHEMISTRY

42.	3	43.	4	44.	1	45.	2
46.	2	47.	3	48.	4	49.	1
50.	3	51.	3	52.	4	53.	4
54.	2						

GEOGRAPHY

55.	3	56.	1	57.	4	58.	3
59.	3	60.	3	61.	3	62.	2
63.	4	64.	4	65.	3	66.	2

BIOLOGY

67.	4	68.	4	69.	3	70.	1
71.	1	72.	4	73.	4	74.	4
75.	1	76.	2	77.	1	78.	4
79.	4	80.	2				

MATHEMATICS

81.	4	82.	4	83.	2	84.	3
85.	1	86.	1	87.	1	88.	2
89.	1	90.	4	91.	3	92.	2
93.	3	94.	2	95.	1	96.	3
97.	1	98.	3	99.	1	100.	2

SOLUTIONS:

HISTORY

1.1	2.2	3.4	4.4	5.4	6.3	7.1	8.2	9.3
10.3	11.3	12.3						

PHYSICS

13.2

Sol. If speed vs time graph is not a straight line then acceleration is variable

14.4

Sol. $\frac{1}{V}-\frac{1}{u}=\frac{1}{f}\Rightarrow\frac{1}{V}-\frac{1}{-30}=\frac{1}{20}$

$\Rightarrow\frac{1}{V}=\frac{1}{20}-\frac{1}{30}=\frac{1}{60}$

$V=60cm$

15.3

Sol. Factual question

$g_{jupiter}>g_{saturn}>g_{earth}>g_{mars}$

16.2

Sol. $\frac{1}{V}+\frac{1}{u}=\frac{1}{f}\Rightarrow\frac{\Delta V}{V^2}+\frac{\Delta U}{U^2}=0$

17.2

Sol. $time=\frac{2l}{V_{sound}}=\frac{2\times55}{330}=0.33s$

18.3

Sol. $R=\frac{V^2}{P}$ $\qquad\therefore R_1:R_2=\frac{V_1^2}{P_1}:\frac{V_2^2}{P_2}$

19.1

Sol. Conceptual

20.1 & 3

Sol. $F=q\left(\vec{V}\times\vec{B}\right)$

A is at positive potential / charge

B is at negative potential / charge

21.3

Sol. Gravitational field is conservative

22.1

Sol. Using Kirchoff's laws

Net resistance of circuit is 8Ω

Current = $\frac{\varepsilon}{R}=\frac{3}{8}=0.375A$

23.3

Sol. $P_{eff}=2P_{lens}+P_{mirror}$

$P_{lens}=\frac{1}{f_{lens}}$, $P_{mirror}=\frac{-1}{f_{mirror}}$

$=\left(\frac{2}{1}-1\right)\left(\frac{1}{20}-\frac{1}{\infty}\right)=\frac{1}{10}$

$P_{eff}=2\times\frac{1}{10}=\frac{1}{5}$

Focal length = 5cm

24.4

Sol. If particle is in uniform circular motion velocity changes but speed does not change.

25.4

Sol. $f_{red}<f_{yellow}<f_{green}<f_{blue}$

ECONOMICS

26.1	27.1	28.2	29.3	30.4	31.4	32.4	33.2

POLITICAL SCIENCE

34.3	35.2	36.3	37.1	38.3	39.4	40.2	41.1

CHEMISTRY

42.3

Sol. $Al^{3+}<Mg^{2+}<F^{-}<O^{-2}$

$\underset{(13/10)}{Al^{3+}}<\underset{(12/10)}{Mg^{2+}}<\underset{(9/10)}{F^{-}}<\underset{(8/10)}{O^{-2}}$: z/e values

43.4

Sol.

Element (given)	Atomic number	Element name
A	9	Fluorine

B	10	Neon
C	11	Sodium
D	12	Magnesium

$$B(inert\ gas) > A(halogen) > D(fully\ filled\ s-orbital) > C(alkali\ metal)$$

44.1

Sol. Stainless steel is iron – chromium – nickel alloy with small amounts of carbon

45.2

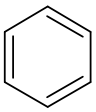
Sol. Based on metal reactivity series (Fe – black ppt)

46.2

Sol. Ethane : $CH_3 - CH_3 : 2sp^3\ carbons$

Ethylene : $CH_2 = CH_2 : 2sp^2$ carbons

Acetylene : $CH \equiv CH : 2sp$ carbons

Benzene :  : $6sp^2$ carbons

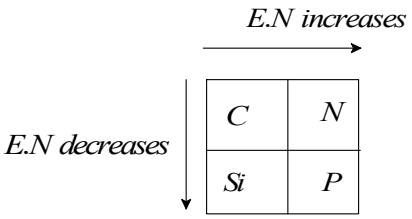
47.3

Sol. ${}_4Be,\ {}_{12}Mg,\ {}_{20}Ca,\ {}_{38}Sr$

48.4

Sol.
$$\underset{E.N \approx}{\overset{Si}{1.9}} < \overset{P}{1.22} < \overset{C}{2.5} < \overset{N}{3.0}$$

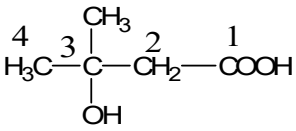
In the periodic table :



49.1

Sol. $2KI_{(aq)} + Pb(NO_3)_{2(s)} \rightarrow \underset{yellow\ ppt}{PbI_2} \downarrow + 2KNO_{3(aq)}$

50.3

Sol. 

3 – Hydroxy – 3- methyl butanoic acid

51.3

Sol. A (group IIIA) $\Rightarrow$ valency = 3

B (group VIA) $\Rightarrow$ valency = 2

Possible compound: A_2B_3 Ex. Al_2O_3

52. 4

Sol. 4s : n = 4, $l = 0,\ m_l = 0$

$3p : n = 3, l = 1,\ m_l = -1, 0, +1$

$5d : n = 5, l = 2, m_l = -2, -1, 0, +1, +2$

53.4

Sol. Fact

54.2

Sol. $Br_2 < HBr < HCl < H_2\ (bond\ \ energy)$

Based on effective overlap

GEOGRAPHY

55.3 56.1 57.4 58.3 59.3 60.3 61.3 62.2 63.4
64.4 65.3 66.2

BIOLOGY

67. 4 68. 4 69.3 70.1 71.1 72.4 73.4 74.4 75.1
76.2 77.1 78.4 79.4 80.2

MATHEMATICS

81.4

Sol: Mean of first 'n' natural number = $\frac{n(n+1)}{2n} = \frac{6n}{11}$

$\Rightarrow 11n + 11 = 12n \Rightarrow n = 11$

82.4

Sol: $\cos\theta = \frac{a}{b} \Rightarrow \sin\theta = \sqrt{1 - \cos^2\theta} = \frac{\sqrt{b^2 - a^2}}{b}$

$\Rightarrow \cos ec\,\theta = \frac{b}{\sqrt{b^2 - a^2}}, \cot\theta = \frac{a}{\sqrt{b^2 - a^2}}$

$\cos ec\,\theta + \cot\theta = \frac{a+b}{\sqrt{b^2 - a^2}} = \frac{\sqrt{a+b}}{\sqrt{b-a}}$

83.2

Sol: If -2 is root of $x^2 - Px + 6$ & $x^2 + Px - K = 0$

then $(-2)^2 - P(-2) + 6 = 0 \Rightarrow P = -5$

Now, $x^2 + Px - K = 0 \Rightarrow (-2)^2 + (-5)(-2) - K = 0$

$\Rightarrow K = 14$

84.3

Sol: $x + \frac{1}{x} = \frac{13}{6} \Rightarrow 6x^2 - 13x + 6 = 0$

$\Rightarrow x = \frac{2}{3} or \frac{3}{2}$

85.1

Sol: Volume of sphere = Volume of cone

$\Rightarrow \frac{4}{3}\pi r_s^3 = \frac{1}{3}\pi r_c^2 h_c$

$\Rightarrow \frac{4}{3}\pi (3)^3 = \frac{1}{3}\pi r_c^2 \times 3$

$\Rightarrow r_c^2 = 36$

$r_c = 6cm$

86.1

Sol: $P(x) = x^2 + 3x + K$

$\alpha + \beta = -3$

$\alpha - \beta = 5 \Rightarrow \alpha - 1, \beta = -4$

$\Rightarrow \alpha\beta = K \Rightarrow K = -4$

87.1

Sol: $\frac{x-y}{xy} = 5$ & $\frac{x+y}{xy} = 7$

$\frac{x-y}{xy} - \frac{(x+y)}{xy} = 5 - 7 \Rightarrow \frac{-2y}{xy} = -2 \Rightarrow x = 1$

88.2

Sol: $\frac{1}{\alpha} + \frac{1}{\beta} = \frac{\alpha+\beta}{\alpha\beta} = \frac{-q}{-p} = \frac{q}{p}$

89.1

Sol: $\cos 30^\circ x + \sin 30^\circ y = 3$

$\Rightarrow \frac{\sqrt{3}}{2}x + \frac{1}{2}y = 3 \Rightarrow \sqrt{3}x + y = 6 \rightarrow A$

from given options, (0, 6) & $(2\sqrt{3}, 0)$ satisfies eq A

90.4

Sol: AD = AF, BD = BE, CF = CE (Tangents from external point are equal)

2AD + 2BD + 2CF = 10 + 12 + 14 = 36

$\Rightarrow$ AD + BD + CF = 18

(AD + BD + CF) – (BE + CE) = 18 – 12

$\Rightarrow$ AD + BD + CF – BD – CF = 6 ($\because$ BE = BD, CF = CE)

$\Rightarrow$ AD = 6

91. 3

Sol. $a = p^3q^2,\ \ b = p^2q^4$, p & q are prime

$LCM\left(a,b\right) = p^3q^4$ (taking highest power of each prime factor)

92. 2

Sol. P(card is divisible by 2 & 3) = P(card is divisible by 6)

$\because$ 6, 12, 18 are divisible by 6

$\Rightarrow$ P(card is divisible by 6) = $\dfrac{3}{20}$

93. 3

Sol. Given A.P = 5, 12, 19, …….., 173

d = 12 – 5 = 7

from end, a = 173, d = -7

$a_{10} = 173 + 9\left(-7\right)$

= 110

94. 2

Sol. Area of triangle formed by these points = 0

$\Rightarrow \dfrac{1}{2}\left[a\left(3a-1\right)+3a\left(1-2a\right)+3\left(2a-3a\right)\right]=0$

$\Rightarrow 3a^2 - a + 3a - 6a^2 + 6a - 9a = 0$

$\Rightarrow -3a^2 - a = 0$

$a\left(3a+1\right)=0$

$a = 0,\ a = \dfrac{-1}{3}$

95.1

Sol. Slope of x-axis = 0 = sin 0^0

Slope of y-axis = not defined = cot 0^0

Distance between points $\left(\sin 55^0, 0\right) \& \left(0, \sin 35^0\right)$

$$= \sqrt{\left(\sin 55^0\right)^2 + \left(\sin 35^0\right)^2} = \sqrt{\sin^2\left(90-35\right) + \left(\sin^2 35\right)}$$

$$= \sqrt{\cos^2 35^0 + \sin^2 35^0} = \sqrt{1} = 1 = \sec 0^0$$

96. 3

Sol. $DE \perp AC$ and $AD = \frac{1}{2}BD$

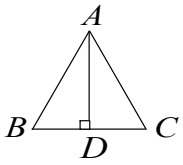
$\Delta ADE \sim \Delta ABC$ (AA similarity)

By midpoint theorem of similar triangle

$$\Rightarrow DE = \frac{1}{2}BC = \frac{1}{2} \times 6cm = 3cm$$

97.1

Sol. Let each side of equilateral triangle = a



Height of equilateral triangle = $\frac{\sqrt{3}a}{2}$

$$AD^2 = \left(\frac{\sqrt{3}a}{2}\right)^2 = \frac{3a^2}{4} = \frac{3BC^2}{4}$$

$\therefore$ both A and C

98.3

Sol. Volume of resulting sphere = sum of volume of 3 spheres

$$\frac{4}{3}\pi R^3 = \frac{4}{3}\pi 15^3 + \frac{4}{3}\pi 20^3 + \frac{4}{3}\pi 25^3$$

$$\Rightarrow R^3 = 15^3 + 20^3 + 25^3$$

$$\Rightarrow R = \sqrt[3]{27,000}$$

R = 30 cm

99. 1

Sol. $\cos ec60^0 x + \cos 45^0 y = 4 \Rightarrow \frac{2}{\sqrt{3}}x + \frac{1}{\sqrt{2}}y = 4$

Point $\left(\tan 60^0, \sec 45^0\right) = \left(\sqrt{3}, \sqrt{2}\right)$ does not satisfy the line equation

as $\frac{2}{\sqrt{3}} \times \sqrt{3} + \frac{1}{\sqrt{2}}\sqrt{2} = 3 \neq 4$

100.2

Sol. Let OQ be the radius of circle

In ΔOQP, $\sin 60^0 = \frac{OQ}{OP} = \frac{r}{4}$

$$\frac{\sqrt{3}}{2} = \frac{r}{4} \Rightarrow r = 2\sqrt{3}$$