NTSE STAGE – 1 (2017)

ANSWERS KEYS (SAT)

PHYSICS		CHEMISTRY		BIOLOGY		S. SCIENCE		MATHEMATICS	
1.	C	14.	A	27.	A	41.	B	81.	D
2.	D	15.	B	28.	B	42.	B	82.	B
3.	B	16.	B	29.	C	43.	C	83.	C
4.	C	17.	C	30.	B	44.	B	84.	A
5.	B	18.	C	31.	B	45.	D	85.	B
6.	D	19.	D	32.	C	46.	A	86.	C
7.	A	20.	A	33.	C	47.	C	87.	A
8.	B	21.	D	34.	D	48.	C	88.	B
9.	A	22.	B	35.	C	49.	C	89.	D
10.	A	23.	C	36.	C	50.	A	90.	B
11.	B	24.	D	37.	D	51.	C	91.	C
12.	C	25.	B	38.	B	52.	A	92.	A
13.	C	26.	A	39.	B	53.	D	93.	C
				40.	D	54.	A	94.	B
						55.	B	95.	D
						56.	A	96.	B
						57.	D	97.	C
						58.	C	98.	B
						59.	C	99.	A
						60.	A	100.	B
						61.	A		
						62.	C		
						63.	D		
						64.	A		
						65.	B		
						66.	BORC		
						67.	A		
						68.	C		
						69.	A		
						70.	C		
						71.	A		
						72.	B		
						73.	C		
						74.	D		
						75.	B		
						76.	B		
						77.	A		
						78.	A		
						79.	B		
						80.	C		

HINT & SOLUTIONS (SAT)

PHYSICS

1. **(C)**

    T = $t_{AB} + t_{AC}$
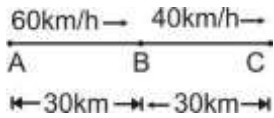
    $= \dfrac{30}{60} + \dfrac{30}{40} = \dfrac{1}{2} + \dfrac{3}{4} = \dfrac{5}{4}$ h

    = 75 min

2. **(D)**
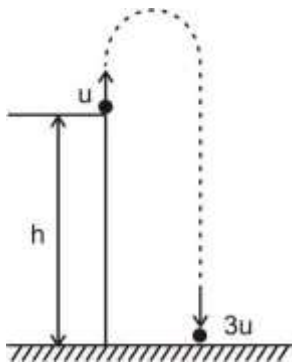
    $(-3u)^2 = (u)^2 + 2(-g)(-h)$

    $\Rightarrow 9u^2 = u^2 + 2gh$

    $\Rightarrow 8u^2 = 2gh$

    $\Rightarrow \left[h = \dfrac{4u^2}{g} \right]$

3. **(B)**

    Let $v_2 = 2v_1$

    $\therefore \quad \dfrac{k_1}{p_1} = \dfrac{1/2 m v_1^2}{m v_1} = \dfrac{v_1}{2}$

    Now, $\dfrac{k_2}{p_2} = \dfrac{1/2 m v_2^2}{m v_2} = \dfrac{v_2}{2} = \dfrac{2v_1}{2} = 2\left(\dfrac{v_1}{2}\right) = 2\left(\dfrac{k_1}{p_1}\right)$

4. **(C)**

$\because$ $V = \nu\lambda$

$\lambda = \dfrac{3 \times 10^8}{30cm\ 10^9} = 0.3m =$

5. **(B)**
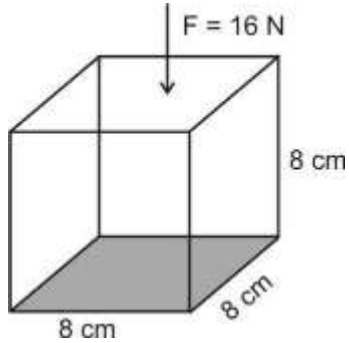
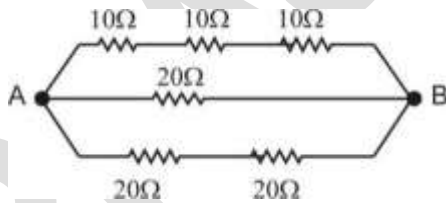$P = \dfrac{F}{A} = \dfrac{16}{8 \times 8 \times 10^{-4}} = 0.25 \times 10^4 Pa$

$\therefore\ [P = 2500Pa]$

6. **(D)**

$W = Fs\cos\theta$

when $\theta = 0^0, \Rightarrow \cos 0^0 = 1$(maximum)

$\therefore\ W = Fs$ is maximum

$\therefore\ \xrightarrow{\quad F \quad}$

$\xrightarrow{\quad s \quad}$ is correct

7. **(A)**

$R_{AB} = ?$

$\dfrac{1}{R_{AB}} = \dfrac{1}{30} + \dfrac{1}{20} + \dfrac{1}{40}$

$\dfrac{1}{R_{AB}} = \dfrac{4+6+3}{120} = \dfrac{13}{120}$

$R_{AB} = \dfrac{120}{13} = 9.23\Omega$

8. **(B)**

$$R_1 = \frac{\rho L}{4A} \quad \ldots\ldots (1)$$

$$R_2 = \frac{\rho \times 2L}{A} \quad \ldots\ldots (2)$$

$$\frac{R_1}{R_2} = \frac{\rho L}{4A} \times \frac{A}{\rho \times 2L}$$

$$\frac{R_1}{R_2} = \frac{1}{8} = 1:8$$

9. **(A)**

On increasing the length of the conductor by stretching, the new resistance is given by -

$R' = (n)^2 R$ Where n is no. of times of stretching

$R' = (3)^2 R \ [n = 3]$

$R' = 9R$

10. **(A)**

Our solar system lies in "Milky way" Galaxy

11. **(B)**

"Presbyopia" Occurs in old age. 'Presbyopia' is natural part of the ageing process. It happens due to hardening of the lens of eye to focus light behind rather than on the retina when looking at closer objects.

12. **(C)**

by lens makers' formula

$$\frac{1}{f} = (n-1)\left(\frac{1}{R_1} - \frac{1}{R_2}\right); \text{ where n is refractive index of lens.}$$

In case – 1

$$\frac{1}{f_1} = (n-1)\left(\frac{1}{R} - \left(-\frac{1}{R}\right)\right)$$

$$f_1 = \frac{R}{2(n-1)}$$

In Case – 2

$$\frac{1}{f_2} = (n-1)\left(\frac{1}{R} - \frac{1}{\infty}\right)$$

$$f_2 = \frac{R}{(n-1)}$$

$\therefore f_2 = 2f_1 = 2f$

13. **(C)**

$p_1 = p_2$

$\sqrt{2m_1K_1} = \sqrt{2m_2K_2}$

$m_1K_1 = m_2K_2$

if $m_1 > m_2$

so, $\dfrac{m_1}{m_2} = \dfrac{K_2}{K_1}$ so, if $m_1 > m$ then –

$K_2 > K_1$

CHEMISTRY

14. Electron is discovered by J.J. Thomson
15. Gypsum is $CaSO_4.2H_2O$
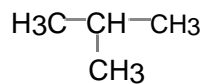16. The process in which the red hot cast iron is cooled immediately in cold water is known as quenching
17. $Na^+ \Rightarrow 1s^2_{\ 2} \ 2s^2 \ 2p^6_{\ 8}$
18. SO_2
    $x + (-2) \times 2 = 0$
    $x = 4$
19.

    H3C—CH—CH3
          |
        CH3

    2-methylpropane
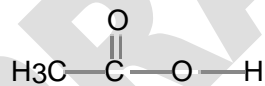
20. Stainless steel contains Fe, Ni, Cr
21. Number of proton = 1
    Number of electron = 11
    Number of Neutron = 12
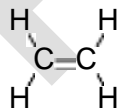22. General electronic configuration of III group is $ns^2 \, np^1$
23. $Zn(s) + H_2SO_4 \,(aq) \longrightarrow ZnSO_4 \,(aq) + H_2 \uparrow$
24.

           O
           ||
    H3C—C—O—H
    Carboxylic acid
25.

    H   H
     \   /
      C=C
     /   \
    H   H
    Double covalent bond
26.
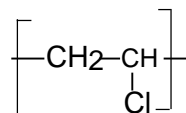
    —CH2—CH—
          |
         Cl
    Poly vinyl chloride (PVC)

MATHEMATICS

81. $\dfrac{\cos^2\theta + \tan^2\theta - 1}{\sin^2\theta}$

$\Rightarrow \cot^2\theta + \sec^2\theta - \csc^2\theta$

$\Rightarrow \sec^2\theta - 1$

$\Rightarrow \tan^2\theta$

82. $\dfrac{\cos^2 20^\circ + \cos^2 70^\circ}{\sin^2 59^\circ + \sin^2 31^\circ}$

$\Rightarrow \dfrac{\cos^2 20^\circ + \sin^2 20^\circ}{\cos^2 31 + \sin^2 31}$

$\Rightarrow 1$

83. $\dfrac{a_1}{a_2} = \dfrac{b_1}{b_2} \neq \dfrac{c_1}{c_2}$

$\dfrac{2}{3} = \dfrac{m}{-7}$

84. $x^3 - 4x^2 - 7x + 10$

$\Rightarrow (x-1)(x^2 - 3x - 10)$

$\Rightarrow (x-1)(x-5)(x+2)$

$x = 1, 5, -2$

85. $\dfrac{x+1}{x^2-1} - \dfrac{x-x^2+2}{x(x^2-1)}$

$\Rightarrow \dfrac{x^2 + x - x + x^2 - 2}{x(x^2-1)}$

$\Rightarrow \dfrac{2x^2 - 2}{x(x^2-1)}$

$\Rightarrow \dfrac{2}{x}$

86. $MB = \sqrt{5^2 - 3^2}$

$MB = 4\text{ cm} \quad AB = 8\text{ cm}$

87. $2\pi(R+r)h = 1320$

$2\pi(8+r)14 = 1320$

$2 \times \dfrac{22}{7} \times 14(8+r) = 1320$

$(8+r) = 15$

$r = 7$

Diameter $= 14$

88. $\tan\theta = \dfrac{h}{4}$

$\theta = 45^\circ$

89. $\sin\theta(\csc\theta - \sin\theta)$

$\Rightarrow 1 - \sin^2\theta = \cos^2\theta$

90. HT, TH

$P(E) = \dfrac{1}{2}$

91. Only one way to have same birthday

$\therefore P(E) = \dfrac{364}{365}$

92. Sunita = y   Vineeta = x
$(y - 5) = 3(x - 5)$ $(y + 10) = 2(x + 10)$
$3x - y - 10 = 0$ $2x - y + 10 = 0$
$x = 20,$ $y = 50$

93. 10, 12, 14 98
$98 = 10 + (n - 1)2$
$88 = 2n - 2$
$n = 45$

94. $A^C \cap B^C$

95. $N = \dfrac{\frac{4}{3}\pi(8)^3}{\frac{4}{3}\pi(1)^3} = \dfrac{5}{2}$

96. $\left[\dfrac{\cos 41 + \cos 41}{\cos 41} \right]^2$ cos 41
$2^2 = 4$

97. C

98. B

99. $S = \dfrac{20}{2}[16 + (20 - 1)(-5)]$

$= 0 \times -79 = -790$

100. Distance covered

$= 21 \times 60 \times 2\pi \dfrac{1}{2}.6$

$= 21 \times 60 \times \dfrac{22}{7} \times 1.6$

$= 6336 \ m$

$= 6.336 \ km$

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ANSWERS KEYS (MAT)

1.	D	2.	C	3.	B	4.	D	5.	B	6.	C	7.	A
8.	C	9.	D	10.	A	11.	B	12.	D	13.	C	14.	B
15.	A	16.	B	17.	D	18.	C	19.	D	20.	A	21.	B
22.	A	23.	B	24.	D	25.	B	26.	C	27.	A	28.	B
29.	D	30.	C	31.	C	32.	A	33.	C	34.	C	35.	A
36.	D	37.	B	38.	C	39.	A	40.	C	41.	A	42.	D
43.	A	44.	C	45.	B	46.	D	47.	A	48.	D	49.	C
50.	B												

HINT & SOLUTIONS (MAT)

1. $1^3, 2^2, 3^3, 4^2, 5^3, 6^2, 7^3$
   = 125

2. Common difference 3, 5, 7, 9,
   11 28+11=39

3. 10, 18, 28, 40, 54, ?, 88
      8   10   12   14   16
   54+16=70

4. x3, x3, x3,....
   108x3 = 324

5. $1^2, 3^2, 5^2, 7^2, 9^2, 11^2$
   Square of odd numbers is 81

6. Raw material – Clay

7. 1st comes in 2nd- water

8. lack of second results in the first – sanitation

9. Thermometer shows temperature

10. An oven is an appliance to keep food items hot
    Similarly, a refrigerator keeps food-items cold

11. First is made up of second – steel

12. 1st revolves around 2nd – earth

13. 1st + 135º clockwise direction – North East

14. +1, +1, +1, ...
    OFNFTJT

15. +1, -1, +1, -1...
    UQBHOHOF

16. +1, +1, +1....
    FAMOUS

17. A–4,C–5,E–9,P–7,T=7 Ans
    455978

18. In the given code
    A=2,B=4,C=6,....2=52 So,
    ACT = 2 + 6 + 40 = 48 and
    BAT=4+2+40=46
    Ans – 46

19. All except throat are sense organs – Throat

20. Brother of mother – Uncle
    Uncle's son – Cousin

21. Grand son

22. Let Akash's age today = x years
    Then, Akash's age after 1 year = (x + 1) years
    Therefore x + 1 = 2(x - 12)
    $\Rightarrow$ x + 1 = 2x –24 = 25

23. Lets son's ager be x
    Then father's age is 3x
    Five years ago, father's age = 3x –
    5 And son's age = x – 5
    So, 3x – 5 = 4(x - 5)
    $\Rightarrow$ 3x – 5 = 4x –20 = 15

24. Given that seventh day of a month is three days earlier than Friday
    $\Rightarrow$ Seventh day is Tuesday
    $\Rightarrow$ 14th is Tuesday
    $\Rightarrow$ 19th is Sunday

25. 26th Jan – Saturday
    Day in between 26th Jan to 14th Feb $\Rightarrow$ 19
    So off day = 5
    Therefore Saturday + 5 = Thursday

26. (Rank from bottom) + (Rank from top) –
    1 26+7–1=32

27. Position from right = 14
    Total = 40
    So $\Rightarrow$ 40 – 14 + 1 = 27

28. South-West

29. 10 meters

30. By observation – C

31. 8+6+2+4=20

32. 9×3=27

33. 7+5+1+1+3+4=21

34. By observation – Six

35. By observation – A (4, 6, 8)

36. By observation – 2

37. By observation – 4

38. 13+19=32
    4×8=32
    So C – 20

39. x1, x2, x3, x4, x5.
    X6 480 × 6 = 2880

40. 1+2=3
    2+3 =5
    3+5=8
    5+8=13

41. 5×(6+7)=63
    Ans (A) – 1

42. A+F=K 1
    + 6
    +5+5 Ans
    D – K

43. By observation (A)

44. By observation (C)

45. By observation (B)

46. By observation (D)

47. By observation (A)

48. By observation (D)

49. By observation (C)

50. By observation (B)