

**NTSE – Stage – 1 (2014)**  
**Hints and Solution**

**Mental Ability Test (MAT)**

1. (4)
2. (3)
3. (3)
4. (1)
5. (2)
6. (1)
7. (3)
8. (3)
9. (1)
10. Question in Wrong
11. (3)
12. (1)
13. (3)
14. (3)
15. (4)
16. (2)
17. (3)
18. (1)
19. (2)
20. (2)
21. (2)
22. (3)
23. (2)
24. (3)
25. (1)
26. (2)
27. (1)
28. (2)
29. (1)
30. (2)
31. (3)
32. (1)
33. (3)
34. (1)
35. (4)
36. (1)

37. (2)
38. (3)
39. (4)
40. (1)
41. (4)
42. (3)
43. (2)
44. (2)
45. (4)
46. (1)
47. (4)
48. (2)
49. (4)
50. (1)

**Language Test**

**English**

1. (3)
2. (4)
3. (1)
4. (4)
5. (4)
6. (1)
7. (2)
8. (1)
9. (3)
10. (4)
11. (1)
12. (1)
13. (1)
14. (2)
15. (2)
16. (3)
17. (1)
18. (2)
19. (1)
20. (3)
21. (2)
22. (1)

23. (3)
24. (2)
25. (3)
26. (4)
27. (3)
28. (2)
29. (1)
30. (1)
31. (3)
32. (1)
33. (3)
34. (1)
35. (2)
36. (1)
37. (1)
38. (4)
39. (1)
40. (1)

**Scholastic Aptitude Test (SAT)**

**Physics**

1. (3)

$$W = \Delta KE$$

$$= \frac{1}{2}mv_f^2 - \frac{1}{2}mv_i^2$$

$$= \frac{1}{2} \times 2000 [15^2 - 5^2]$$

$$= 2 \times 10^5 \text{ J}$$

$$v_i = \frac{18 \times 5}{18} = 5 \text{ m/s}$$

$$v_f = \frac{54 \times 5}{18} = 15 \text{ m/s}$$

2. (3)

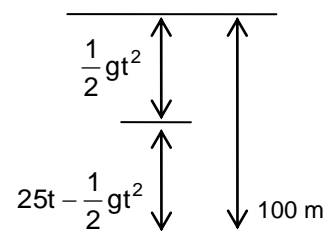
(-)ve acceleration for both the cars is equal since  $\mu$  is same.

3. (3)

$$\frac{1}{2}gt^2 + \left\{ 25t - \frac{1}{2}gt^2 \right\} = 100$$

$$t = 4\text{s}$$

$$\text{Distance from ground } 25 \times 4 - \frac{1}{2}(10)(4)^2 = 20\text{m}$$



4. (2)

5. (3)

$$-30.4 = 12t - \frac{1}{2}(9.8)t^2$$

$$4.9t^2 - 12t - 30.4 = 0$$

$$t = 4 \text{ s}$$

6. (1)

$$d = \frac{vt}{2} = \frac{340 \times 5}{2} = 850 \text{ m} = 0.85 \text{ km.}$$

7. (4)

Angular momentum

8. (1)

Lens should form a virtual image of a distant object at 100 cm from the lens. Thus it should be a divergent lens and its focal length = - 100 cm

$$f = - 100 \text{ cm} = - 1 \text{ m}$$

$$\therefore P = \frac{1}{f} = \frac{1}{-1} = -1 \text{ D}$$

9. (3)

$$\text{Apparent depth} = \frac{D}{\mu} = \frac{2}{1.33} = \frac{1}{4/3} = \frac{3}{2} \text{ m}$$

10. (2)

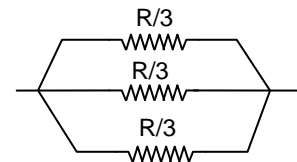
Ref. Index of medium is greater than ref. index of material of lens.

11. (3)

$$\frac{1}{R'} = \frac{1}{R/3} + \frac{1}{R/3} + \frac{1}{R/3}$$

$$= \frac{3}{R} + \frac{3}{R} + \frac{3}{R} = \frac{9}{R} \Rightarrow \frac{R}{R'} = 9$$

$$I_{\max} = ni = n \left( \frac{P}{V} \right)$$



12. (2)

$$\therefore n = \frac{VI_{\max}}{P} = 110$$

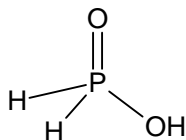
### Chemistry

13. (2)

Graphite is used as a lubricant due to layer structure.

14. Ans. (3)

$\text{H}_3\text{PO}_2$  is a monobasic acid due to it has only one replaceable hydrogen.



15. (4)

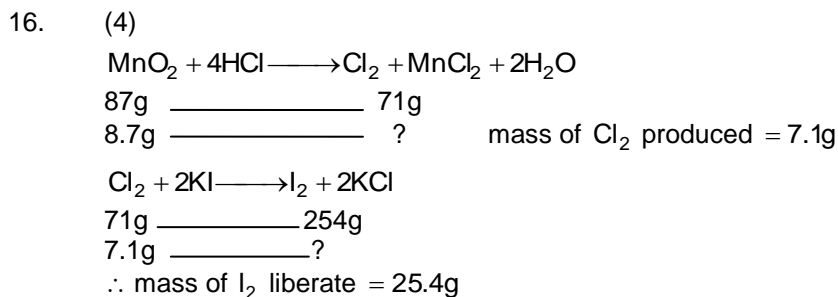
Atomic mass of gold (Au) = 197 g (100%)

24 carat gold — 197 g (100%)

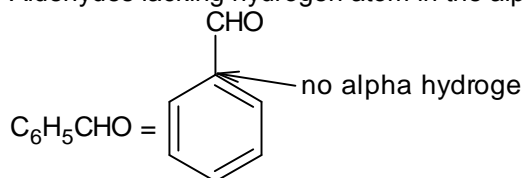
20 carat gold — ?

$$\therefore \text{mass of gold (Au)} = \frac{20 \times 197}{24} = 164.16 \text{ g}$$

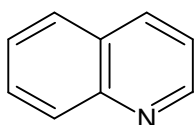
$$\% \text{ of gold present in 20 carat gold} = \frac{164.16}{197} \times 100 = 83.33\%$$



17. (2)  
 Aldehydes lacking hydrogen atom in the alpha position involve in "cannizzaro reaction".



18. (3)  
 Quinoline base is not present in DNA



19. (3)  
 Dacron (Terylene) is an example "Condensation of Polymes"

20. (2)  
 It's Mohr's Salt  
 $(\text{NH}_4)_2\text{Fe}(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$   
 $\text{MnO}_4^- + \text{Fe}^{+2} \xrightarrow{\text{H}^+} \text{Mn}^{+2} + \text{Fe}^{+3}$   
 Ammoniumiron(II)sulphate decolorizes  $\text{KMnO}_4$

21. (1)  
 $2\text{F}_2 + 2\text{H}_2\text{O} \longrightarrow 4\text{HF} + \text{O}_2 \uparrow$   
 $\text{Cl}_2 + \text{H}_2\text{O} \longrightarrow \text{HCl} + \text{HOCl}$   
 $\text{Na} + \text{H}_2\text{O} \longrightarrow \text{NaOH} + \frac{1}{2}\text{H}_2 \uparrow$   
 $\text{P}_4$  doesn't react with  $\text{H}_2\text{O}$

22. (3)  
 Molarity (M) =  $\frac{n}{V(\text{mL})} \times 1000$   
 $0.1 = \frac{n}{50} \times 1000$   
 $\therefore$  no. of moles of  $\text{KI} = 5 \times 10^{-3}$   
 $\therefore$  No. of Iodine atoms = No. of moles  $\times 6.023 \times 10^{23}$   
 $= 5 \times 10^{-3} \times 6.023 \times 10^{23}$   
 $= 3.011 \times 10^{21}$

23. (2)  
 1 mole of electrons = 1 Farady  
 $\therefore 5e + \text{BrO}_2 \longrightarrow \text{Br}^-$   
 $\therefore$  5 Faradys are required.

**Biology**

- 24. (2)
- 25. (2)
- 26. (1)
- 27. (2)
- 28. (4)
- 29. (2)
- 30. (1)
- 31. (3)
- 32. (4)
- 33. (4)
- 34. (3)
- 35. (3)

**Mathematics**

36. (2)

$$\frac{1}{q+r} - \frac{1}{p+q} = \frac{1}{r+p} - \frac{1}{q+r}$$

$$p^2 - r^2 = q^2 - p^2 \Rightarrow 2p^2 = r^2 + q^2$$

$\therefore q^2, p^2, r^2$  are in AP

37. (3)

$$\alpha + \alpha^2 = \frac{-p}{3}$$

$$\alpha^3 = 1 \Rightarrow (\alpha+1)(\alpha^2 + \alpha + 1) = 0$$

$$(\alpha + 1) \left( \frac{-p}{3} + 1 \right) = 0$$

$\alpha = +1, p = 3$   
 $P = -6$

38. (4)

$$lb = \frac{22}{7} \times \frac{35}{11} = 10 \quad (i)$$

And  $a/c \mid = b + 3 \quad (ii)$   
Solving (i) & (ii),  $l = 5, b = 2$

39. (2)

$$X + y = 1 \text{ \& } x^3 + y^3 + 3xy = (x + y)^3 - 3xy(x + y) + 3xy = 1$$

40. (4)

$$(10a + b) - (10b + a) = 27$$

Or  $9(a - b) = 27$   
Or  $a - b = 3$

41. (2)

In a leap year number of days  
= 366 = 52 complete weeks + 2days  
Remaining two days are Sunday, Monday  
Monday, Tuesday  
Saturday, Sunday

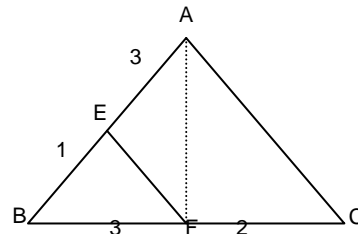
For ourable event = 2  
Total events = 7  
Prob =  $\frac{2}{7}$

42. (2)  
It is obvious
43. ()  
No correct option is given
44. (4)  
 $\sin\theta_1 + \sin\theta_2 + \sin\theta_3 = 3$   
 $\sin\theta_1 = \sin\theta_2 = \sin\theta_3 = 1$   
 $\therefore \theta_1 = \theta_2 = \theta_3 = \frac{\pi}{2}$   
 $\therefore \cos\theta_1 + \cos\theta_2 + \cos\theta_3 = 0$

45. (2)  
 $\sin\theta + \operatorname{cosec}\theta = 2$   
 $\theta = \frac{\pi}{2}$

46. (2)  
 $\text{Area} = \frac{1}{2} |1(-6-5) + 4(5-2) + 3(2+6)|$   
 $= \frac{1}{2} |-11 + 12 + 24| = \frac{25}{2} = 12.5 \text{ sq units}$

47. (4)  
 Let Area of  $\triangle BEF = x$   
 $\therefore$  Area of  $\triangle AFE = 3x$   
 Let Area of  $\triangle ABF = 3y$   
 $\therefore$  Area of  $\triangle CAF = 2y$   
 $\text{Area } \triangle ABC = \text{Area } \triangle BEF + \text{Area } \triangle AEF$   
 $3y = x + 3x$  (i)  
 $3y = 4x$   
 $\frac{3}{4} = \frac{x}{y}$



$$\frac{\text{Area } \triangle BEF}{\text{Area } \triangle ABC} = \frac{x}{y} = \frac{1}{5} \times \frac{3}{4} = \frac{3}{20}$$

48. (1)  
 Let  $r_1 =$  radius of big circle &  $r_2 =$  radius of small circle  
 $\pi(r_1^2 + r_2^2) = 153\pi$   
 $\therefore r_1^2 + r_2^2 = 153$  (i)  
 And  $r_1 + r_2 = 15$  (ii)  
 Solving (i) & (ii)  
 $r_1 = 12, r_2 = 3$   
 $\frac{r_1}{r_2} = \frac{12}{3} = 4$

49. (3)  
 $L =$  length &  $b =$  breadth  
 $\therefore \sqrt{l^2 + b^2} + l = 5b$  (i)  
 $\sqrt{l^2 + b^2} - b = 8$   
 $L^2 = 64 + 16b$  (ii)  
 Solving (i) & (ii) we get  
 $L^2 + 4l - 96 = 0$   
 $\therefore l = 12, b = 5$   
 $\text{Arcat} = lb = 60 \text{ sq units}$

50. (3)

51. (4)

$$\text{Combined mean} = \frac{9 \times 100 + 6 \times 80}{15} = 92$$

52. (4)

13 observations are in ascending order

15, 51, 52, 53, 54, 55, 57, 58, 59, 61, 62, 62, 68 median = 57

53. (4)

Mode = 5

Median = 5

54. (3)

$$\text{Given } \frac{3a}{b^3} = \frac{18}{11} \text{ and } \frac{a+8}{2b} = \frac{2}{5}$$

$$\Rightarrow a = 2 \text{ and } b = 25$$

55. (4)

5 does not appear

Favorable events =  $5 \times 5 = 25$

Total events =  $6 \times 6 = 36$

### History

56. (3)

57. (4)

58. (2)

59. (2)

60. (2)

61. (3)

62. (4)

63. (2)

64. (3)

65. (2)

### Geography

66. (4)

67. (4)

68. (2)

69. (2)

70. (1)

71. (2)

72. (2)



73. (2)

74. (2)

75. (1)

### Civics

76. (1)

77. (4)

78. (4)

79. (3)

80. (1)

81. (2)

82. (2)

83. (3)

84. (3)

85. (2)

### Economics

86. (3)

87. (4)

88. (1)

89. (3)

90. (3)