

KARNATAKA NTSE - STAGE 1 (2017)
ANSWER KEY & SOLUTIONS
PHYSICS

1. $\vec{A} \times (-2) = -2 \cdot \vec{A}$

Magnitude doubles & direction becomes opposite.

(2)

2. Area under v - t graph \Rightarrow change in displacement of the practical

(3)

3. $m \qquad 4m$

p

$mv_1 = 4mv_2$

$v_1 = 4v_2$

K_1

K_2

$K_1 = \frac{1}{2}mv_1^2$

$K_2 = \frac{1}{2}4mv_2^2$

$= \frac{1}{2}m(4v_2)^2$

$= \frac{1}{2}4mv_2^2$

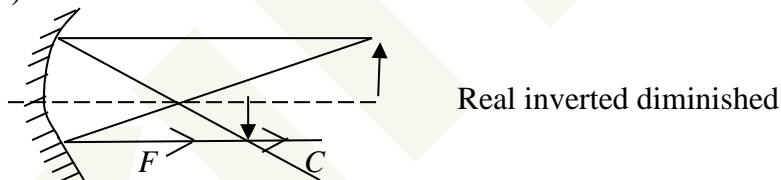
$= 16\left(\frac{1}{2}mv_2^2\right)$

$= 4\left(\frac{1}{2}mv_2^2\right)$

$K_1 : K_2 = 4 : 1$

(2)

4. (2)



5. (1)

(A) \rightarrow correct

(R) \rightarrow correct

6. $F = G \frac{m_1 m_2}{R^2} = \frac{6.67 \times 10^{-11} \times 2 \times 16}{4^2} = 13.34 \times 10^{-11} N$

(2)

7. (1)

8. (3)

Generally focal length of Eyepiece is greater than focal length objective lens for good magnification.

9. (A) → correct

(B) → correct

(1)

Pressure proportional to density at constant temp

10. $\Delta E = \Delta mc^2$

$$= (1 \times 10^{-6}) \times (3 \times 10^8)^2$$

$$= 9 \times 10^{10} \text{ J}$$

(4)

11. According to Stefan's law

Radiation power $\propto T^4$

∴ On increasing the temperature by two times radiation power will increase by $(2)^4 = 16$ times.

(3)

12. In a half positive wave of input AC single upper diode will conduct and in next negative wave lower diode will conduct & it is called full wave rectifier.

(2)

13. $\text{Reg} = \left(\frac{1}{3+3} + \frac{1}{3} \right)^{-1}$

$$= \left(\frac{1}{6} + \frac{1}{3} \right)^{-1}$$

$$= 2\Omega$$

(4)

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ANSWER KEY & SOLUTIONS
CHEMISTRY

14. (3)

Fact

15. (1)

Reason: Across the period size decreases, down the group size increases.

16. (4)

Reason: Methane and Propane do not exhibit isomerism

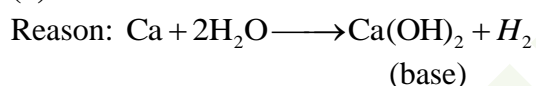
17. (3)

Reason: Indicator will have less wavelength in basic medium ($R > P > Q$)

18. (4)

Reason: Method of preparation of silicon.

19. (2)

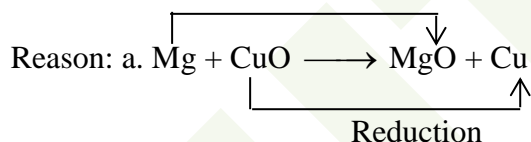


(base)



Shows pink colour in phenolphthalein

20. (3)

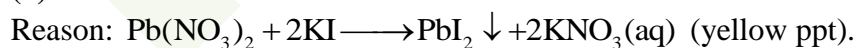


b. Oxygen is displaced.

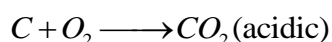
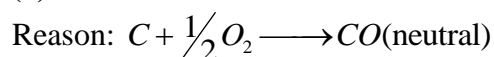
21. (2)

Reason: Chemical 'A' cannot be alcohol it can't turn blue litmus to red. Chemical 'B' is an acid.

22. (1)



23. (4)



24. (2)

Reason: X is most electropositive
Y is most electronegative
So, type of bond formed is ionic.

25. (3)

Reason: Methan has negative M.Pt & B.Pt.
Ethanoic acid has positive M.Pt & B.Pt.

26. (4)

(Fact)

FIITJEE

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ANSWER KEY

BIOLOGY

27. (3)

28. (4)

29. (2)

30. (3)

31. (1)

32. (3)

33. (3)

34. (2)

35. (1)

36. (1)

37. (2)

38. (4)

39. (3)

40. (1)

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ANSWER KEY

SST

41. 2	42. 1
43. 3	44. 1
45. 4	46. 4
47. 3	48. 4
49. 1	50. 3
51. 2	52. 4
53. 1	54. 1
55. 3	56. 4
57. 3	58. 1
59. 4	60. 4
61. 3	62. 3
63. 1	64. 4
65. 2	66. 1
67. 2	68. 1
69. 1	70. 1
71. 3	72. 1
73. 4	74. 2
75. 2	76. 1
77. 4	78. 2
79. 3	80. 2

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ANSWER KEY & SOLUTIONS

MATHS

81. $\pi r_2^2 = 1386\text{cm}^2$ $r_2 = 21\text{cm}$

$\pi r_1^2 = 962.5\text{cm}^2$ $r_1 = 17.5$

$r_2 - r_1 = 3.5\text{cm}$

(3)

82. $Vol = \pi r^2 h = V_1$

$V_2 = \pi(1.2r)^2(1.2h) = \pi r^2 h(1.2)^3$

$= (1.2)^3 V_1$

% Increase in volume $= \frac{V_2 - V_1}{V_1} \times 100 = \frac{(1.2)^3 - 1}{1} \times 100$

$= 72.8\%$

(4)

83. Grace

$x^2 + px - 4 = 0$ has a root '-4'.

$\therefore (-4)^2 + P(-4) - 4 = 0 \Rightarrow P = 3$

And $x^2 + 3x + m$ has equal roots $\Rightarrow (3)^2 - 4m = 0$

$\therefore m = 9/4$

84. St I: $\sqrt{5 + \sqrt{24}} = \sqrt{x} + \sqrt{y}$

$\therefore 5 + \sqrt{24} = x + y + 2\sqrt{x}\sqrt{y} \neq 5 + 2\sqrt{24}$ (wrong)

St II: $\sqrt{5 - \sqrt{24}} = \sqrt{3} - \sqrt{2}$

$\therefore 5 - \sqrt{24} = (\sqrt{3} - \sqrt{2})^2 = 3 + 2 - 2\sqrt{6}$

$= 5 - \sqrt{24}$ (True)

(2)

85. $S = \cos^2 5^\circ + \cos^2 10^\circ + \cos^2 15^\circ + \dots + \cos^2 85^\circ + \cos^2 90^\circ$

$S = \cos^2 90 + \cos^2 85 + \dots + \cos^2 5$

$(= 0)$

$2S = (\cos^2 5 + \cos^2 85) + (\cos^2 10 + \cos^2 80) + \dots + (\cos^2 85 + \cos^2 5)$

$\Rightarrow S = \frac{17}{2} = 8\frac{1}{2}$

(3)

86. $(x+a)$ is a factor of the polynomials $(x^2 + px + q)$ & $(x^2 + mx + n)$

$$\therefore (-a)^2 + p(-a) + q = 0 \quad \& \quad (-a)^2 + m(-a) + n = 0$$

$$q - aP = n - am$$

$$\Rightarrow \frac{q-n}{p-m} = a$$

(1)

87. Let LCM = x & HCF = y

$$x = 14y \quad \& \quad x + y = 600 \Rightarrow \begin{matrix} y = 40 \\ x = 560 \end{matrix}$$

\therefore Let numbers be a & b

$$\therefore ab = xy = 560 \times 40$$

$$a = 80, b = \frac{560 \times 40}{80} = 280$$

(3)

88. $P \cap Q = \left((P \cap Q)' \right)' = (P' \cup Q)'$

(4)

89. $AN \times BL \times CM$

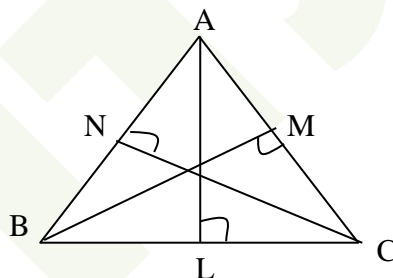
$$\frac{AN}{CL} = \frac{OA}{OC}$$

$$\frac{BL}{AM} = \frac{OB}{OA}$$

$$\frac{CM}{BN} = \frac{OC}{OB}$$

$$\frac{AN \times BL \times CM}{AM \times BN \times CL} = L$$

(1)



90. FATE: A \boxed{EFT} — 3!

FAET — 1

E \boxed{AFT} — 3!

$$\therefore 3! + 3! + 1 = 13$$

(2)

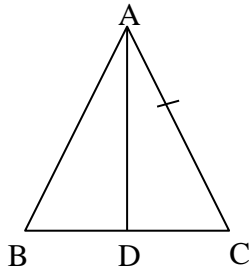
91. 12 points of which 4 collinear.

$$\therefore \text{total no of lines} = {}^{12}C_2 - {}^4C_2 + 1 = 61$$

$$\text{total no of triangles} = {}^{12}C_3 - {}^4C_3 = 216$$

(4)

92.



$$AC^2 = AD^2 + DC^2$$

$$BC^2 = AD^2 + DC^2$$

$$(BD + DC)^2 = AD^2 + DC^2$$

$$AD^2 - BD^2 = 2BD \times DC$$

(1)

93. $\frac{\text{No. of black balls}}{\text{total balls}} = \frac{2}{5} \frac{\text{No. of white balls}}{\text{total balls}}$

$$\Rightarrow \text{Black} = \frac{2}{5} \times 60 = 12$$

(2)

94. By alternate segment theorem $\angle AMP = \angle MBA$

$\Rightarrow \Delta PMB$ is isosceles by secant property $PM^2 = PA.PB$ also $PM = MB$ (ΔPMB is isosceles)

$$\Rightarrow MB^2 = PA.PB$$

Both A & B are true

(4)

95. (i) a, b, c in GP $\Rightarrow (b)^2 = Ca \Rightarrow b = \sqrt{ac}$

(ii) a, b, c in AP $\Rightarrow 2b = a + c$

(iii) a, b, c in HP $\Rightarrow \frac{2}{b} = \frac{1}{a} + \frac{1}{c} \Rightarrow a + c = \frac{2ac}{b}$

$$\Rightarrow (3) \text{ i - d, ii - a, iii - b}$$

96. A has smaller standard deviation \Rightarrow A is more consistent than B only I

$$\& \% = \frac{SD}{Mean} \times 100$$

'B' is more efficient

(2)

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97. $\tan 60^\circ = \frac{H}{b} \Rightarrow H = \sqrt{36}$

$\tan 30^\circ = \frac{H}{a} \Rightarrow H = \frac{a}{\sqrt{3}}$

$H^2 = \sqrt{36} \times \frac{a}{\sqrt{3}}$

$H = \sqrt{ab}$

(3)

98. Equating slopes $\Rightarrow \frac{1-b}{1} = \frac{1}{1-a}$

$\Rightarrow 1 - a - b + ab = 1$

$\Rightarrow ab = a + b \Rightarrow \frac{a+b}{ab} = 1$

(2)

99. $I_1 = 11l, Exp_1 = 9m$

$I_2 = 7l, Exp_2 = 5m$

$11l - 9m = 400 = 7l - 5m \Rightarrow 4l = 4m \Rightarrow l = m$

$\Rightarrow 2l = 400 \Rightarrow l = 200 \Rightarrow I_1 \neq I_2 = 18l = 3,600.$

(1)

100. $y = a + a^2 + a^3 + \dots \infty |a| < 1$

sum of infinite G.P = $\frac{\text{first term}}{1 - \text{common ratio}}$

$\Rightarrow \frac{a}{1-a} = y$

$\Rightarrow a = y - y^a \quad (a \neq 1)$

$\Rightarrow (1+y)a = y$

$\Rightarrow a = \frac{y}{1+y}$

(1)