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

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

Magnitude doubles & direction becomes opposite.

(2)

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

(3)

3.

m		$4m$
p		
mv_1	=	$4mv_2$
v_1	=	$4v_2$

K_1 $\qquad\qquad$ K_2

$K_1 = \frac{1}{2}mv_1^2$ $\qquad$ $K_2 = \frac{1}{2}4mv_2^2$

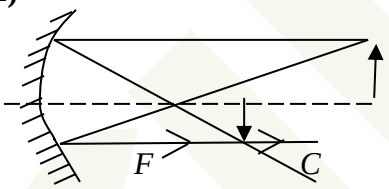
$= \frac{1}{2}m(4v_2)^2$ $\qquad$ $= \frac{1}{2}4mv_2^2$

$= 16\left(\frac{1}{2}mv_2^2\right)$ $\qquad$ $= 4\left(\frac{1}{2}mv_2^2\right)$

$K_1 : K_2 = 4:1$

(2)

4. **(2)**



Real inverted diminished

5. **(2)**

(A) $\rightarrow$ correct

(R) $\rightarrow$ correct

$\rightarrow$ angle of incidence > critical angle for TIR

6. $F = G\frac{m_1m_2}{R^2} = \frac{6.67\times10^{-11}\times2\times16}{4^2} = 13\cdot34\times10^{-11}\,N$

(2)

7. **(1)**

8. **(1)**

9. (A) → correct
(B) → correct Pressure proportional to density at constant temp
(1)

10. $\Delta E = \Delta mc^2$
$= \left(1\times10^{-6}\right)\times\left(3\times10^{8}\right)^2$
$= 9\times10^{10}\,\text{J}$
(4)

11. According to Stefen's law
Radiation power αT^4
$\therefore$ On increasing the temperature by two time 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. (2)
Reason: Indicator will have less wavelength in basic medium (R > Q > P)

18. (4)
Reason: Method of preparation of silicon.

19. (2)
Reason: $Ca + 2H_2O \longrightarrow Ca(OH)_2 + H_2$
(base)
↓
Shows pink colour in phenolphthalein

20. (3)
Reason: a. $Mg + CuO \longrightarrow MgO + Cu$
Reduction

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)
Reason: $Pb(NO_3)_2 + 2KI \longrightarrow PbI_2 \downarrow + 2KNO_3(aq)$ (yellow ppt).

23. (4)
Reason: $C + \frac{1}{2}O_2 \longrightarrow CO$(neutral)
$C + O_2 \longrightarrow CO_2$(acidic)

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)

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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. 3 **42.** 4

43. 3 **44.** 1

45. 4 **46.** 4

47. 2 **48.** 4

49. 1 **50.** 2

51. 2 **52.** 4

53. 1 **54.** 1

55. 2 **56.** 3

57. 3 **58.** 1

59. 4 **60.** 1

61. 2 **62.** 3

63. 1 **64.** 4

65. 2 **66.** 1

67. 2 **68.** 1

69. 3 **70.** 3

71. 3 **72.** 1

73. 4 **74.** 2

75. 2 **76.** 3

77. 4 **78.** 4

79. 4 **80.** 2

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ANSWER KEY & SOLUTIONS
MATHS

81. $\pi r_2^2 = 1386 cm^2 \quad r_2 = 21 cm$

$\pi r_1^2 = 962.5 cm^2 \quad r_1 = 17.5$

$r_2 - r_1 = 3.5 cm$

(3)

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

$V_2 = \pi(1 \cdot 2r)^2 (1.2\,h) = \pi r^2 h (1.2)^3$

$= (1.2)^3 V_1$

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

= 72.8%

(4)

83. $x^2 + px - 4 = 0$ 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: $\sqrt{5 - \sqrt{24}} = \sqrt{3} - \sqrt{2}$

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

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

(2)

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

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

$(= 0)$

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

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

(3)

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

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

$q - aP = n - am$

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

(1)

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87. Let LCM $= x$ & HCF $= y$

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

$\therefore$ Let numbers be a & b

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

$a = 80, b = \dfrac{560 \times 40}{80_2} = 280$

(3)

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

(4)

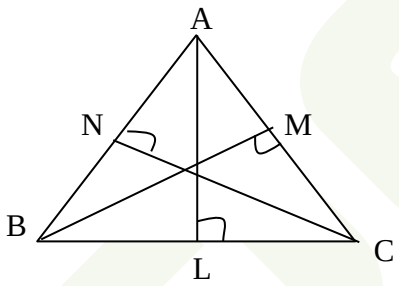
89. $AN \times BL \times CM$

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

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

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

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



(1)

90. FATE: A $\boxed{EFT}$ — 3!

E $\boxed{AFT}$ — 3!

FAET — 1

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

(2)

91. 12 points of which 4 collinear.

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

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

(4)

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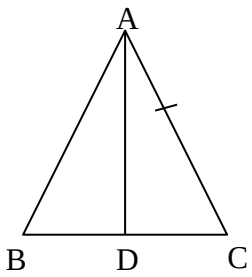
92.



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

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

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

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

(1)

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

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

(2)

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

$\Rightarrow \Delta$ PMB is isosceles by secant properly $PM^2 = PA.PB$ also $PM = MB$ (Δ PMB 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 $\Rightarrow$ 26 = 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) 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. $\tan 60° = \frac{H}{b} \Rightarrow H = \sqrt{36}$

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

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

$H = \sqrt{ab}$

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

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

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

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

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

$\Rightarrow a = y/1+y$

(1)