FIITJEE
NOIDA CENTRE

NATIONAL TALENT SEARCH STATE LEVEL EXAMINATION (UTTAR PRADESH) - 2019 (Stage-1)

HINTS & SOLUTIONS

MAT

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

21. 1

22. 2

23. 2

24. 4

25. 2

26. 3

27. 2
Sol. t s t t t r

28. 2

29. 3

30. 1

31. 3

32. 2

33. 4

34. 2

35. 3

36. 1

37. 3

38. 2

39. 3

40. 2

41. 1

42. 3

43. 2

44. 1

45. 1

46. 1

47. 3

48. 3

49. 1

50. 4

51. 4

52. 1

53. 3

54. 1

55. 3

56. 2
Sol.

C	F	J	N
+2	+3	+4	+5
E	I	N	S

57. 4
Sol.

D	G	J	N
–1	–2	–3	–4
C	E	G	J

58. 1
Sol.

B	J	M	T
+3	+2	+3	+2
E	L	P	V

59. 3
Sol.

H	K	O	R
+5	+4	+3	+2
M	O	R	T

60. 4
Sol. BREAD = 2 + 18 + 5 + 1 + 4 = 30

61. 2

62. 3

63. 1

64. 3

65. 4
Sol. 61 TO 65

p^- – No Game
S^- – No Game
Q^+ – Football
R^- – Hockey
T^+ – Chess

66. 2
Sol. 2 + 6 + 2 + 3 = 13

67. 1
Sol. 12 ÷ 84 = 7 × = 14

68. 2
Sol. $\frac{25+17+6}{6}=8$

69. 2
Sol. 2 × 3 × 5 = 30

70. 3
Sol. $2^2+4^2=20$

71. 3
Sol. Murli → Krishan → Gopal → Mohan → Girdhar

72. 1

73. 4

74. 1

75. 3

76. 1

77. 1

78. 2

79. 3

80. 3

81. 2

82. 4

83. 3

84. 2

85. 3

86. 2

87. 4

88. 2

89. 4

90. 4

91. 1

92. 4

93. 2

94. 1

95. 3

96. 2

97. 3

98. 4

99. 1

100. 1

Sol. 96 TO 100

E > B > C > A > D

PHYSICS

101 2

Sol. In concave mirror, if object is placed at centre of curvature, image is formed at centre of curvature itself.

102. 1

Sol. Q = 15 C and t = 5 s

$\therefore$ I = Q/t = 15/5 = 3 A

103. 4

Sol. Image is formed at retina.

104. 3

Sol. 1 KWH = $1 \times 10^3 \times 60 \times 60$ J = 3600000 J

105. 1

Sol. Generator is used to produce electric current.

106. 4

Sol. $\mu_{air} = 1$, $\mu_{glass} = 1.5$, $c = 3 \times 10^8$ m/s

$\mu = c/v$

$v = c/\mu = (3 \times 10^8)/1.5 = 2 \times 10^8$ m/s

107. 3

Sol. Given: 220V, 100 W

For V = 110 Volt

$$P_0 = \frac{V^2}{R} \Rightarrow R = \frac{220^2}{100} = 484$$

$$\therefore\ P = \frac{V^2}{R} = \frac{110^2}{484} = 25\,\text{W}$$

108. 2

Sol. $f = 20$ cm

$$P = \frac{100}{f} = \frac{100}{20} = 5D$$

109. 3

Sol. $f = 15cm$, $u = -10cm$

$$\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$$

$$\frac{1}{15} = \frac{1}{-10} + \frac{1}{v}$$

$$\frac{1}{v} = \frac{1}{15} + \frac{1}{10}$$

$v = 6$ cm

110. 1

Sol. $v = 340\,\text{m/s}$, t = $\frac{1}{10}$s (to hear an echo time difference should be 1/10 sec)

$\therefore$ 2d = v × t

$$\Rightarrow \text{d} = \frac{340 \times \frac{1}{10}}{2} = 17\ \text{m}$$

111. 2

Sol. Solar cell is used in communication satellite.

112. 1

Sol. Density of water is maximum at 4 °C.

So, $\rho_2 > \rho_1$

$$\rho_2 = \frac{m}{v_2} \Rightarrow v_2 = \frac{m}{\rho_2}$$

Similarly $v_1 = \frac{m}{\rho_1}$

As $\rho_2 > \rho_1$

So $v_1 > v_2$

113. 4

Sol. $R = \frac{\rho l}{A} \Rightarrow l = \frac{RA}{\rho}$

$l' = \frac{l}{5}$, So, $R_1 = \frac{RA}{l} \times \frac{l}{5A} \Rightarrow R_1 = R/5$

Each wire has resistance R/5.

So, $\frac{1}{R'} = \frac{5}{R} + \frac{5}{R} + ...5 \text{ times}$

So, $R' = \frac{R}{25}$

$\therefore \quad \frac{R}{R'} = 25$

CHEMISTRY

114. 1

Sol. According to question, Chemical formula of oxide = MO

Thus, valency of metal in this case is 2

Valency of phosphate ion is 3

$M_2^{\times}(PO_4)_3 \Rightarrow M_3(PO_4)_2$

115. 3

Sol. Dry ice is solid form of CO_2 at high pressure and turns into gaseous state as the pressure is released (undergoes sublimation)

116. 2

Sol. Fluorine is the most electronegative element in periodic table. Value on Pauling scale is 4.0 and it gains stability by obtaining one electron and the distance at which the valence electron resides is minimum as compared to other elements having 7 valence electrons.

117. 4

Sol. HgO decomposes on heating. Mercury is less reactive and has less affinity for oxygen.

$2HgO \xrightarrow{\Delta} 2Hg + O_2$

118. 3

Sol. Cinnabar is HgS which is sulphide ore of mercury.

119. 2

Sol. Ethanal is CH_3CHO

–al suffix is used for aldehyde [–CHO]

120. 4

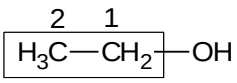
Sol. pH of pure water is 7

Since ionic product of water at 25°C is 10^{-14}

$\left[H^+\right]\left[^-OH\right] = 10^{-14}$

$\therefore \quad \left[H^+\right] = \left[^-OH\right] = 10^{-7}$

121. 1
Sol. C_2H_5OH



Number of carbon = 2; Functional group = –OH [Suffix: -ol]
IUPAC name: Ethanol

122. 3
Sol. Oxalic acid is the acid present in tomato

123. 4
Sol. Let the normality of HCl be N_1 with volume V_1 and the normality of NaOH be N_2 with volume V_2
According to normality equation
$N_1V_1 = N_2V_2$
$10N_1 = 15N_2$
$N_1 = 1.5N_2$ ...(i)
Now we have to calculate the volume of HCl to neutralize 30 mL of NaOH
$N_1V'_1 = N_2V'_2$
$N_1V'_1 = N_2 \times 30$
Putting the value of N_1 from equation (i)

$V'_1 = \frac{30 \times 10}{15}$ = 20 mL

124. 2
Sol. Chemical formula of baking soda is $NaHCO_3$ (sodium bicarbonate)

125. 4
Sol. $Fe_2O_3 + 2Al \longrightarrow Al_2O_3 + 2Fe$
More reactive element displaces the less reactive element is known as displacement reaction.
Aluminium is more reactive than Fe.

126. 3
Sol. $Al_4C_3 + 12H_2O \longrightarrow \underset{\text{Methane}}{4Al(OH)_3 + 3CH_4}$

BIOLOGY

127. 2
Sol. 2-male gametes are present in pollen tube.

128. 3
Sol. Insulin is an animal hormone

129. 2
Sol. Water is the source of oxygen produced during photosynthesis.

130. 3
Sol. Adenosine Triphosphate (ATP) is known as “Currency of Energy”.

131. 2
Sol. Food synthesized in leave is transported by special conducting tissue i.e. Phloem.

132. 1
Sol. Spinal cord controls the reflex actions.

133. 2
Sol. Guttation relies on hydathodes (pores found on surface of leaves).

134. 4
Sol. Pituitary gland is also known as Master Gland.

135. 3
Sol. Gymnos – Naked, sperma – seeds, Gymnosperms are also called as naked seeded plants.

136. 4
Sol. DNA or RNA i.e. Deoxy Ribo Nucleic acid or Ribonucleic acid, is genetic material of the cell.

137. 1
Sol. Johan Gregor Mendel is known as the “Father of Genetics”

138. 2
Sol. Mushroom is a edible fungi.

139. 3
Sol. Frog has 3-chambered heart i.e. 2auricles and 1 venticle.

140. 4
Sol. Ethylene is the Phytohormone which helps in ripening of fruits.

SOCIAL SCIENCE

141. 3
Sol. Anguttar Nikaya

142. 4
Sol. Badruddin Tyabji

143. 2
Sol. Mahatma Gandhi

144. 3
Sol. Herodotus

145. 2
Sol. Panini

146. 2
Sol. Mundkopanishad

147. 3
Sol. Jay Samhita

148. 3
Sol. Kaushambi

149. 2
Sol. Mars

150. 4
Sol. Gujrat

151 C
Sol. Sardar Bhagat Singh

152. 2
Sol. 2015 A.D

153. 2
Sol. Anandmath

154. 1
Sol. 2004 A.D.

155. 2
Sol. Palash

156. 4
Sol. Jaunpur

157. 2
Sol. Swami Vivekanand

158. 2
Sol. M.S. Swaminathan

159. 2
Sol. Cotton

160. 2
Sol. NH – 47 A

161. 4
Sol. Uttar Pradesh

162. 1
Sol. 245

163. 1
Sol. Allahabad

164. 3
Sol. 7

165. 2
Sol. 2000 A.D.

166. 3
Sol. State Emergency

167. 4
Sol. Oddisha

168. 2
Sol. Hugli

169. 4
Sol. Saturn

170. 2
Sol. Silant Valley

171. 1
Sol. 16th September

172. 3
Sol. 1972

173. 2
Sol. Pacific ocean

174. 4
Sol. Bihar

175. 3
Sol. Madhya Pradesh

176. 3
Sol. Wheat Production

177. 4
Sol. 12 members of Rajya Sabha

178. 2
Sol. Defection

179. 2
Sol. Balban

180. 3
Sol. Firozshah Tughlaq

MATHEMATICS

181. 1
Sol. It satisfies the condition.

182. No Option is Correct
Sol. (a, b) satisfies $x-y=2$ and $x+y=4$, then
$\Rightarrow a-b=2$ and $a+b=4$
$\Rightarrow a=3, b=1$

183. 4
Sol. $G_{(x,y)}=\left(\frac{x_1+x_2+x_3}{3}, \frac{y_1+y_2+y_3}{3}\right)$
$\Rightarrow 0=\left(\frac{-1+5+x}{3}\right) \Rightarrow x=-4$
$\Rightarrow -3=\left(\frac{4+2+y}{3}\right) \Rightarrow y=-15$

184. 1

Sol. $\tan\theta+\sin\theta=m$ ...(i)

$\tan\theta-\sin\theta=n$ ...(ii)

$m^2-n^2=4\sin\theta.\tan\theta$

$\tan^2\theta-\sin^2\theta=mn$

$\sin^2\theta\left(\sec^2\theta-1\right)=mn$

$\sin\theta.\tan\theta=\sqrt{mn}$

$m^2-n^2=4\sin\theta.\tan\theta=4\sqrt{mn}$

185. 4

Sol. $75\times35=(18\times70)+(18\times80)-x$

$2625-1260-1440=-x$

$\Rightarrow\quad x=75$

186. 3

Sol. $x=3+2\sqrt{2}$, $y=3-2\sqrt{2}$

$x+y=6$

187. 1

188. 3

Sol. Sum of exterior angles = 360°

$n\times18°=360°$

$n=\dfrac{360°}{18°}=20$ sides

189. 3

Sol. $\dfrac{4x+16}{4}=x+4$

190. 2

Sol. $OP=\sqrt{\left(0-(-6)\right)^2+(0-8)^2}$

$OP=\sqrt{36+64}$ = 10 units

191. No Option is Correct

Sol. $A_I\rightarrow9x;\ B_I\rightarrow4x$

$A_E\rightarrow3y;\ B_E\rightarrow y$

$9x-3y=3000$ ...(i)

$4x-y=1000$

$12x-3y=3000$ ...(ii)

(ii) – (i)

$x=\dfrac{2000}{3}$

B's Income = Rs $\left(\dfrac{8000}{3}\right)$

192. 4

Sol. Let the sides of the square be x and y.

$\Rightarrow \quad x^2 + y^2 = 468$ ...(i)

and $4(x+y) = 120$

$\Rightarrow \quad x + y = 30$ ...(ii)

Solving x and y, we get

$x - y = 6$

193. 1

Sol. $\dfrac{ar(\Delta ABC)}{\Delta DEF} = \dfrac{48}{12} = \left(\dfrac{BC}{EF}\right)^2$

BC = 6 cm

194. 3

Sol. $ar(\Delta ABC) = \sqrt{s(s-a)(s-b)(s-c)}$

$s = \dfrac{8+6+4}{2} = 9$

$ar(\Delta ABC) = \sqrt{9(9-8)(9-6)(9-4)} = 3\sqrt{15}$

$ar(ABCD) = 3\sqrt{15} \times 2 = 6\sqrt{15}\ \text{cm}^2$

195. 3

Sol. Let the radii of cone = 4k

Let the radii of cylinder = 3k

Let the height of the cone = 2y

Let the height of the cylinder = 3y

$\dfrac{V_{cone}}{V_{cylinder}} = \dfrac{\frac{1}{3} \times \pi (4k)^2 \times 2y}{\pi \times (3k)^2 \times (3y)} = \dfrac{32}{81}$

196. 4

Sol. $\sin\theta = \dfrac{3}{5}, \cos\theta = \dfrac{4}{5}$

$\sin 2\theta = 2\sin\theta.\cos\theta = 2\left(\dfrac{3}{5}\right)\left(\dfrac{4}{5}\right) = \dfrac{24}{25}$

197. 3

Sol. Product of two odd numbers will be odd number.

198. 3

Sol. $0.\bar{6} = \dfrac{6}{9}$

$0.\bar{7} = \dfrac{7}{9}$

$0.\bar{6} + 0.\bar{7} = \dfrac{6}{9} + \dfrac{7}{9} = \dfrac{13}{9} = 1.\bar{4}$

199. 4

Sol. $x+\frac{1}{x}=\sqrt{3},\ x^3+\frac{1}{x^3}=?$

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

$$=\left(\sqrt{3}\right)^3-3x\left(\frac{1}{x}\right)\sqrt{3}=0$$

200. 4

Sol. $5^{x+1}+5^{2-x}=126$

$x=2,-1$