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PART – II
SCHOLOASTIC APTITUDE TEST (SAT)
Held on: March 28, 2021
ANSWERS

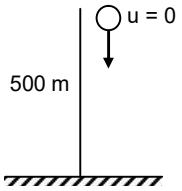
101.	**3**	102.	**1**	103.	**2**	104.	**3**
105.	**1**	106.	**1**	107.	**2**	108.	**1**
109.	**2**	110.	**1**	111.	**4**	112.	**1**
113.	**1**	114.	**2**	115.	**2**	116.	**3**
117.	**2**	118.	**4**	119.	**3**	120.	**3**
121.	**3**	122.	**3**	123.	**2**	124.	**1**
125.	**2**	126.	**4**	127.	**3**	128.	**1**
129.	**3**	130.	**2**	131.	**2**	132.	**1**
133.	**3**	134.	**4**	135.	**3**	136.	**4**
137.	**2**	138.	**1**	139.	**1**	140.	**3**
141.	**2**	142.	**3**	143.	**1**	144.	**4**
145.	**2**	146.	**3**	147.	**1**	148.	**3**
149.	**1**	150.	**1**	151.	**4**	152.	**4**
153.	**2**	154.	**1**	155.	**4**	156.	**4**
157.	**1**	158.	**3**	159.	**3**	160.	**3**
161.	**1**	162.	**3**	163.	**2**	164.	**3**
165.	**4**	166.	**3**	167.	**1**	168.	**4**
169.	**1**	170.	**1**	171.	**3**	172.	**3**
173.	**2**	174.	**2**	175.	**1**	176.	**3**
177.	**2**	178.	**4**	179.	**2**	180.	**3**
181.	**1**	182.	**1**	183.	**3**	184.	**1**
185.	**2**	186.	**3**	187.	**1**	188.	**3**
189.	**1**	190.	**3**	191.	**3**	192.	**2**
193.	**1**	194.	**4**	195.	**3**	196.	**1**
197.	2	198.	**1**	199.	**2**	200.	**3**

HINTS AND SOLUTIONS

101. 3

Sol. Time taken by stone to fall

$t_1 = \sqrt{\frac{2h}{g}} = \sqrt{\frac{2\times 500}{10}}$ = 10 sec



Time taken by sound to reach top

$t_2 = \frac{h}{v_{sound}} = \frac{500}{340}$ = 1.47 sec

Total time = $t_1 + t_2$

= 11.47 sec.

102. 1

Sol. Time taken = $\frac{\text{Distance}}{\text{Speed}} = \frac{1.5\times 1000}{2\times 1000\times\left(\frac{35}{100}\right)}$ = 2.14 s

103. 2

Sol. When a body like earth is moving in a circular path the work done in that case is zero because centripetal force acts along the radius of circular path.

104. 3

Sol. The sound can travel in air because disturbance travel from one place to another.

105. 1

Sol. Total time = 2 min 20 sec = 140 sec

Number of rounds = $\frac{140}{40}$ = 3.5

Distance covered = 3.5 × 2 × 3.14 × 100

= 2198 $\simeq$ 2200 m

Displacement = 200 m

106. 1

Sol. $v \propto \sqrt{Temp}$

107. 2

Sol. As body is moving with uniform velocity, no force is required.

108. 1

Sol. Acceleration = 10 m/s (slope of v – t graph)

Force = mass $\times$ acceleration = $\frac{50}{1000}\times 10$ = 0.5 N

109. 2

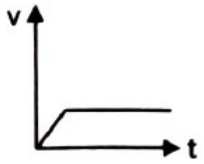
Sol. Distance covered = Area under graph. = $\frac{(5+30)\times 50}{2}$ = 875 m

110. 1

Sol. If displacement of particle is zero distance covered by it may be zero or may not be zero.

111. 4

Sol. A steel ball is dropped into glycerine, the most appropriate plot of velocity and time will



112. 1

Sol. $KE \propto p^2$

$p_1 = 1.25\ p$

Increase in KE = $\frac{\Delta KE}{KE} \times 100 = \frac{(1.25\,p)^2 - p^2 \times 100}{p^2} = 56.25\%$

113. 1

Sol. Using WE theorem

ΔKE = Work done

$\frac{1}{2} \times m \times (100)^2 = f \times 5$ …(1)

$\frac{1}{2} \times m \times (300)^2 = f \times x$ …(2)

$\div$ (1) by (2)

$\frac{1}{9} = \frac{5}{x}$

$\Rightarrow$ x = 45 cm

114. 2

Sol. Dry ice gets converted directly into gaseous state under normal atmospheric conditions

115. 2

Sol. Blood is a colloidal solution & colloidal solution show tyndall effect.

116. 3

Sol. CO and N_2 both have same molecular mass.

117. 2

Sol. $n = \frac{180}{18} = 10\,\text{moles}$

1 mole = 6.022×10^{23} molecules of H_2O

10 moles = $6.022 \times 10^{23} \times 10$ molecules of H_2O

118. 4

Sol. Chromatography separation technique is used in “Forensic science”.

119. 3

Sol. $M = \frac{\text{Moles}}{\text{Volume}}$

120. 3

Sol. Phosphate ion is negative tripositive ion.

Calcium is divalent positive ion

Oxide ion is divalent negative ion

121. 3

Sol. $n = \frac{4}{17} = 0.235$

$0.235 = \frac{W_{SO_2}}{64}$

$W_{SO_2} = 15\,g$

122. 3

Sol. Mol. mass of $Fe_2(SO_4)_3$ = 400

$n = \frac{40}{400} = 0.1$

Fe = $0.1 \times 2 = 0.2$

S = $0.1 \times 3 = 0.3$

O = $0.1 \times 12 = 1.2$

123. 2

Sol. K.E = $\frac{1}{2}mv^2$

124. 1

Sol. Vitamin B_{12} contains Co^{3+}

125. 2

Sol. The correct formula of "Ammonium sulphate" is $(NH_4)_2SO_4$.

126. 4

Sol. Mol. mass of Na_2SO_3 = 126

$n = \frac{Mass}{Mol.mass}$

$100 \times 126 = 12600$ g

127. 3

Sol. Bacterial cell wall are made of peptidoglycan (also called murein), which is made from polysaccharide chains cross-linked by unusual peptides containing D-amino acids.

128. 1

Sol. Yogurt /curd is made from the fermentation of the lactose in milk by the rod-shaped bacteria Lactobacillus delbrueckii subsp.

129. 3

Sol. Potassium channels and pumps have been identified and shown to function in the uptake of ions and opening of stomatal apertures.

130. 2

Sol. Tracheids are the main water conducting tissue generally present in Gymnosperms.

131. 2

Sol. The Central Pollution Control Board (CPCB) is an autonomous agency. It plays an advisory role to the Government and State Pollution Control Boards (SPCB) in matters relating to the implementation and enforcement of the Air, Water and Environmental Acts.

132. 1

Sol. Herdmania belongs to protochordata.

133. 3
Sol. Snake, Lizard, Turtle are reptiles while Rat is a mammal.

134. 4
Sol. Preventive and control measures adapted for the storage of grains includes
– Fumigation
– Proper drying
– Strict cleaning

135. 3
Sol. The endoskeleton of sharks is comprised largely of unmineralized cartilage.

136. 4
Sol. Succulent plants with CAM metabolism open their stomata at night and close them during the day.

137. 2
Sol. Arthropoda and Mollusca have open circulatory system.

138. 1
Sol. Mustard : dicot :: Cycas : Gymnosperm

139. 1
Sol. Spongilla – porifera .
Euglena is protozoa
Penicillin – Fungi
Hydra – Coelentrata

140. 3
Sol. Sclerenchyma is the tissue which makes the plant hard and stiff. Sclerenchyma is the supporting tissue in plants.

141. 2
Sol. $x + y + z = 0$ then,
squaring it
$(x + y + z)^2 = x^2 + y^2 + z^2 + 2(xy + yz + zx)$
$\Rightarrow 0 = x^2 + y^2 + z^2 + 2(xy + yz + zx)$
$\Rightarrow x^2 + y^2 + z^2 = -2(xy + yz + zx)$ …(i)
squaring equation (i) then,
$\Rightarrow x^4 + y^4 + z^4 + 2(x^2y^2 + y^2z^2 + z^2x^2)$
$= 4[x^2y^2 + y^2z^2 + z^2x^2 + 2(xy^2z + xyz^2 + x^2yz)]$
$\Rightarrow x^4 + y^4 + z^4 + 2(x^2y^2 + y^2z^2 + z^2x^2)$
$= 4[x^2y^2 + y^2z^2 + z^2x^2 + 2xyz(x + y + z)]$
$\because x + y + z = 0 \Rightarrow 2xyz(x + y + z) = 0$
$\therefore x^4 + y^4 + z^4 = 2(x^2y^2 + y^2z^2 + z^2x^2)$
$\therefore \dfrac{x^4 + y^4 + z^4}{x^2y^2 + y^2z^2 + z^2x^2} = 2$

142. 3
Sol. $x^a = y^{2b} = z^{3c} = k$
$\Rightarrow x = k^{1/a}, y = k^{1/2b}, z = k^{1/3c}$
$\Rightarrow y^2 = zx$
$\Rightarrow k^{\frac{2}{2b}} = k^{\frac{1}{3c}} \times k^{\frac{1}{a}}$

$\Rightarrow k^{\frac{1}{b}} = k^{\frac{1}{a}+\frac{1}{3c}}$

$\Rightarrow \frac{1}{a}+\frac{1}{3c}=\frac{1}{b}$

143. 1

Sol. $m = 2^{\frac{1}{3}} + 2^{\frac{-1}{3}}$ …….(i)

Cubing equation (i)

$m^3 = \left(2^{\frac{1}{3}}\right)^3 + \left(2^{-\frac{1}{3}}\right)^3 + 3\times 2^{\frac{1}{3}} \times 2^{-\frac{1}{3}}\left(2^{\frac{1}{3}} + 2^{-\frac{1}{3}}\right)$

$\Rightarrow m^3 = 2 + 2^{-1} + 3m$

$\Rightarrow m^3 = 2 + \frac{1}{2} + 3m$

$\Rightarrow 2m^3 = 5 + 6m$

Therefore

$\Rightarrow 2m^3 - 6m + 1 = 5 + 6m - 6m + 1 = 6$

144. 4

Sol. $\left(p^2+2p+3\right)^2 + \left(p^2-2p+3\right)^2$

$\Rightarrow p^4 + 4p^2 + 9 + 4p^3 + 12p + 6p^2 + p^4 + 4p^2 + 9$

$-4p^3 - 12p + 6p^2$

$\Rightarrow 2p^4 + 20p^2 + 18$

$\therefore$ Coefficient of p^2 is 20.

145. 2

Sol. $a^3 + 3a^2b + 3ab^2 + 2b^3$

$\Rightarrow a^3 + b^3 + 3ab(a+b) + b^3$

$\Rightarrow (a+b)^3 + b^3$

$\Rightarrow (a+b+b)\left[(a+b)^2 + b^2 - (a+b).b\right]$

(by using identity $p^3+q^3 = (p+q)\left(p^2+q^2-pq\right)$)

$\Rightarrow (a+2b)\left[\left(a^2+b^2+2ab+b^2-ab-b^2\right)\right]$

$\Rightarrow (a+2b)\left(a^2+b^2+ab\right)$

146. 3

Sol. $a = 64^{\frac{1}{3}}, b = 65^{\frac{1}{3}}$

$\Rightarrow a+b-\frac{1}{a^2+ab+b^2}$

$\Rightarrow (a+b) - \frac{(a-b)}{(a-b)\left(a^2+ab+b^2\right)}$

$\Rightarrow (a+b)-\dfrac{(a-b)}{a^3-b^3}$

$\Rightarrow (a+b)-\dfrac{(a-b)}{64-65}$

$\Rightarrow (a+b)+(a-b)$

$\Rightarrow 2a$

$\Rightarrow 2\times\left(4^3\right)^{\frac{1}{3}}=8$

147. 1

Sol. $9^{k+2}-240=9^k$

$9^k\times 9^2-240-9^k=0$

Let's say $9^k=p$

$\Rightarrow 81p-240-p=0$

$\Rightarrow 80p=240\Rightarrow p=3$

$\Rightarrow 9^k=3$

$\Rightarrow 3^{2k}=3^1\Rightarrow 2k=1\Rightarrow k=\dfrac{1}{2}$

$\therefore (18k)^k=\left(18\times\dfrac{1}{2}\right)^{\frac{1}{2}}=3$

148. 3

Sol. $z=3+3^{\frac{1}{3}}+3^{\frac{2}{3}}$

$\Rightarrow z-3=3^{\frac{1}{3}}+3^{\frac{2}{3}}$

Cubing both sides

$(z-3)^3=\left(3^{\frac{1}{3}}\right)^3+\left(3^{\frac{2}{3}}\right)^3+3\times 3^{\frac{1}{3}}\times 3^{\frac{2}{3}}\left(3^{\frac{1}{3}}+3^{\frac{2}{3}}\right)$

$\Rightarrow z^3-27-9z(z-3)=3+9+9\left(3^{\frac{1}{3}}+3^{\frac{2}{3}}\right)$

$\Rightarrow z^3-9z^2+27z-27=12+9(z-3)$

$\Rightarrow z^3-9z^2+18z-12=0$

$\Rightarrow z^3-9z^2+18z-7=5$

149. 1

Sol. L : M : N = 2 : 3 : 4

$L^2+M^2+N^2=11600$

$\therefore (2x)^2+(3x)^2+(4x)^2=11600$

$\Rightarrow 4x^2+9x^2+16x^2=11{,}600$

$\Rightarrow 29x^2=11600$

$\Rightarrow x^2=400\Rightarrow x=20$

$\therefore L=2x=40$

$M = 3x = 60$

$N = 4x = 80$

$\therefore L + M - N = 40 + 60 - 80 = 20$

150. 1

Sol. $p + q + r = 2$ ……..(i)

$pq + qr + rp = -1$ and $pqr = -2$

Squaring equation (i)

$p^2 + q^2 + r^2 + 2(pq + qr + rp) = 4$

$\Rightarrow p^2 + q^2 + r^2 + 2(-1) = 4$

$\Rightarrow p^2 + q^2 + r^2 = 6$

$\because (p^3 + q^3 + r^3 - 3pqr) = (p + q + r)(p^2 + q^2 + r^2 - pq - qr - pr)$

$\Rightarrow p^3 + q^3 + r^3 - 3(-2) = 2(6 + 1) \Rightarrow p^3 + q^3 + r^3 = 8$

151. 4

Sol. $a + b + c = (\sqrt{2} - \sqrt{6}) + (\sqrt{6} - \sqrt{3}) + (\sqrt{3} - \sqrt{2}) = 0$

$\Rightarrow a^3 + b^3 + c^3 - 3abc = 0$

Or $a^3 + b^3 + c^3 - 2abc = abc$

$= (\sqrt{2} - \sqrt{6})(\sqrt{6} - \sqrt{3})(\sqrt{3} - \sqrt{2}) = 3\sqrt{2} + \sqrt{6} - 4\sqrt{3}$

152. 4

Sol. $x^2y + xz^2 + y^2z - x^2z - y^2x - z^2y$

$= x^2y - z^2y + xz^2 - x^2z + y^2z - y^2x$

$= y(x^2 - z^2) - xz(x - z) - y^2(x - z)$

$= (x - z)[xy + yz - xz - y^2]$

$= (x - z)[x(y - z) - y(y - z)]$

$= (x - y)(y - z)(x - z)$

153. 2

Sol. Since $ZY = ZX \Rightarrow \angle ZXY = \angle ZYX = x^o$

$\Rightarrow \angle XZT = 2x$

Since $XZ = XT \Rightarrow \angle XTZ = \angle XZT = 2x$

Now, $\angle XYT + \angle XTY = 99^o$

$\Rightarrow 3x = 99 \Rightarrow x = 33$

154. 1

Sol. Given : $a + b = m$ and $\frac{1}{a} + \frac{1}{b} = \frac{1}{n}$

$\Rightarrow b = m - a$ and $\frac{a + b}{ab} = \frac{1}{n}$

Or $b = m - a$ and $\frac{m}{ab} = \frac{1}{n}$

Or $b = m - a$ and $b = \dfrac{mn}{a}$

$\Rightarrow m - a = \dfrac{mn}{a}$

$\Rightarrow am - a^2 = mn \Rightarrow a^2 = m(a - n)$

155. 4

Sol. $x = 0.4737373$ .....(i)

$\Rightarrow 100x = 47.37373$ .....(ii)

equation (ii) – equation (i) gives

$99x = 46.9 \Rightarrow x = \dfrac{469}{990}$

Similarly $1.\bar{6} = \dfrac{5}{3}$

So, $x + 1.\bar{6} = \dfrac{469}{990} + \dfrac{5}{3} = \dfrac{2119}{990} = 2.1\overline{40}$

156. 4

Sol. By Pythagoras Theorem,

$ET = \sqrt{30^2 + 16^2} = 34$ cm

$ar(REST) = ar(RET) + ar(EST)$

$= \dfrac{1}{2} \times 16 \times 30 + \sqrt{48 \times (48 - 42)(48 - 34)(48 - 20)}$

$= 240 + \sqrt{48 \times 6 \times 14 \times 28} = 240 + 336 = 576$ cm^2

157. 1

Sol. Speed of train = 72 km/hr

= 20 m/sec

Let length of platform = x m

then $(240 + x) = 20 \times 20$

$\Rightarrow x = 160$ m

158. 3

Sol. Shaded area = Area of Triangle – Area of 3 Sectors

$= \dfrac{\sqrt{3}}{4} \times 8 \times 8 - \dfrac{60}{360} \times \pi \times (4)^2 \times 3 = \left(16\sqrt{3} - 8\pi\right)$cm^2

159. 3

Sol. Incorrect sum of 9 values $= 9 \times 35 = 315$

Correct sum $= 315 - 8 + 80 = 387$

Correct Mean $= \dfrac{387}{9} = 43$

160. 3

Sol. $\dfrac{3\sqrt{2} + 2\sqrt{3}}{4\sqrt{2} + 3\sqrt{3}} \times \dfrac{4\sqrt{2} - 3\sqrt{3}}{4\sqrt{2} - 3\sqrt{3}}$

$= \dfrac{6 - \sqrt{6}}{5} = \dfrac{6}{5} + \left(-\dfrac{1}{5}\right)\sqrt{6} \Rightarrow p = \dfrac{6}{5}, q = \dfrac{-1}{5}$