

# FIITJEE

## MUKHYAMANTRI VIGYAN PRATIBHA PARIKSHA PART – II

### SCHOLASTIC APTITUDE TEST (SAT)

Held on: February 27, 2022

### ANSWERS

101.	2	102.	4	103.	2	104.	3
105.	1	106.	2	107.	1	108.	4
109.	No option	110.	2	111.	3	112.	3
113.	1	114.	4	115.	4	116.	2
117.	1	118.	1	119.	2	120.	3
121.	4	122.	2	123.	4	124.	1
125.	3	126.	3	127.	4	128.	2
129.	2	130.	3	131.	2	132.	2
133.	3	134.	2	135.	2	136.	2
137.	3	138.	3	139.	1	140.	2
141.	2	142.	2	143.	4	144.	1
145.	1	146.	2	147.	3	148.	3
149.	4	150.	3	151.	4	152.	2
153.	1	154.	3	155.	1	156.	2
157.	2	158.	3	159.	4	160.	4
161.	3	162.	2	163.	3	164.	4
165.	1	166.	3	167.	2	168.	1
169.	1	170.	2	171.	4	172.	4
173.	1	174.	1	175.	2	176.	2
177.	2	178.	4	179.	1	180.	3
181.	2	182.	4	183.	2	184.	4
185.	2	186.	3	187.	1	188.	1
189.	2	190.	1	191.	1	192.	3
193.	3	194.	3	195.	2	196.	4
197.	1	198.	1	199.	1 or Bonus	200.	2

## HINTS AND SOLUTIONS

101. Weight =  $mg$   
And 'g' is maximum on earth surface.
102. When any object is dropped it suffer acceleration due to gravity. Hence the spheres will have same acceleration.
103. When any object floats, then ratio of volume submerge is equal to ratio of density  

$$\frac{d}{1000} = \frac{3}{4} \Rightarrow d = 750 \text{ kg/m}^3$$
104. Wavelength is the distance between two consecutive crest or two consecutive trough.

105. Given that  $PE_1 = \frac{1}{2}KS^2 = 10 \text{ J}$   
When stretched by distance 'S' further  

$$PE_2 = \frac{1}{2}K(2S)^2 = 4 \times \frac{1}{2}KS^2$$
  
 Work done =  $\Delta PE = (4 - 1) \frac{1}{2}KS^2 = 3 \times \frac{1}{2}KS^2$   
 Word done =  $3 \times 10 = 30 \text{ J}$

106. Relation between momentum and kinetic energy.

$$P_1 = \sqrt{2mK_1}$$

$$P_2 = \sqrt{\frac{2mK_1}{4}} = \frac{1}{2}P_1$$

Where P is momentum  
K is kinetic energy

107.  $v = \lambda f$   

$$= \frac{50}{100} \times 4000 = 2 \times 10^3 \text{ m/s}$$
  

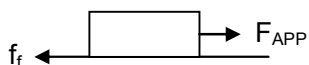
$$d = v \times t = 2 \times 10^3 \times 4 = 8 \times 10^8 \text{ m} = 8 \text{ km}$$

108. Graph 4  $\rightarrow$  slope of graph = 0, acceleration = 0

109.  $s = \frac{u^2}{2a}$        $u_1 = nu$        $s_1 = \frac{(nu)^2}{2a} = n^2s$

110.  $F = ma$   
As  $m = \text{constant}$  ;  $a = \text{constant}$   
 $\Rightarrow f = \text{constant}$ .

- 111.



For  $v = \text{constant}$

$a = \text{zero}$

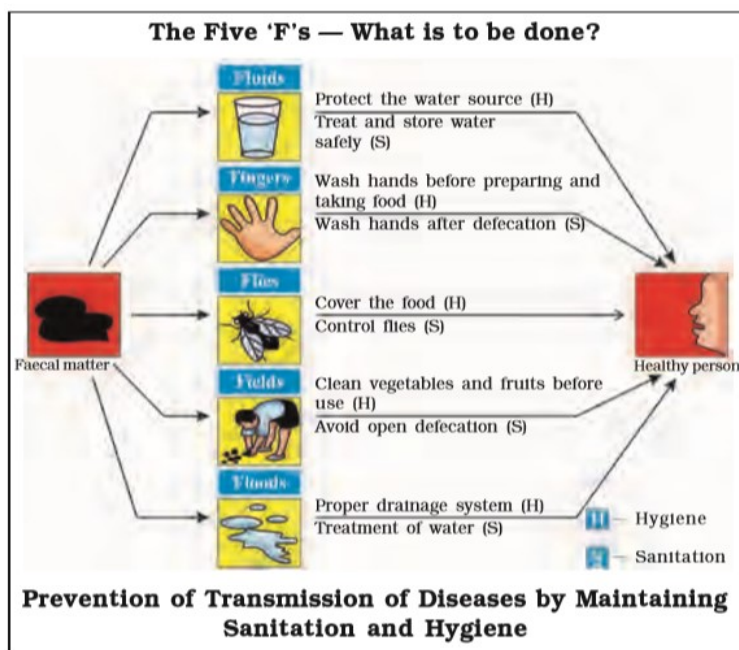
$$F_{\text{net}} = F_{\text{APP}} - f_f = 0$$

$$F_{\text{APP}} = f_f = F$$

112.  $a = \frac{v^2 - u^2}{2s}$   
 $= \frac{0 - (30)^2}{2 \times 100} = -4.5 \text{ m/s}^2$
113. 0.8 sec = 24 cycle  
 1 sec =  $\frac{24}{0.8} = 30$  cycles  
 Frequency = 30 Hz
114. Electronic configuration of Z = 2, 8, 8. It is an inert gas(Ar). Thus the valency of inert gas is 0.
115. Number of neutron = Mass number – Atomic number
116.  ${}_4\text{Be} \rightarrow 2, 2$   
 K, L shell
117. Iron sulphate  $\rightarrow \text{FeSO}_4$
118. Number of moles =  $\frac{20}{2} = 10$  moles of hydrogen gas  
 Number of moles =  $\frac{180}{18} = 10$  moles of water
119. Brass is an alloy of Cu & Zn.
120. (a) Sulphur ( $\text{S}_8$ ) – Polyatomic  
 (b) Chlorine ( $\text{Cl}_2$ ) – Diatomic  
 (c) Phosphorus ( $\text{P}_4$ ) – Tetraatomic  
 (d) Oxygen( $\text{O}_2$ ) – diatomic
121. In emulsion both dispersion phase and dispersion medium are liquid.
122. Pumic is an example of solid sol in which dispersion phase is gas and dispersion medium is solid.
123.  $\text{H}_2\text{S}$  is a colourless gas with rotten egg smell.
124. Mixture of anthracene & common salt is separated by sublimation method.
125. States of matter are solid, Plasma, Bose-Einstein condensate and gas.
126. Rate of evaporation  $\propto \frac{1}{\text{Humidity}}$
127. Hybrid in plants mean cross between two species, varieties and genera.
128. Water resistant and waxy layer present on epidermis of cactus is called **Cuticle** and its function is to prevent loss of water.
129. Storage of enzymes for the digestion of cellular components like carbohydrates, proteins etc. is carried out by **Lysosomes**.
130. Pseudocoelom is not a feature of Annelid.

131. The type of tissue found in petiole is Collenchyma and it provides support.
132. Lactobacillus is a **rod shaped** bacteria responsible for formation of curd.
133. **Cork** and vascular cambium originates from secondary meristem in dicots.
134. **Apis mellifera** has maximum production of honey and is easy to handle as they sting less.
135. Plant cell and bacterial cell have some of common feature, like Plasma membrane, Ribosomes, Chromosomes.

136.



According to the above given information eating fruits directly from the cart won't be considered in 5Fs.

137. Oxygen enters the cell by the process of diffusion when the concentration of O<sub>2</sub> inside the cell **decreases**.
138. Crop rotation is carried out for **increasing fertility of soil**.
139. The five kingdom classification system of organisms was proposed by **Whittaker (1969)**.
140. 'Polio' is caused by a virus with **single strand RNA**.

141. 2

Sol.  $M = 5 + 5^{\frac{1}{3}} + 5^{\frac{2}{3}}$

$$\Rightarrow M - 5 = 5^{\frac{1}{3}} + 5^{\frac{2}{3}}$$

On cubing both sides we get,

$$\Rightarrow (M - 5)^3 = \left( 5^{\frac{1}{3}} + 5^{\frac{2}{3}} \right)^3$$

$$\Rightarrow M^3 - 125 - 15M^2 + 75M = 5 + 25 + 3 \times 5(M - 5)$$

$$\Rightarrow M^3 - 15M^2 + 75M - 125 = 30 + 15M - 75$$

$$\Rightarrow M^3 - 15M^2 + 60M - 40 = 40$$

142. 2

Sol. Given:  $pqr = 1$

$$\begin{aligned} \text{Now } & \frac{1}{1+p+q^{-1}} + \frac{1}{1+q+r^{-1}} + \frac{1}{1+r+p^{-1}} \\ &= \frac{q}{q+pq+1} + \frac{r}{r+qr+1} + \frac{p}{p+pr+1} \\ &= \frac{q}{q+pq+pqr} + \frac{r}{r+qr+1} + \frac{p}{p+pr+1} \quad (\because \text{using } pqr = 1) \\ &= \frac{1}{1+p+pr} + \frac{r}{r+\frac{1}{p}+1} + \frac{p}{p+pr+1} \quad (\text{Using } qr = \frac{1}{p}) \\ &= \frac{1}{1+p+pr} + \frac{pr}{pr+1+p} + \frac{p}{p+pr+1} = \frac{1+pr+p}{1+pr+p} = 1 \end{aligned}$$

143. 4

$$\begin{aligned} \text{Sol. } A &= \frac{1}{3-\sqrt{8}} - \frac{1}{\sqrt{8}-\sqrt{7}} + \frac{1}{\sqrt{7}-\sqrt{6}} - \frac{1}{\sqrt{6}-\sqrt{5}} + \frac{1}{\sqrt{5}-2} \\ &= (3+\sqrt{8}) - (\sqrt{8}+\sqrt{7}) + (\sqrt{7}+\sqrt{6}) - (\sqrt{6}+\sqrt{5}) + (\sqrt{5}+2) \\ &= 3+2=5 \\ \text{So, } \frac{1}{A} &= \frac{1}{5} \end{aligned}$$

144. 1

Sol. Let numbers are  $x$  and  $y$  then  $x + y = 10$  and  $x^3 + y^3 = 370$

$$\text{We have } (x+y)^3 = x^3 + y^3 + 3xy(x+y)$$

$$\Rightarrow (10)^3 = 370 + 3xy(10)$$

$$\Rightarrow xy = 21$$

$$\text{Now, } x^2 + y^2 = (x+y)^2 - 2xy$$

$$= 10^2 - 2 \times 21 = 58$$

145. 1

Sol. Natural numbers from 1 to 160 contains  
one digit numbers (1 to 9) = 9

2 digit numbers (10 to 99) = 90

3 digit numbers (100 + 160) = 61

$$\begin{aligned}\text{So, total key press} &= 9 \times 1 + 90 \times 2 + 61 \times 3 \\ &= 372\end{aligned}$$

146. 2

Sol. From figure, In  $\triangle LPQ$ ,  $\angle LQP = 90^\circ - 17^\circ = 73^\circ$

$$\Rightarrow \angle QLN = 73^\circ - 36^\circ = 37^\circ = \angle MLQ$$

Now, in  $\triangle LMQ$

$$\angle LMQ = 180^\circ - (73^\circ + 37^\circ) = 70^\circ$$

147. 3

Sol. Total remaining cards = 48

remaining Kings = 3

$$\text{So, required probability} = \frac{3}{48}$$

148. 3

Sol.  $M = \sqrt{22 + \sqrt{5 + \sqrt{13 + \sqrt{9}}}}$

$$= \sqrt{22 + \sqrt{5 + \sqrt{16}}}$$

$$= \sqrt{22 + \sqrt{9}} = \sqrt{25} = 5$$

Similarly  $N = \sqrt{7 + \sqrt{1 + \sqrt{5 + \sqrt{16}}}} = 3$

$$\text{So, } M^3 - 3M^2N + 3MN^2 - N^3 = (M - N)^3 = 8$$

149. 4

Sol. Given,  $a = b^{3x}$ ,  $b = c^{3y}$ ,  $c = a^{3z}$

$$\Rightarrow b = (a^{3z})^{3y} = a^{9yz}$$

$$\Rightarrow a = (a^{9yz})^{3x} = a^{27xyz}$$

$$\Rightarrow 27xyz = 1 \Rightarrow xyz = \frac{1}{27}$$

150. 3

Sol. Given:  $h = 12$  m,  $r = 5$  m  $\Rightarrow \ell = 13$  m

$$\text{Total cost of canvas} = \frac{22}{7} \times 5 \times 13 \times 28 = \text{Rs. } 5720$$

151. 4

Sol. We have,  $0.\bar{3} = \frac{1}{3}$  and  $0.8\bar{3} = \frac{5}{6}$

$$\text{So, } 0.\bar{3} + 0.8\bar{3} = \frac{1}{3} + \frac{5}{6} = \frac{7}{6} = 1.\bar{16}$$

152. 2

Sol. Given:  $p + \frac{1}{p} = 5 \Rightarrow p^2 + \frac{1}{p^2} = 23$

Now,  $\frac{p^4 + 3p^3 + 5p^2 + 3p + 1}{p^4 + 1}$

$$= \frac{p^2 + 3p + 5 + \frac{3}{p} + \frac{1}{p^2}}{p^2 + \frac{1}{p^2}} \quad (\text{On dividing each term by } p^2)$$

$$= \frac{\left(p^2 + \frac{1}{p^2}\right) + 3\left(p + \frac{1}{p}\right) + 5}{p^2 + \frac{1}{p^2}}$$

$$= \frac{23 + 3 \times 5 + 5}{23} = \frac{43}{23}$$

153. 1

Sol. Given data:

3, 6, 7, 10, x, 15, 19, 20, 25, 28

$$\text{Median} = \frac{x + 15}{2} = 13 \Rightarrow x = 11$$

So, Mean of given data is  $\frac{3 + 6 + 7 + 10 + 11 + 15 + 19 + 20 + 25 + 28}{10}$

$$= \frac{144}{10} = 14.4$$

154. 3

Sol. Given:  $1^2 + 2^3 + \dots + 9^3 = 2025$

Now,  $(0.11)^3 + (0.22)^3 + \dots + (0.99)^3$

$$= (0.11)^3 [1^3 + 2^3 + \dots + 9^3]$$

$$= (0.11)^3 \times 2025 = 2.695275$$

155. 1

Sol.  $\frac{x+1}{x+2} = 0 \Rightarrow x+1=0 \Rightarrow x=-1$

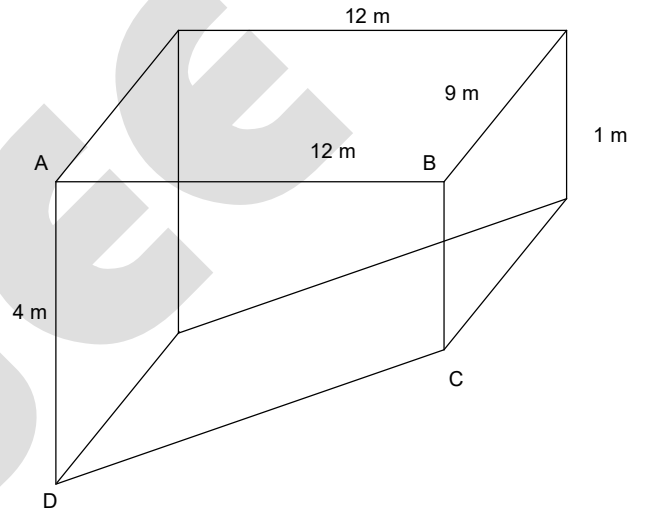
So,  $x^{33} + x^{32} + x^{13} + x^{12} + x + 1 = 0$

156. 2

Sol. Volume = Area of base (trapezium ABCD)  $\times$  height

$$= \frac{1}{2}(4+1) \times 12 \times 9$$

$$= 270 \text{ m}^3$$



157. 2

Sol. Let  $x$  be side of square then radius of incircle  $= \frac{x}{2} \Rightarrow \text{Area} = \pi \left(\frac{x}{2}\right)^2$

$$\text{radius of circumcircle} = \frac{\text{diagonal}}{2} = \frac{\sqrt{2}x}{2} = \frac{x}{\sqrt{2}}$$

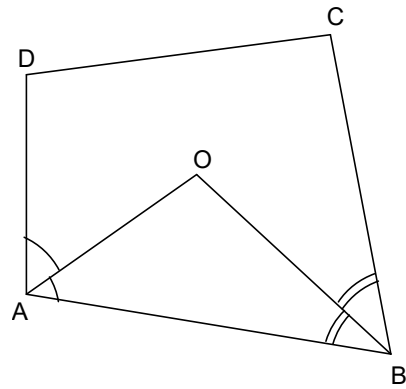
$$\text{area of circum circle} = \pi \left(\frac{x}{\sqrt{2}}\right)^2$$

$$\text{Ratio of areas} = \frac{\pi \left(\frac{x}{2}\right)^2}{\pi \left(\frac{x}{\sqrt{2}}\right)^2} = \frac{1}{2}$$

158. 3



Sol.  $\angle C + \angle D = 360 - (\angle A + \angle B)$   
 $= 360 - 2(\angle OAB + \angle OBA)$   
 $= 360 - 2(180 - \angle AOB)$   
 $= 2\angle AOB$   
 $\Rightarrow k = 2$



159. 4

Sol. Given:  $3a = 4b = 6c \Rightarrow a : b : c = 4 : 3 : 2$

Let  $a = 4k, b = 3k, c = 2k$

Now  $a + b + c = 27\sqrt{29} \Rightarrow 9k = 27\sqrt{29}$

$$\Rightarrow k = 3\sqrt{29}$$

So,  $\sqrt{a^2 + b^2 + c^2} = \sqrt{29k^2} = k\sqrt{29} = 87$

160. 4

Sol.  $x = \sqrt{3 + \sqrt{5}} \Rightarrow x^2 = 3 + \sqrt{5} \Rightarrow x^2 - 3 = \sqrt{5}$

Squaring both sides, we get

$$x^4 + 9 - 6x^2 = 5 \Rightarrow x^4 - 6x^2 + 4 = 0$$