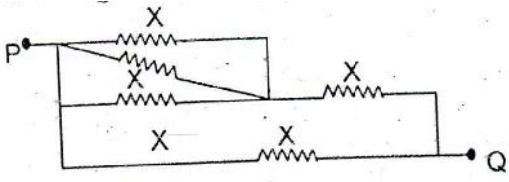
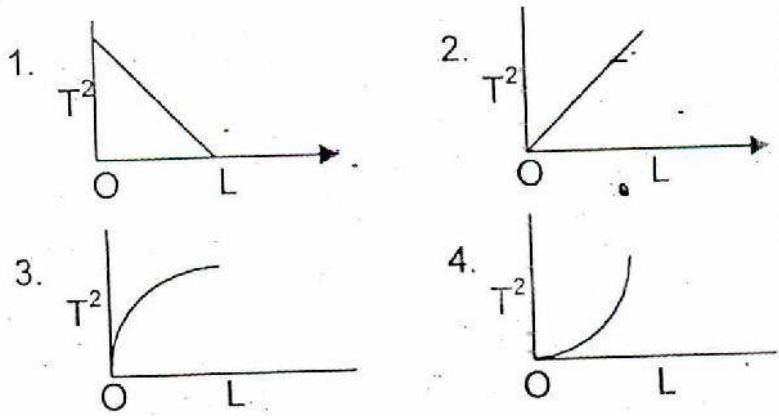


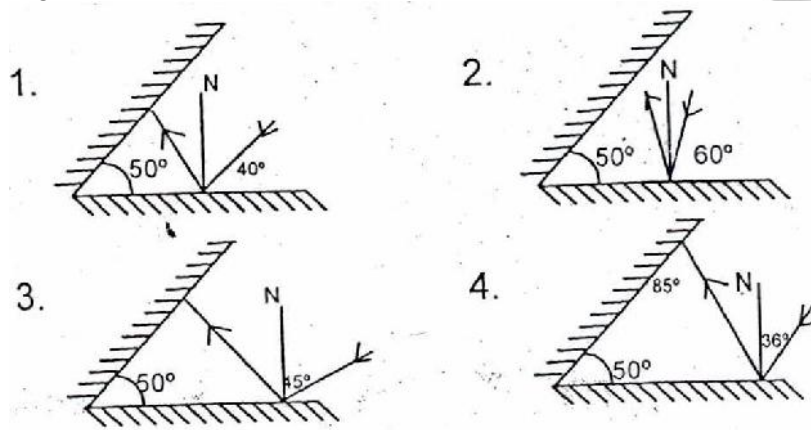
NTSE STAGE – I (2016- 17) SCHOLASTIC APTITUDE TEST

101. The distance travelled by a body falling freely from rest in 2nd, 3rd and 5th second of its motion are in the ratio
(1) 7 : 5 : 3 (2) 3 : 5 : 7
(3) 5 : 3 : 7 (4) 5 : 7 : 3
102. Two extremes ends of a moving train (engine and guard coach) pass a pole with speeds U and V respectively with a constant acceleration. The speed with which the middle point of the train will pass the same pole is
(1) $\frac{U+V}{2}$ (2) $\frac{V^2+U^2}{2}$
(3) $\frac{UV}{2}$ (4) $\sqrt{\frac{U^2+V^2}{2}}$
103. An athlete completes one round of circular track of radius r in 30s with uniform speed. The ratio of distance to the displacement traveled by the athlete at the end of 45s is
(1) $2r$ (2) $\frac{2}{3}r$
(3) $\frac{3}{2}\pi$ (4) 2π
104. Five resistances of same value ' x ' are joined in an electric circuit as shown in figure. The equivalent resistance between ends P and Q is 3Ω . The value of x
(1) $\frac{1}{5}\Omega$
(2) $\frac{5}{4}\Omega$
(3) $\frac{21}{4}\Omega$
(4) $\frac{7}{4}\Omega$
- 
105. A bomb of mass 9 kg initially at rest explodes into two pieces of masses 3 kg and 6 kg. If the kinetic energy of 3 kg mass is 216J, then the velocity of 6kg mass will be
(1) 4 m/s (2) 3 m/s
(3) 2 m/s (4) 6 m/s
106. A glass rod is rubbed with silk, is found positively charged. This is because
(1) Electrons are transferred from glass rod to silk.
(2) Electrons are transferred from silk to glass rod.
(3) Protons are transferred from glass rod to silk
(4) Protons are transferred from silk to glass rod
107. A ship rises up as it enters the sea from a river because
(1) Sea water is harder than river water
(2) Density of sea water is lesser than river water
(3) Large quantity of sea water pushes ship up

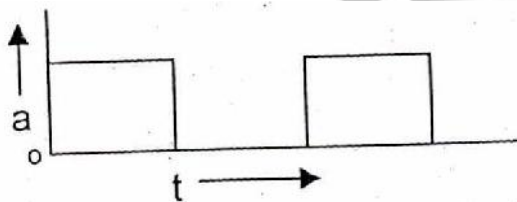
(4) Density of sea water is greater than river water
108. Which one of the following represents the correct graph between L and T^2 in simple pendulum?



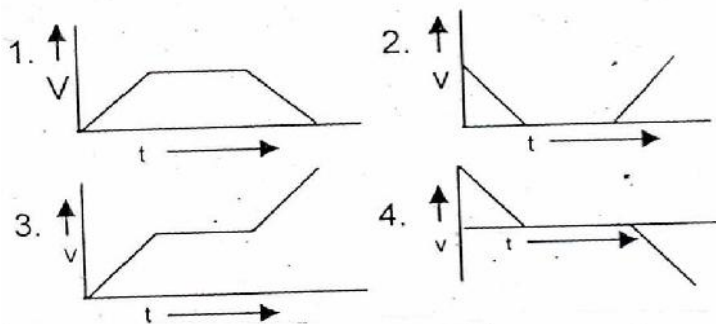
109. Which one of the following correctly depicts reflection. When two mirrors are inclined at an angle of 50° ?



110. Acceleration time graph of a body is shown below:



Which of the following velocity time graph of the same body



111. A man of 80 kg mass stands on a weighing machine in a lift which is moving upwards with a uniform speed of 5m/s. The reading of the weighing machine will be. (Take $g = 10 \text{ m/s}^2$)

- (1) zero
- (2) 400N
- (3) 800N
- (4) 1200N

112. An electric bulb marked 40W – 220V is connected with an electric supply of 110v. Its electric power is
 (1) 100W (2) 40W
 (3) 20W (4) 10W
113. An overhead power transmission line carries a current from east to east directs as then magnetic field at a point 1.5 cm north of the line is in
 (1) North direction (2) South direction
 (3) Vertically upward (4) Vertically downward
114. Total internal reflection is not possible when ray of light travels from
 (1) glass to water (2) glass to air
 (3) water to air (4) water to glass
115. How many grams of oxygen gas is essentially required for complete combustion of 3 moles of butane gas?
 (1) 624 g (2) 312 g
 (3) 128 g (4) 64 g
116. IUPAC name of $\text{H} - \overset{\text{O}}{\parallel} \text{C} - \overset{\text{O}}{\parallel} \text{C} - \text{H}$
 (1) Oxoethanal (2) Glyoxal
 (3) Ethanedial (4) Ethanedione
117. What is the mass of pure ethanoic acid required to neutralize 280 mL of 0.5 molar pure lime water completely?
 (1) 60.4 g (2) 30.2 g
 (3) 16.8 g (4) 8.4 g
118. A metal sulphate has the formula MSO_4 . The phosphate of the same metal will have the formula
 (1) $\text{M}_3(\text{PO}_4)_3$ (2) M_2PO_4
 (3) $\text{M}(\text{PO}_4)_2$ (4) $\text{M}_3(\text{PO}_4)_2$
119. The mass of sodium chloride formed when 5.3 g of sodium carbonate is dissolve in 250ml of $\frac{1}{2}$ molar HCl solution will be
 (1) 5.85 g (2) 7.32 g
 (3) 11.7 g (4) 58.5 g
120. A gas mixture contains 50% helium and 50% methane by volume at S.T.P. What is the percentage by mass of the methane in the mixture?
 (1) 20% (2) 40%
 (3) 60% (4) 80%
121. The German silver, an alloy, has the composition
 (1) Cu + Sn + Zn (2) Cu + Zn + Ni
 (3) Cu + Ag + Zn (4) Ag + Hg + Sn
122. Out of the following, which is the incorrect statement?
 (1) Adsorption is always an exothermic process
 (2) The soap solution is not a colloidal solution below its CMC.
 (3) 'Argyrol' used in eye – lotion is a colloidal solution
 (4) Gold number is the number of moles of gold formed in anode mud during copper refining.

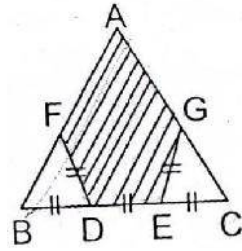
123. A mixture of non – reacting gasses contains hydrogen and oxygen gases in the mass ratio of 1 : 4 respectively. What will be the molar ratio of the above two gases in the mixture?
 (1) 16 : 1 (2) 1 : 4
 (3) 4 : 1 (4) 1 : 6
124. An element 'X' has the same number of electrons in the first and the fourth shell as well as in the second and the third shell. What is the formula and nature of its oxide?
 (1) XO, Neutral (2) XO₂, Acidic
 (3) XO₂, Amphoteric (4) XO, Basic
125. Which of the following is not used as a food preservative?
 (1) Alitame (2) BHA
 (3) BHT (4) Na₂SO₃
126. Match the column – I with column – II.
- | | Column-I | | Column-II |
|-----|------------------------------|-----|--------------------|
| (a) | 0.5 mole SO ₂ gas | (P) | 10 moles of proton |
| (b) | 1 mole H ₂ O | (Q) | 11.2 L at S.T.P |
| (c) | 96g of O ₂ gas | (R) | 2 moles |
| (d) | 88g of CO ₂ gas | (S) | 6 moles of atoms |
- (1) (a) – (R), (b) – (P), (c) – (Q), (d) – (S) (2) (d) – (P), (c) – (Q), (b) – (R), (a) – (S)
 (3) (a) – (P), (b) – (Q), (c) – (S), (d) – (R) (4) (a) – (Q), (b) – (P), (c) – (S), (d) – (R)
127. Choose the incorrect statement:
 (1) Iodine – value is a parameter to denote the degree of unsaturation of fatty acids.
 (2) Cholesterol is not present in plant fats
 (3) Rancidity is a reduction process of oily food materials.
 (4) Tocopherol is an antioxidant.
128. Iodine present in iodised salt in our diet is essential for
 (1) Synthesis of insulin (2) Synthesis of thyroxine
 (3) Synthesis of adrenalin (4) Synthesis of growth hormone
129. Which of the following is not controlled by medulla in hind brain?
 (1) Blood pressure (2) Salivation
 (3) Body Posture (4) Vomitting
130. The breakdown of glucose to pyruvate takes place in
 (1) Mitochondria (2) Nucleus
 (3) Lungs (4) cytoplasm
131. The oxygen rich blood from lungs comes to the heart in
 (1) Left atrium (2) Right atrium
 (3) Right ventricle (4) Left ventricle
132. Growth of pollen tube in the style towards the ovule in plants is an example of
 (1) Geotropism (2) Hydrotropism
 (3) Phototropism (4) Chemotropism
133. The common passage of urine and sperm in human male is
 (1) Seminal vesicle (2) Ureter
 (3) Vas deferens (4) Urethra
134. Out of the following, which enzyme is active in acidic medium
 (1) Pepsin (2) Trypsin
 (3) Lipase (4) Amylase

135. Bowman capsule is found in
 (1) Small intestine (2) Kidneys
 (3) Heart (4) Brain
136. "Khadins" are used in Rajasthan to
 (1) Check soil erosion (2) Recharge ground water
 (3) Promote soil erosion (4) Trap wild animals
137. Which of these is 'not' a reflex action?
 (1) Salivation on smell of food
 (2) Secretion of sweat
 (3) Blinking of eye in strong light
 (4) Withdrawal of hand on touching hot object.
138. A food chain comprising of a snake, grass, frog and insect, the secondary consumer is
 (1) Insect (2) Snake
 (3) Frog (4) Grass
139. Identify the inherited trait from the following:
 (1) Colour of seed of garden pea
 (2) Developed musculature of a wrestler
 (3) Singing ability of a person.
 (4) Darkening of skin due to exposure to sunlight
140. Which of the following disease cannot be sexually transmitted.
 (1) Cholera (2) HIV / AIDS
 (3) Syphilis (4) Gonorrhoea
141. The simplified form of the expression given below is

$$\frac{\frac{y^4 - x^4}{x(x+y)} - \frac{y^3}{x}}{y^2 - xy + x^2}$$

 (1) 1 (2) 0
 (3) -1 (4) 2
142. If $a = \frac{4xy}{x+y}$, the value of $\frac{a+2x}{a-2x} + \frac{a+2y}{a-2y}$ in most simplified form is
 (1) 0 (2) 1
 (3) -1 (4) 2
143. If $\frac{x^2 - bx}{ax - c} = \frac{m-1}{m+1}$, has roots which are numerically equal but of opposite signs, the value of m must be
 (1) $(a-b)/(a+b)$ (2) $(a+b)/(a-b)$
 (3) c (4) $\frac{1}{c}$
144. In the set of equations $z^x = y^{2x}$, $2^z = 2.4^x$; $x + y + z = 16$, the integral roots in the order x, y, z = 16,
 (1) 3, 4, 9 (2) 9, -5, 12
 (3) 12, -5, 9 (4) 4, 3, 9

145. $\triangle ABC$ is an equilateral triangle, we have $BD = EG = DF = DE = EC$, then the ratio of the area of the shaded portion to area of $\triangle ABC$ is



- (1) $\frac{4}{11}$ (2) $\frac{7}{9}$
(3) $\frac{5}{12}$ (4) $\frac{6}{7}$

146. If $A + B = 90^\circ$ then $\frac{\tan A \tan B + \tan A \cot B}{\sin A \sec B} - \frac{\sin^2 B}{\cos^2 A}$ is equal to

- (1) $\cot^2 A$ (2) $\cot^2 B$
(3) $-\tan^2 A$ (4) $-\cot^2 A$

147. The value of the following expression is

$$\left[\frac{1}{(2^2 - 1)} \right] + \left[\frac{1}{(4^2 - 1)} \right] + \left[\frac{1}{(6^2 - 1)} \right] + \dots + \left[\frac{1}{(20^2 - 1)} \right]$$

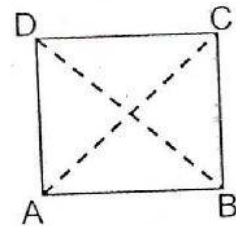
is

- (1) $\frac{10}{21}$ (2) $\frac{13}{27}$
(3) $\frac{15}{22}$ (4) $\frac{8}{33}$

148. If $2^{\sin x + \cos y} = 1$, $16^{\sin^2 x + \cos^2 y} = 4$, then values of $\sin x$ and $\cos y$ respectively are

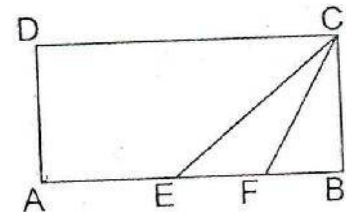
- (1) $-\frac{1}{2}, \frac{1}{2}$ (2) $\frac{1}{2}, -\frac{1}{3}$
(3) $1, -1$ (4) $\frac{1}{\sqrt{2}}, \frac{-1}{\sqrt{2}}$

149. ABCD is a square of area of 4 square units which is divided into 4 non overlapping triangles as shown in figure, then sum of perimeters of the triangles so formed is



- (1) $8(2 + \sqrt{2})$ (2) $8(1 + \sqrt{2})$
(3) $4(1 + \sqrt{2})$ (4) $4(2 + \sqrt{2})$

150. In the diagram ABCD is a rectangle with $AE = EF = FB$, the ratio of the areas of triangle CEF and that of rectangle ABCD is



- (1) $1 : 6$ (2) $1 : 8$
(3) $1 : 9$ (4) $1 : 10$

151. If we divide a two digit number by the sum of its digits we get 4 as quotient and 3 as remainder. Now if we divide that two digit number by the product of its digits, we get 3 as quotient and 5 as remainder the two digit number is

- (1) Even (2) Odd prime
(3) Odd composite (4) Odd

152. The average weight (in kg) of all the students in a class equals the number of students in the class. The increase in the average weight when a teacher to 21 kg is included equals

the decrease in average weight when a student of 19 kg is included. The strength of the class is

- (1) 15 (2) 10
(3) 20 (4) 17

153. Four positive integers sum to 125. If the first of these numbers is increased by 4, the second is decreased by 4, the third is multiplied by 4 and the fourth is divided by 4 we find four equal numbers then four original integers are

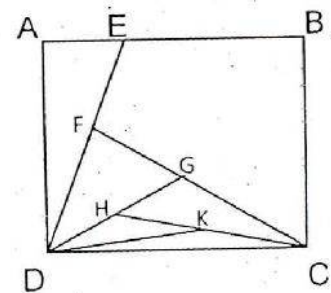
- (1) 16, 24, 5, 80 (2) 8, 22, 38, 57
(3) 7, 19, 46, 53 (4) 12, 28, 40, 45

154. The total number of squares on a chessboard is

- (1) 206 (2) 205
(3) 204 (4) 202

155. In the figure, the area of square ABCD is 4 cm^2 and E is mid point of AB; F, G, H and K are the mid points of DE, CF, DG and CH respectively. The area of $\triangle KDC$ is:

- (1) $\frac{1}{4} \text{ cm}^2$ (2) $\frac{1}{8} \text{ cm}^2$
(3) $\frac{1}{16} \text{ cm}^2$ (4) $\frac{1}{32} \text{ cm}^2$



156. If $x\%$ of y is equal to 1% of z , $y\%$ of z is equal to 1% of x and $z\%$ of x is equal to 1% of y , then the value of $xy + yz + zx$ is

- (1) 1 (2) 2
(3) 3 (4) 4

157. The volume and whole surface area of a cylindrical solid of radius ' r ' units are v and s respectively. If the height of cylinder is 1 unit then $\frac{v}{s}$ is equal to

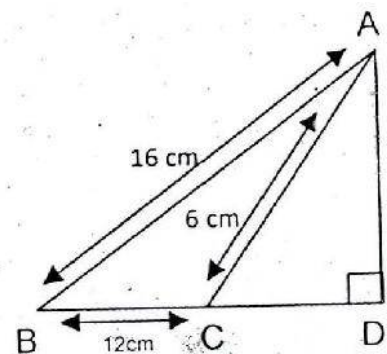
- (1) $\frac{1}{2} \left(1 - \frac{1}{r+1} \right)$ (2) $\frac{1}{2} \left(1 + \frac{1}{r+1} \right)$
(3) $\frac{1}{2} \left(1 - \frac{1}{r} \right)$ (4) $\frac{1}{2} \left(1 + \frac{1}{r} \right)$

158. If the height of right circular cylinder is increased by 10% while the radius of base is decreased by 10% then curved surface area of cylinder

- (1) Remains same (2) Decreases by 1%
(3) Increases by 1% (4) Increases by 0.1%

159. In the figure $\angle D = 90^\circ$ $AB = 16 \text{ cm}$, $BC = 12 \text{ cm}$ and $CA = 6 \text{ cm}$, then CD is:

- (1) $\frac{13}{6} \text{ cm}$ (2) $\frac{17}{6} \text{ cm}$
(3) $\frac{19}{6} \text{ cm}$ (4) $\frac{18}{5} \text{ cm}$



160. If x, y, z are real numbers such that $\sqrt{x-1} + \sqrt{y-2} + \sqrt{z-3} = 0$ then the values of x, y, z are respectively
(1) 1, 2, 3 (2) 0, 0, 0
(3) 2, 3, 1 (4) 2, 4, 1
161. Napoleonic code is known as
(1) Civil code of 1802 (2) Civil code of 1803
(3) Civil code of 1804 (4) Civil code of 1805
162. When was Victor Emmanuel II proclaimed king of united Italy?
(1) 1860 (2) 1861
(3) 1863 (4) 1871
163. Satyagrah of Gandhiji against oppressive planation system was started from which place?
(1) Dandi (2) Surat
(3) Ahmedabad (4) Champaran
164. Who set up the first Indian Jute mill in Calcutta in 1917?
(1) Seth Hukum Chand (2) G.D. Birla
(3) Dwaraka Nath Tagore (4) J.N. Tata
165. Where was khilafat committee formed in March 1919?
(1) Lucknow (2) Bombay
(3) Lahore (4) Ajmer
166. Who wrote about the injustice of the caste system in his book 'Gulamgiri'?
(1) B.R. Ambedkar (2) Periyar
(3) Amrit Lal Thakkar (4) Jyotiba Phule
167. The Act was made by Britishers to censor the India press was
(1) Rowlatt Act (2) Regulating Act
(3) Vernacular Act (4) Pitt Act
168. Who was the king of France during French Revolution?
(1) Louis XIV (2) Louis XV
(3) Louis XVI (4) Louis XVII
169. Which of the following book is not written by Premchand?
(1) Rangbhoomi (2) Indulekha
(3) Sevasadan (4) Godan
170. Who was propaganda minister of Hitler?
(1) Goebbels (2) Raasputin
(3) Stalin (4) Helmuth
171. Which of the following country is not included in Indo-China?
(1) Laos (2) Vietnam
(3) Cambodia (4) Japan
172. How much percent of iron ore is found in magnetite?
(1) 70% (2) 65%
(3) 60% (4) 75%
173. Which coal has highest quantity?
(1) Peat (2) Lignite
(3) Bituminous (4) Anthracite

174. During which period was the greatest damage inflicted upon Indian forest?
(1) Colonial period (2) Mughal period
(3) Maratha period (4) Gupt period
175. A chemical compound called 'texol' extracted from the Himalyan yew is used to cure which disease?
(1) Tuberculosis (2) Cancer
(3) Asthma (4) Fever
176. In which year was the 'Project Tiger' launched?
(1) 1974 (2) 1970
(3) 1972 (4) 1973
177. Which crop is kharif crop in North and Rabi in south India?
(1) Rice (2) Sugar cane
(3) Sesame (4) Cotton
178. In which industry limestone is used as a raw material?
(1) Cotton textiles (2) Iron and steel
(3) Cement industry (4) Jute industry
179. Which one of the following is the type of plate boundary of the Indian plate along the Himalayan Mountain?
(1) Ocean-continent convergence (2) Divergent-boundary
(3) Transform boundary (4) Continent-continent boundary
180. Which of the following island groups lies to South East India?
(1) Andaman and Nicobar Islands (2) Lakshadweep
(3) Maldives (4) Sri Lanka
181. Which of the following is the main form of degradation in the irrigated areas?
(1) Gully erosion (2) Wind erosion
(3) Siltation of land (4) Salinisation of soils
182. River Narmada originates from which of the following hills
(1) Amarkantak (2) Satpura
(3) Vindhyachal (4) Mahabaleshwar
183. Which one of the following is not a good argument in favour of democracy?
(1) People feel free and equal in democracy
(2) Democracy resolves conflict in a better way than other
(3) Democratic government is more accountable to the people
(4) Democratic counties are more prosperous than others
184. Who prepared the constitution of India in 1928?
(1) B.R. Ambedkar (2) Rajendra Prasad
(3) Jawahar Lal Nehru (4) Moti Lal Nehru
185. Who appoints the chief election commissioner of India?
(1) The Prime Minister (2) People of India
(3) President of India (4) Chief justice of India
186. Main recommendations of Mandal commission was
(1) reservation of Schedule caste
(2) reservation of schedule tribe
(3) reservation for socially and educationally backward
(4) reservation for minorities

187. In America Legislature is called
(1) Upper house (2) Congress
(3) Lower house (4) Cabinet
188. Which one of the following state was born out of cultural, ethnicity and geography?
(1) Kerala (2) Nagaland
(3) Mizoram (4) Assam
189. In modern democracy power sharing arrangements can take in following way
(1) Among different organs of government (2) Among government at different level
(3) Among different social groups (4) All of them
190. Which one of the following subject is of union list?
(1) Police (2) Trade
(3) Foreign Affairs (4) Commerce
191. "Religion can never be separated from politics" said by
(1) Sardar Patel (2) Jawahar Lal Nehru
(3) Mahatma Gandhi (4) Indira Gandhi
192. Who interprets the constitution of India?
(1) Lok Sabha (2) Rajya Sabha
(3) Both (Lok Sabha & Rajya Sabha) (4) The Supreme Court of India
193. Which one of the following is not a function of political party?
(1) To fill the political offices (2) Contest the election
(3) To pass the Budget (4) Do not shape the Public Opinion
194. What is the time period of government budge in India?
(1) From 1st January to 31st December (2) From 1st March to 30th April
(3) From 1st April to 31st March (4) From 1st April to 31 December
195. After which five year plant there were three annual plans.
(1) First five year plan (2) Third five year plan
(3) Fourth five year plan (4) Fifth five year plan
196. How many days of guaranteed work is provided by National Rural Employment Guarantee Act.
(1) 200 days (2) 100 days
(3) 300 days (4) 500 days
197. Which one of the following agency issues one rupee currency note in India?
(1) Reserve Bank of India (2) Ministry of Finance
(3) Commerce Ministry (4) Commercial Banks
198. Selling of part of public sector enterprises is called
(1) Globalization (2) Privatization
(3) Disinvestment (4) Liberalization
199. Blue revolution is associated with which activity
(1) Indigo cultivation (2) Fisheries
(3) Poultry farming (4) Availability of drinking water
200. Which one of these is not a feature of money?
(1) Medium of exchange (2) Source of Income
(3) Store of value (4) Unit of account

NTSE STAGE – I (2016- 17)
SCHOLASTIC APTITUDE TEST SOLUTIONS

PHYSICS

101. $S_{nth} = u + \frac{1}{2}a(2n - 1)$
 $n = 2, n = 3, n = 5$
ratio = 3 : 5 : 9

102. $a = \frac{v^2 - u^2}{2l}$; l = length of the train.
 $v^2 = u^2 + 2\left(\frac{v^2 - u^2}{2l}\right) \times \frac{l}{2}$
 $V = \sqrt{\frac{u^2 + V^2}{2}}$

103. Ratio = $\frac{2\pi r + \frac{2\pi r}{4}}{2r} = \frac{3}{2}\pi$

104. Resistance = $\frac{4x}{7} = 3$.
 $x = \frac{21}{4}\Omega$

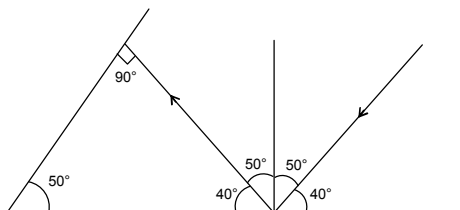
105. Using conservation of momentum
 $M_1V_1 = M_2V_2$
 $3 \times V_1 = 6 \times V_2 \dots(i)$
 $\frac{1}{2} \times 3 \times V_1^2 = 216$
 $\Rightarrow V_1 = 12 \text{ m/s} ; V_2 = 6 \text{ m/s}$

106. Electrons are transferred from glass rod to silk.

107. $\frac{V_s}{V} = \frac{\text{Density of body}}{\text{Density of liquid}}$

108. $T = 2\pi\sqrt{\frac{l}{g}}$
 $\Rightarrow T^2 = 4\pi^2 \frac{l}{g} \Rightarrow T^2 \times l$
Hence straight line.

109.



110. $V = at$
Hence straight line graph with +ve slope.

111. $V = \text{constant}$, $a = 0$, $m = 80 \text{ kg}$
 $T = mg = 800 \text{ N}$

112. $P = \frac{V^2}{R} = \frac{110 \times 110}{220 \times 220} \times 40 = 10 \text{ W}$

113. Using right hand thumb rule.

114. Density of glass is more than water.

CHEMISTRY

115. $2\text{C}_4\text{H}_{10} + 13\text{O}_2 \longrightarrow 8\text{CO}_2 + 10\text{H}_2\text{O}$
2 moles required 13 mole O_2
1 mole required $\frac{13}{2}$ mole O_2
3 mole required $\frac{13}{2} \times 3 = \frac{39}{2} = 19.5$ mole
Wt of O_2 required = $19.5 \times 32 = 624 \text{ g}$

116.
$$\begin{array}{c} \text{O} \quad \text{O} \\ || \quad || \\ \text{H} - \text{C} - \text{C} - \text{H} \\ | \quad | \\ 1 \quad 2 \end{array}$$

Ethanedial

117. $2\text{CH}_3\text{COOH} + \text{Ca}(\text{OH})_2 \longrightarrow \text{Ca}(\text{CH}_3\text{COO})_2 + 2\text{H}_2\text{O}$
280 mL, $0.5 = 140 \times 10^{-3}$ moles
1 mole required 2 moles CH_3COOH
 140×10^{-3} required $140 \times 10^{-3} \times 2$ moles $\text{CH}_3\text{COOH} = 0.280$ mole
i.e $0.280 \times 60 = 16.8 \text{ g}$

118. MSO_4
 $\text{M}^{2+} \text{SO}_4^{2-}$
i.e., $\text{M}^{2+} \text{PO}_4^{3-}$
 $\text{M}_3(\text{PO}_4)_2$

119. $\text{Na}_2\text{CO}_3 + 2\text{HCl} \longrightarrow 2\text{NaCl} + \text{H}_2\text{O} + \text{CO}_2$

$$\frac{5.3 \text{ g}}{106} = 0.05 = 5 \times 10^{-2}$$

$$250 \times \frac{1}{2} = 125 \times 10^{-3} \text{ moles} = 12.5 \times 10^{-2}$$

Limiting reagent

$$2 \times 5 \times 10^{-2} = 10^{-1} \text{ moles} = 0.1 \text{ moles}$$

i.e., 5.85 g

120.



50 % He 50 % CH₄

Suppose 22.4 L volume is present

i.e. 11.2 L He i.e. ½ mole He i.e. 2 g He
 11.2 L He i.e. ½ mole CH₄ i.e. 8 g CH₄

$$\% \text{CH}_4 = \frac{8}{10} \times 100 = 80\%$$

121. 60% Copper
 20% Nickel
 20% Zinc

122. The protective power of lyophilic colloids is measured in terms of gold number

123. Non reacting gases

H₂ : O₂

1 : 4

$$\frac{W_{\text{H}_2}}{W_{\text{O}_2}} = \frac{1}{4}$$

$$\frac{W_{\text{H}_2} M_{\text{O}_2}}{M_{\text{H}_2} W_{\text{O}_2}}$$

$$\frac{n_{\text{H}_2}}{n_{\text{O}_2}} = \frac{1 \times 32}{4 \times 2} = \frac{4}{1}$$

124. X should be calcium (Ca – 2, 8, 8, 2)
 CaO, Basic

125. Alitame used as sweetener

126. (a)	0.5 mole SO ₂ gas	(Q)	11.2 L at S.T.P
(b)	1 mole H ₂ O	(P)	10 moles of proton
(c)	96g of O ₂ gas	(S)	6 moles of atoms
(d)	88g of CO ₂ gas	(R)	2 moles

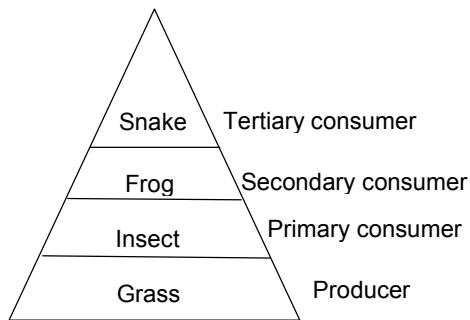
127. Rancidity is the phenomenon of oxidation of oils and fat which lead to their foul smell and unpleasant odour.

128. Iodine is essential for the formation of thyroxine hormone. It is present in iodised salt.

129. Medulla oblongata helps to control blood pressure, salivation, vomiting where as body posture is controlled by cerebellum.

130. Glycolysis takes place in cytoplasm of the cell.
131. Oxygen rich blood carried out by pulmonary vein from lungs to left atrium of the heart.
132. Growth of pollen tube in the style towards the ovule in plants is an example of chemotropism
133. Urethra is the common passage of urine and sperm in human males.
134. Pepsin is protein digesting enzyme which activated in acidic medium secreted by chief cells of stomach.
135. Bowman's capsule is apart of nephron in kidney.
136. 'Khadins' are used in Rajasthan for Rain Water Harvesting.
137. Sweating is not a reflex action.

138.



Therefore 'frog' is the secondary consumer.

139. Colour of seed of garden pea is an inherited trait.
140. Cholera is caused by vibrio cholerae and it is transmitted through contaminated food and water.

141.
$$\frac{\frac{y^4 - x^4}{x(x+y)} - \frac{y^3}{x}}{y^2 - xy + x^2}$$

$$= \frac{(y^2 + x^2)(y - x) - y^3}{x(y^2 - xy + x^2)}$$

$$= \frac{-x(y^2 - xy + x^2)}{x(y^2 - xy + x^2)}$$

$$= -1$$

142. $a = \frac{4xy}{x+y}$

$$\Rightarrow \frac{a}{2x} = \frac{2y}{x+y}, \frac{a}{2y} = \frac{2x}{x+y}$$

By applying Componendo Dividendo

$$\frac{a+2x}{a-2x} = \frac{3y+x}{y-x} \text{ and } \frac{a+2y}{a-2y} = \frac{3x+y}{x-y}$$

$$\text{So, } \frac{a+2x}{a-2x} + \frac{a+2y}{a-2y} = \frac{3y+x}{y-x} + \frac{3x+y}{x-y} = 2$$

143. $\frac{x^2 - bx}{ax - c} = \frac{m-1}{m+1}$

In standard form, given equation is $(m+1)x^2 - x(bm + b + ma - a) + cm - c = 0$

Since roots are equal in magnitude but opposite in signs

\Rightarrow Sum of zeros = 0

or $bm + b + ma - a = 0$

$\Rightarrow m = \frac{a-b}{a+b}$

144. By going through options
 $x = 4, y = 3, z = 9$

145. Let area of triangle ECG = x sq. units

\Rightarrow ar(Δ AGE) = 2x sq. units

Now, ar(Δ AEC) = 3x sq. units

Since, BD = DE = EC

\Rightarrow ar(ABD) = ar(ADE) = ar(AEC)

So, Area of triangle ABC = 9x sq units

Shaded area = 7x sq. units

Required ratio = $\frac{7x}{9x} = \frac{7}{9}$

146. $\therefore A + B = 90^\circ$

$\therefore \frac{\tan A \cdot \tan B + \tan A \cdot \cot B}{\sin A \cdot \sec B} = \frac{\sin^2 B}{\cos^2 A}$

$= \frac{\cot B \cdot \tan B + \cot B \cot B}{\sin A \cdot \operatorname{cosec} A} = \frac{\cos^2 A}{\cos^2 A}$

$= \frac{1 + \cot^2 B}{1} - 1$

$= \cot^2 B$

147. $\frac{1}{(2^2-1)} + \frac{1}{(4^2-1)} + \frac{1}{(6^2-1)} + \dots + \frac{1}{20^2-1}$

$= \frac{1}{1 \times 3} + \frac{1}{3 \times 5} + \frac{1}{5 \times 7} + \dots + \frac{1}{19 \times 21}$

$= \frac{1}{2} \left(\frac{1}{1} - \frac{1}{3} \right) + \frac{1}{2} \left(\frac{1}{3} - \frac{1}{5} \right) + \frac{1}{2} \left(\frac{1}{5} - \frac{1}{7} \right) + \dots + \frac{1}{2} \left(\frac{1}{19} - \frac{1}{21} \right)$

$= \frac{1}{2} \left[\frac{1}{1} - \frac{1}{3} + \frac{1}{3} - \frac{1}{5} + \frac{1}{5} - \frac{1}{7} + \dots + \frac{1}{19} - \frac{1}{21} \right]$

$= \frac{1}{2} \left(1 - \frac{1}{21} \right)$

$= \frac{1}{2} \times \frac{20}{21} = \frac{10}{21}$

148. $2^{\sin x + \cos y} = 1 = 2^0$

$\sin x + \cos y = 0$

let $\sin x = a, \cos y = b$

$\Rightarrow a + b = 0$

$$\Rightarrow a^2 + b^2 + 2ab = 0$$

$$\Rightarrow ab = -\frac{1}{4}$$

$$16^{\sin^2 x + \cos^2 y} = 4 = 16^{1/2}$$

$$\sin^2 x + \cos^2 y = \frac{1}{2}$$

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

$$\therefore a + b = 0$$

$$\Rightarrow a + \frac{-1}{4a} = 0$$

$$\Rightarrow 4a^2 - 1 = 0$$

$$a = \pm \frac{1}{2}$$

$$\Rightarrow b = -a$$

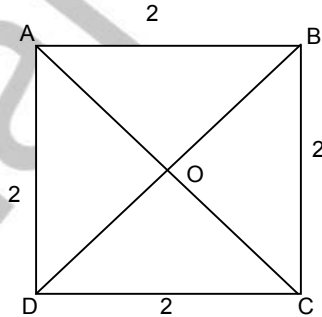
$$b = \pm \frac{1}{2}$$

149. $AB = BC = CD = DA = 2 \text{ cm}$

$$AC = BD = 2\sqrt{2}$$

$$\therefore AO = BO = CO = DO = \sqrt{2}$$

$$\begin{aligned} \therefore \text{Sum of perimeter} &= (2 + \sqrt{2} + \sqrt{2}) \times 4 \\ &= 8 + 8\sqrt{2} \\ &= 8(1 + \sqrt{2}) \end{aligned}$$



150. $\therefore \text{Ar}(\text{CEF}) = \frac{1}{3} \text{Ar}(\text{ABC})$

$$= \frac{1}{6} \text{Ar}(\text{ABCD})$$

$$\therefore \frac{\text{Ar}(\text{CEF})}{\text{Ar}(\text{ABCD})} = \frac{1}{6}$$

151. $10a + b = (a + b)4 + 3$

$$10a + b = 3ab + 5$$

$$6a = 3b + 3 \quad 5 \times (b + 1) + b = 3 \times \left(\frac{b + 1}{2}\right) \times b + 5$$

$$5b + 5 + b = \frac{3}{2}b^2 + \frac{3}{2}b + 5$$

$$\frac{3}{2}b^2 - \frac{9}{2}b = 0$$

$$\frac{3b}{2}(b - 3) = 0 \quad b \neq 0 \text{ as } a \neq \frac{1}{s}$$

$$b = 3$$

$$a = 2$$

Number is 23. Odd prime,

152. $\text{avg wt} = \text{total students} = n$

$$\frac{n^2 + 21}{n + 1} - n = n - \frac{n^2 + 18}{n + 1}$$

$$\frac{n^2 + 21 + n^2 + 19}{n + 1} = 2n$$

$$2n^2 + 40 = 2n^2 + 2n$$

$$n = 20$$

153. $a + b + c + d = 125$ $a + 4 = b - 4 = 4c = \frac{d}{4} = t$

$$t - 4 + t + 4 + t / 4 + 4t = 125$$

$$\frac{25t}{4} = 125 \quad t = 20$$

$$a = 24, b = 16$$

$$c = 5, d = 80$$

154. $1^2 + 2^2 + 3^2 + 4^2 + 5^2 + 6^2 + 7^2 + 8^2$

$$\frac{8(8+1)(2 \times 8 + 1)}{6} = \frac{8 \times 9 \times 17}{6} \Rightarrow 12 \times 17 \Rightarrow 204$$

155. $\text{ar } \triangle ADE = \text{ar } \triangle BEC = 1$

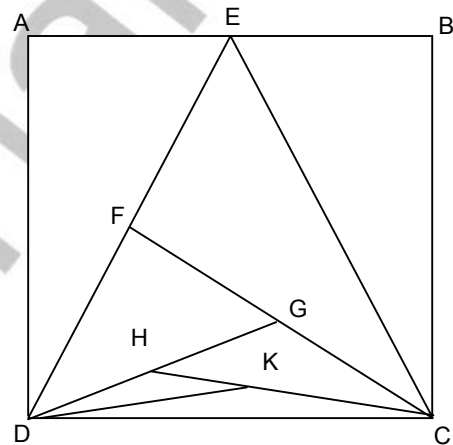
$$\text{ar } \triangle DEC = \frac{4}{2} = 2$$

$$\text{ar } \triangle DFC = \frac{2}{2} = 1$$

$$\text{ar } \triangle DGC = \frac{1}{2}$$

$$\text{ar } \triangle DHC = \frac{1}{4}$$

$$\text{ar } \triangle DKC = \frac{1}{4 \times 2} = \frac{1}{8}$$



156. $xy = z, yz = x, xz = y \Rightarrow x^2 y^2 z^2 = xyz$

$$xyz = 1$$

$$z^2 = 1 \Rightarrow z = \pm 1$$

$$x = \pm 1, y = \pm 1$$

$$xy + zy + zx = 3$$

157. $V = \pi r^2 h$

$$S = 2\pi r h + 2\pi r^2$$

$$\frac{V}{S} = \frac{\pi r^2}{2\pi r + 2\pi r^2}$$

$$= \frac{1}{2} \left(\frac{r}{1+r} \right) = \frac{1}{2} \left[1 - \frac{1}{r+1} \right]$$

158. $h = 1.1h$

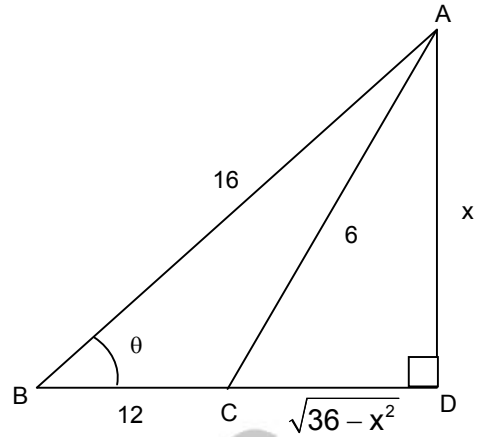
$$r = .9h$$

$$\text{Area} = 2\pi r h = 2\pi 1.1 \times .9h$$

$$.99(2\pi r h)$$

Decreases by 1%

159. $256 = x^2 + 144 + 36 - x^2 + 24\sqrt{36 - x^2}$
 $\sqrt{36 - x^2} = \frac{76}{24} = \frac{19}{6}$
 $CD = \frac{19}{6}$



160. $x - 1 = 0$
 $y - 2 = 0$
 $z - 3 = 0$
 $x = 1, y = 2, z = 3$

askIITians