NATIONAL TALENT SEARCH EXAMINATION (NTSE-2018) STAGE -1

STATE : HARYANA PAPER : SAT

Date: 05/11/2017

Max. Marks: 100 **Time allowed: 90 mins**

SOLUTIONS

101. Which has more number of particles?

(1) 46 g of Na atom (2) 8 g of O_2 molecules

(3) 0.1 mole of carbon atom (4) 28 g of N_2 molecules

Ans. (1)

Sol. 46 g of Na contain 2 mole which has 12.044×10^{23} no. of atoms (1 mole = 6.022×10^{23} particles).

102. Choose the correct option about cheese :

(1) Cheese is an example of emulsion in which dispersed phase is a liquid and dispersing medium is solid.

(2) Example of gel in which dispersed phase is solid dispersing medium is liquid.

(3) Example of emulsion in which dispersed phase is solid and dispersing medium is liquid.

(4) Example of gel in which dispersed phase is liquid and dispersing medium is solid.

Ans. (4)

Sol. Cheese is an example of gel in which dispersed phase is liquid dispersing medium is solid.

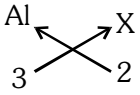
103. If the aluminium salt of anion 'X is Al_2X_3 the formula of magnesium salt of 'X' will be :

(1) Mg_2X (2) MgX_2 (3) MgX (4) Mg_2X_3

Ans. (3)

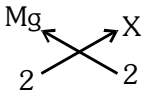
Sol. MgX

Al_2X_3



Magnesium salt of X

In simplified form



104. On reacting and compound of calcium (x) with water, compound (y) is obtained, (y) on boiling with NH_4Cl a gas (z) is obtained, x, y, & z respectively are :

(1) $CaCO_3$, CaO, NH_3 (2) $CaCO_3$, CaO, Cl_2

(3) CaO, $CaCl_2$, Cl_2 (4) CaO, $Ca(OH)_2$,NH_3

Ans. (4)

Sol. $CaO + H_2O \longrightarrow \underset{(y)}{Ca(OH)_2}$

$\underset{(x)}{}$

$Ca(OH)_2 + 2NH_4Cl \longrightarrow CaCl_2 + \underset{(z)}{2NH_3(g)} + 2H_2O$

105. A metal x is placed below Al and above Pb, in activity series. The extraction of metal is done by reacting carbon with its oxide. Metal oxide is used to join cracks of machine parts and rail lines by reacting it with Al The metal is :

(1) Zn (2) Cu (3) Fe (4) Mg

Ans. (3)

Sol. Fe (Thermite reaction)

$2Al + Fe_2O_3 \longrightarrow 2Fe + Al_2O_3$

106. A colourless gas with choking smell is evolved when Cu turning are heated with Conc. H_2SO_4. The gas is :

(1) SO_2 (2) SO_3 (3) H_2S (4) S

Ans. (1)

Sol. SO_2

When copper turnings are treated with concentrated sulphuric acid, copper sulphate sulphur di-oxide and water are formed.

$Cu + \text{conc. } 2H_2SO_4 \longrightarrow CuSO_4 + SO_2 + 2H_2O$

107. Acetic acid is reduced with $LiAlH_4$ to give

(1) CH_3CH_2OH (2) CH_2CHO (3) CH_3OH (4) CH_3CH_3

Ans. (1)

Sol. CH_3CH_2OH

$CH_3COOH \xrightarrow{LiAlH_4} CH_3—CH_2—OH$

108. Read the statement about carbon and choose correct option :

A. It has small atomic size.

B. Its melting & boiling point is low as compared to other members of group.

C. It shows electropositive character.

D. It shows maximum tendency of catenation.

(1) A, B are correct (2) B, D are correct (3) A, C & D are correct (4) A & D are correct

Ans. (4)

Sol. A & D are correct

Carbon has small atomic size and it shows maximum tendency of catenation.

109. Which of the following metal is not placed in eighth group of Mendeleev periodic table?

(1) Fe (2) Na (3) Pt (4) Ni

Ans. (2)

Sol. Na

110. Baking powder is a mixture of :

(1) Sodium carbonate & Sodium hydrogen carbonate (2) Sodium carbonate & Acetic acid

(3) Sodium hydrogen carbonate & methanoic acid (4) Sodium hydrogen carbonate & tartaric acid

Ans. (4)

Sol. Sodium hydrogen carbonate & tartaric acid

111. Which of the following elements form acidic oxide?

A. Element with atomic no. 7 B. Element with atomic no. 3

C. Element with atomic no. 15 D. Element with atomic no. 19

(1) A & B (2) A & C (3) B & D (4) Only A

Ans. (2)

Sol. A & C

Nitrogen (Z = 7) and phosphorus (Z = 15) both are non metal. Non metal oxides are acidic in nature.

112. $KMnO_4$ is a strong oxidising agent in acidic medium. To provide acidic medium H_2SO_4 is used instead of HCl because :

(1) H_2SO_4 is stronger acid than HCl (2) H_2SO_4 is a dibasic acid

(3) HCl is oxidised by $KMnO_4$ to Cl_2 (4) Only H_2SO_4 is completely ionized

Ans. (3)

Sol. HCl is oxidised by $KMnO_4$ to Cl_2.

$2KMnO_4 + 16HCl \longrightarrow 2KCl + 2MnCl_2 + 8H_2O + 5Cl_2$

113. Consider the two statements below one labelled as Assertion (A) and other as Reason (R), Examine there two statements carefully and decide if Assertion (A) and Reason (R) individually true and if so (R) is a correct explanation of (A) select your answer using the code given below :

Assertion (A) : CO_2 is a gas but SiO_2 is a solid at room temperature.

Reason (R) : CO_2 contain C = O bonds but SiO_2 does not contain Si = O bonds.

(1) Both A & R are true and R is a correct explanation of A

(2) Both A & R are true and R is not correct explanation of A

(3) A is true R is false

(4) A is false R is true

Ans. (2)

Sol. CO_2 is gas at room temperature but SiO_2 is solid at room temperature. CO_2 contain C = O bonds but SiO_2 does not contain Si = O bonds. Both statements are true but reason is not correct explanation of A.

114. Non Co-operation movement was withdrawn due to

(1) Jallain Wala Bagh Masscare (2) Chauri Charu incident

(3) Rowlatt Act introduced (4) Nehru Reports Rejection

Ans. (2)

Sol. Chauri Chaura, 1922. At Chauri Chaura in Gorakhpur, a peaceful demonstration in a bazaar turned into a violent clash with the police. Hearing of the incident, Mahatma Gandhi called a halt to the Non-Cooperation Movement.

115. The term Liberalism is derived from the Latin word 'Liber' meaning

(1) Democratic (2) Capitalist (3) Socialist (4) Free

Ans. (4)

Sol. The term Liberalism is derived from the Latin word Liber meaning free.

116. The French Revolution occured in which following year ?

(1) 1788 (2) 1789 (3) 1790 (4) 1791

Ans. (2)

Sol. French revolution occurred in 1789.

117. Who was the chief architect of the unification of Germany ?

(1) Chief Minister William I (2) King William II

(3) Chief Minister Ottovon Bismark (4) King Kaisar

Ans. (3)

Sol. Chief Minister Ottovan Bismarck was the architect of Unification of Germany

118. Who among the following was descirbed as the most dangerous enemy of social order by Duke Metternich ?

(1) Louis Philippe (2) Karol Kuripinski (3) Johan Gotfried (4) Guiseppe Mazzini

Ans. (4)

Sol. Metternich described Guiseppe Mazzini as 'the most dangerous enemy of our social order'.

119. The elites in Vetnam were powerfully influenced by which following culture ?

(1) Indian (2) American (3) European (4) Chinese

Ans. (4)

Sol. The elites in Vietnam were powerfully influenced by Chinese culture

120. Who was the founder of Hoa Hao movement ?

(1) Huynh Phu So (2) Phan Boi Chau

(3) Phan Chu Trinch (4) The official of Imperial court

Ans. (1)

Sol. Huynh Phu So was the founder of Hoa -Hao movement.

121. In January 1930, Gandhiji wrote a letter stating (asking) 'Eleven Demands' to whom ?

(1) Lord Irwin (2) Lord Curzon (3) Lord Ripon (4) Lord Lytton

Ans. (1)

Sol. On 31 January 1930, Gandhiji sent a letter to Viceroy Irwin stating eleven demands.

122. Who was the first President of Indian National Congress?

(1) Dada Bhai Naroji (2) Surendranath Banerjee

(3) W.C. Bonnerjee (4) Gopal Krishan Gokhale

Ans. (3)

Sol. The first, Womesh chunder Bonnerjee, presided over the first session of Indian National Congress held at Bombay in 1885

123. What was the theme of the movie 'Green Beret'

(1) To Glorify War (2) To Glorify Peace

(3) To Glorify Socialism (4) To Glorify Capitalism

Ans. (1)

Sol. Hollywood made films in support of the war, such as John Wayne's Green Berets (1968). This has been cited by many as an example of an unthinking propaganda film that was responsible for motivating many young men to die in the war.

124. Who is the writer of 'Vande Mataram' ?

(1) Rabindranath Tagore (2) Subhash Chandra Bose

(3) Raja Ravi Verma (4) Bakim Chandra Chatterjee (Chattopadhyay)

Ans. (4)

Sol. In the1870s Bankim Chandra Chatterjee wrote 'Vande Mataram' as a hymn to the motherland.

125. Trade Unions first started in which of the following country ?

(1) England (2) America (3) France (4) Russian

Ans. (1)

Sol. Trade Unions were started in England

126. Under which of the following type of resource can tidal energy by put ?

(1) Replenishable (2) Human made (3) Abiotic (4) Non-recyclable

Ans. (1)

Sol. The resources which can be renewed or reproduced by physical, chemical or mechanical processes are known as renewable or replenishable resources. For example, solar and wind energy, water, forests and wildlife, etc.

127. In which of the following state is laterite soil found ?

(1) Jammu and Kashmir (2) Kerala (3) Uttarakhand (4) Jharkhand

Ans. (2)

Sol. These soils are mainly found in Karnataka, Kerala, Tamil Nadu, Madhya Pradesh, and the hilly areas of Odisha and Assam.

128. Which of the following describes a system of agriculture where a single crop is grown on a large area ?

(1) Shifting Agriculture (2) Plantation Agriculture (3) Horticulture (4) Intensive Agriculture

Ans. (2)

Sol. Plantation is also a type of commercial farming. In this type of farming, a single crop is grown on a large area.

129. Which two of the following extreme locations are connected by the east west corridor?

(1) Mumbai and Nagpur (2) Mumbai and Kolkata

(3) Silcher and Porbandar (4) Nagpur and Siliguri

Ans. (3)

Sol. Silcher (Assam) and Porbander (Gujarat) are connected by east -west corridor.

130. Which of the following ports is the deepest land locked and well protected port along the east coast ?

(1) Chennai (2) Tuticorin (3) Paradip (4) Vishakhapatnam

Ans. (4)

Sol. Vishakhapatnam(Andhra Pradesh) is the deepest land-locked and well protected port along the east-coast .

131. Which one of the following agencies market steel for the public sector plants

(1) HAIL (2) SAIL (3) TATA STEEL (4) MNCC

Ans. (2)

Sol. SAIL markets the steel for the Public sector plants

132. Which of the following mineral found in monazite sands ?

(1) Mineral oil (2) Uranium (3) Thorium (4) Coal

Ans. (3)

Sol. The Monazite sands of Kerala is also rich in Thorium.

133. Which one of the following statement is not true ?

(1) Mica can be clear black, green, red, yellow or brown.

(2) Limestone is found associated with composed of calcium carbonates or calcium and magnesium carbonatges

(3) aluminium has good conductivity and great mallelability

(4) Generally minerals are not found in ores

Ans. (4)

Sol. Minerals are usually found in ores.

134. Match the following

1. Salt water lake in India	(i) Barren island
2. active volcano in India	(ii) Pitli island
3. Island which is uninhabited	(iii) Majuli
4. A river is land situated in river Brahmaputra	(iv) Chilka

(1) 1- iv; 2 - ii; 3 - i; 4 - iii (2) 1- iv; 2 - i; 3 - ii; 4 - iii

(3) 1- iii; 2 - ii; 3 - iv; 4 - i (4) 1- ii; 2 - i; 3 - iii; 4 - iv

Ans. (2)

Sol. Salt Water Lake - Chilka

Active Volcano in India -Barren Island

Island Which is Uninhabited - Pitli island

A river island situated in river Brahmaputra-Majuli

135. Himalayas have been divided on the basis of regions from west to east. Which is known as

1. The part of Himalayas lying between Indus and Sutluj	(i) Kumaon Himalayas
2. The part of Himalayas lying between Sutluj and Kali	(ii) Punjab Himalayas
3. The part lying between Tista and Dihang	(iii) Nepal Himalayas
4. The part lying between Kali and Tista	(iv) Assam Himalayas

(1) 1- i; 2 - ii; 3 - iii; 4 - iv (2) 1- i; 2 - iii; 3 - ii; 4 - iv

(3) 1- ii; 2 - i; 3 - iv; 4 - iii (4) 1- iii; 2 - ii; 3 - i; 4 - iv

Ans. (3)

Sol. 1. The part of Himalayas lying between Indus and Sutlaj : Punjab Himalayas

2. The part of Himalayas lying between Sutlaj and Kali : Kumaon Himalayas

3. The part lying between Tista and Dihang : Nepal Himalayas

4. The part lying between Kali and Tista : Assam Himalayas

136. Match list 1 (River) and list 2 (Dam) and select the correct answer using the code given below

List (River)	List-2 (Dam)
1. Mahanadi	(i) Nagarjun
2. Krishana	(ii) Mettur
3. Sutluj	(iii) Hirakund
4. Kaveri	(iv) Bhakhra Nangal

(1) 1- i; 2 - ii; 3- iv; 4- iii (2) 1- ii; 2 - iii; 3- iv; 4- i

(3) 1- iv; 2 - ii; 3- i; 4- iii (4) 1- iii; 2 - i; 3- iv; 4- ii

Ans. (4)

Sol. 1. Mahanadi : Hirakund

2. Krishna : Nagarajun

3. Sutluj : Bhakhra Nangal

4. Kaveri : Mettur

137. Match the following animals with their category of existence and select the correct answer using the code given below :

Animals	**Category of existence**
1. Black Buck	(i) Extinct
2. Asiatic	(ii) Endangered
3. Andaman Wild Pig	(iii) Vulnerable
4. Pink Head Duck	(iv) Endemic

(1) 1- ii; 2 - iii; 3- iv; 4- i (2) 1- i; 2 - ii; 3- iii; 4- iv

(3) 1- iv; 2 - iii; 3- ii; 4- i (4) 1- iii; 2 - ii; 3- i; 4- iv

Ans. (1)

Sol. 1. Black Bug : Endangered

2. Asiatic Elephant : Vulnerable

3. Andaman Wild Pig : Endemic

4. Pink Head Duck : Extinct

138. Which of the following book is written by Kautilya?

(1) Politics (2) Civil government (3) Arthashastra (4) The prince

Ans. (3)

Sol. Arthashastra is written by Kautiliya

139. Which of the following state does not have coalition government ?

(1) Bihar (2) Jammu-Kashmir (3) Goa (4) Orissa

Ans. (4)

Sol. Orissa state does not have a coalition government

140. Which of the following nation has parliamentary government but is not republic?

(1) India (2) U.K. (3) China (4) Nepal

Ans. (2)

Sol. U.K has parliamentary government but is not republic

141. Perosnalities of which of the following group do not match in their position?

(1) Pt. Jawaharlal Nehru, V.P. Singh and Dr. Radhakrishnan

(2) Dr. Rajendra Prasad, Dr. V.V. Giri and Dr. Fakhruddin Ali Ahmed

(3) Lal Bahadur Shastri ,Narsimha Rao and Manmohan Singh

(4) Lala Lajpat Rai, Bal Gangadhar Tilak and Bipin Chandra Pal

Ans. (1)

Sol. Pt. Jawaharlal Nehru (PM), V.P. Singh (PM) and Dr. Radhakrishnan (President)

142. Which article of Indian constitution abolishes untouchability ?

(1) Art. 19 (2) Art. 17 (3) Art. 21 (4) Art. 23

Ans. (2)

Sol. Article 17 of Indian Constitution abolished untouchablity

143. Which of the following statements are correct ?

(i) India is secular

(ii) India has direct democracy

(iii) India has adopted the proportional representation

(iv) India is founder member of U.N.

(1) i, iv, iii (2) i, iv (3) i, ii, iv (4) i, ii, iii

Ans. (2)

Sol. India has representative democracy

144. Which article is related with Uniform Civil Code?

(1) Art. 44 (2) Art.45 (3) Art.14 (4) Art.370

Ans. (1)

Sol. Article 44 is related with Uniform Civil Code

145. Choose the odd group from the following

(1) Lal, Bal, Pal (2) Weather, Climate, Environment

(3) Heart, Kidney, Dengue (4) BJP, Congress, RJD

Ans. (3)

Sol. Heart , Kidney and Dengue is not connected which each other

146. I had booked a ticket in Rajdhani Superfast train, the train was delayed for long hours without any reason, in this situation

(1) I can not approach consumer court as train delays can happen sometime.

(2) I can file a complaint in railway office as claim refund of ticket amount

(3) I can approach consumer cout for deficiency in service and claim refund of superfast charges as damage.

(4) I can cancle my ticket without paying cancellation charges to railway.

Ans. (2)

Sol. It is associated with consumers right in this case, we can file a complaint in railway office as claim refund of ticket amount

147. Assume that national income of a country is Rs. 500,000 crore in any accounting year and they have received foreign aid of Rs.1,000 crore in the year . In this situation national income of that country would.

(1) Increase by Rs. 1,000 crore (2) Decrease by Rs. 1,000 crore

(3) Remain same (4) Increase by half of the foreign aid

Ans. (3)

Sol. In this case National Income remain same

148. After implementation of GST in the country, a shopkeeper has given a work of their book-keepeing/ accounts to my cousin. Such kind of activities can be included in

(1) Primary Sector (2) Secondary Sector (3) Tertiary Sector (4) GST Sector

Ans. (3)

Sol. This is included in service sector because shop keeping is related with service sector

149. Match term of column 1 with column -2

Column 1	**Column 2**
(a) Land	(i) Engineer
(b) Labour	(ii) Mines
(c) Capital	(iii) Machines
(d) Money	(iv) Purchasing power

(1) a-i, b- ii, c -iii, d- iv (2) a-ii, b- i, c -iii, d- iv

(3) a-iv, b- ii, c -i, d- iii (4) a-iii, b- iv, c -i, d- ii

Ans. (2)

Sol. 1. Land : Mines

2. Labour : Engineer

3. Capital : Machines

4. Money : Purchasing Power

150. Why despite less colonies requirement urban areas have a higher poverty line?

(1) Increase of higher price of many essential commodities in urban area

(2) Urban people eat more in hotels

(3) Causes of powervery are different in urban areas

(4) Urban people incur more medical expense

Ans. (1)

Sol. Because of higher prices of many essential commodities in urban area

151. If a farmer works at his field of 5 acre and produces total 150 quintals of wheat in a year. His son has grown up and joined the farming with his father. Which of the following show the disguised unemployment?

(1) production of wheat increase by 50 quintals

(2) production of wheat remain constant

(3) production of wheat increase 20 quintals

(4) production of wheat increase by 100 quintal

Ans. (2)

Sol. Production of Wheat remains Constant

152. Which one of the following statement is incorrect regarding commercial banking?

(1) It deals with money. It accepts deposits and advance loans

(2) It deals with credit and has power to create credit

(3) It deals with the general public

(4) It is not a commercial. Institution whose aim is to earn profit.

Ans. (4)

Sol. It is not a commercial. Institution whose aim is to earn profit.

153. Human Development Index compares countries based on which of the following levels of the people ?

(i) Education level (ii) Pollution level (iii) Health Status

(iv) Building (v) Per Capita Income

(1) (i), (ii), (iii) (2) (i), (iii), (iv) (3) (i), (v), (iii) (4) (i), (ii), (v)

Ans. (3)

Sol. HDI compares countries with Education level, Health status and Per Capita Income.

154. A number when divided by 5, 3 and 2 leaves remainders 4, 2 and 1 respectively. Out of all three digit numbers, find the total such number :

(1) 28 (2) 29 (3) 30 (4) 31

Ans. (3)

Sol.

5	a	
3	b	4
2	c	2
	0	1

So, $\therefore$ c = 1, b = 3c + 2 = 5 and a = 5b + 4 = 29

Hence, least possible number is 29.

So, next possible higher number is $(5 \times 3 \times 2)k + 29 = 30k + 29$

$\therefore$ Least possible 3 digit number is 119 for k = 3

and next possible 3 digit number is 989 for k = 32

Hence, total such number are 30.

155. If $\operatorname{cosec}\theta - \cot\theta = p$, then the value of $\frac{p^2-1}{p^2+1}$ is

(1) $\cos\theta$ (2) $-\cos\theta$ (3) $\sin\theta$ (4) $-\sin\theta$

Ans. (2)

Sol. $\operatorname{cosec}\theta - \cot\theta = p$

Then $\frac{p^2-1}{p^2+1}$

$= \frac{(\operatorname{cosec}\theta - \cot\theta)^2 - 1}{(\operatorname{cosec}\theta + \cot\theta)^2 + 1}$

$= \frac{\operatorname{cosec}^2\theta + \cot^2\theta - 2\operatorname{cosec}\theta\cot\theta - 1}{\operatorname{cosec}^2\theta + \cot^2\theta - 2\operatorname{cosec}\theta\cot\theta + 1}$

$= \frac{2\cot^2\theta - 2\operatorname{cosec}\theta\cot\theta}{2\operatorname{cosec}^2\theta - 2\operatorname{cosec}\theta\cot\theta}$

$= \frac{2\cot\theta(\cot\theta - \operatorname{cosec}\theta)}{2\operatorname{cosec}\theta(\operatorname{cosec}\theta - \cot\theta)}$

$= -\cos\theta$

156. If the sum of the first m terms of an A.P. is n and sum of its first n terms is m, then the sum of its first (m + n) terms is

(1) $-(m+n)$ (2) $m+n$ (3) $-m+n$ (4) $m-n$

Ans. (1)

Sol. Let the first term be 'a' and common difference be 'd' respectively

Then, according to question,

$S_m = n$ and $S_n = m$

$\Rightarrow \frac{m}{2}[2a + (m-1)d] = n$ .....(1)

and $\frac{n}{2}[2a + (n-1)d] = m$ .....(2)

Subtracting equation (1) and equation (2), we get

$\Rightarrow a(m-n) + \frac{d}{2}(m^2 - m - n^2 + n) = n - m$

$\Rightarrow (m-n)[a + \frac{d}{2}(m+n-1)] = n - m$

$\Rightarrow 2a + d(m+n-1) = -2$ .....(3)

$\therefore S_{m+n} = \frac{m+n}{2}(2a + (m+n-1)d)$

$= \frac{(m+n)}{2}(-2) = -(m+n)$

157. If quadratic equation $x^2 + px + k = 0$ has equal roots and -4 is a root of the quadratic equation $x^2 + px - 4 = 0$, then the value of k is

(1) $\frac{3}{2}$ (2) $\frac{-3}{2}$ (3) $\frac{-9}{4}$ (4) $\frac{9}{4}$

Ans. (4)

Sol. $x^2 + px + k = 0$

Roots are equal, then $D = 0 \Rightarrow p^2 - 4k = 0$ .....(1)

Also, $x^2 + px - 4 = 0$

-4 is a root of the equation

Then $16 - 4p - 4 = 0$

$12 - 4p = 0 \Rightarrow p = 3$ .....(2)

from (1) and (2)

$9 - 4k = 0$

$\boxed{k = \frac{9}{4}}$

158. A peacock sitting on the top of a tree observes a serpent on the ground making an angle of depression 30°. If the peacock with a speed of 300 m per minute catches the serpent in 12 seconds, then the height of the tree is

(1) 30 m (2) $30\sqrt{3}$m (3) $\frac{30}{\sqrt{3}}$m (4) 15 m

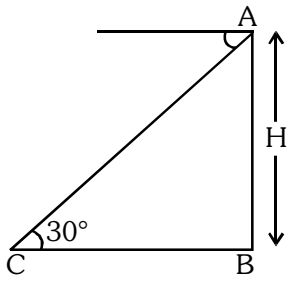
Ans. (1)

Sol. Here,

$AC = 300 \times \frac{12}{60}$ m

$AC = 60$ m

$\therefore \sin 30° = \frac{H}{AC}$



$\Rightarrow \frac{1}{2} = \frac{H}{60} \Rightarrow \boxed{H = 30m}$

159. a, b and c are the sides of a right angled triangle and a circle of radius r touches the sides of the triangle. If c is the hypotenuse of the triangle, then the value of r is :

(1) $\frac{a+b+c}{3}$ (2) $\frac{a+b-c}{3}$ (3) $\frac{a+b+c}{2}$ (4) $\frac{a+b-c}{2}$

Ans. (4)

Sol. Here, APOQ is a square,

$\therefore$ AP = AQ = r (radius)

Also,

CQ = CR = b – r

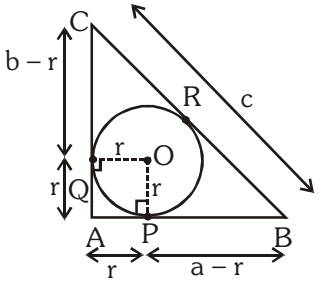
and BP = BR = a – r

$\therefore$ BC = BR + RC

$\Rightarrow c = a - r + b - r$

$\Rightarrow 2r = a + b - c$

$\Rightarrow \boxed{r = \frac{a+b-c}{2}}$



160. If one zero of the quadratic polynomial $ax^2 + 15x + 6$ is reciprocal of the other, then the zeroes of the polynomial are :

(1) 2 and $\frac{1}{2}$ (2) –2 and $\frac{-1}{2}$ (3) 3 and $\frac{1}{3}$ (4) –3 and $\frac{-1}{3}$

Ans. (2)

Sol. Let α, $\frac{1}{\alpha}$ be the zeroes of the quadratic polynomial $ax^2 + 15x + 6$

$\therefore \alpha.\frac{1}{\alpha} = \frac{6}{a} \Rightarrow a = 6$

So, polynomial is $6x^2 + 15x + 6$

$= 3(2x^2 + 5x + 2)$

$= 3(2x^2 + 4x + x + 2)$

$= 3(2x + 1)(x + 2)$

$\therefore$ Zeroe's are $x = -2, -\frac{1}{2}$

161. The mean of certain number of observations is 46. If four observation whose mean is 52 are removed, the mean becomes 44.5. The original number of observation is

(1) 35 (2) 20 (3) 15 (4) 12

Ans. (2)

Sol. Let n be the number of observation. Then, sum of all observation is 46n ..... (1)

If 4 observation are removed. Then sum of 4 observation is $4 \times 52 = 208$ ..... (2)

Then,

$$\text{New mean} = \frac{46n - 208}{n - 4} = 44.5$$

$\Rightarrow 46n - 208 = 44.5n - 178 \Rightarrow 1.5n = 30$

$\Rightarrow \boxed{n = 20}$

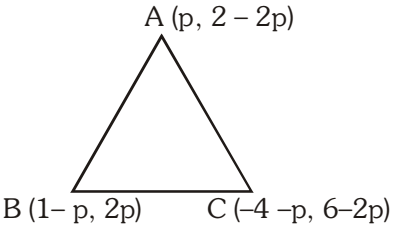
162. The area of a triangle with vertices (p, 2 – 2p), (1 – p, 2p) and (–4 –p, 6–2p) is 70 sq. units. Then, the numbers of possible integral values of p is :

(1) 0 (2) 1 (3) 2 (4) 3

Ans. (2)

Sol. Here

$$\text{Area} = \frac{1}{2}\left|p(4p - 6) + (1 - p)(4) + (-4 - p)(2 - 4p)\right|$$



$\Rightarrow 70 = \frac{1}{2}\left|4p^2 - 6p + 4 - 4p - 8 + 16p - 2p + 4p^2\right|$

$\Rightarrow \left|8p^2 + 4p - 4\right| = 140$

$\Rightarrow 2p^2 + p - 1 = \pm 35$

$\Rightarrow 2p^2 + p - 36 = 0$ or $2p^2 + p + 34 = 0$ (No real solution)

$\Rightarrow 2p^2 + 9p - 8p - 36 = 0$

$\Rightarrow p(2p + 9) - 4(2p + 9) = 0$

$\Rightarrow (p - 4)(2p + 9) = 0$

$\Rightarrow p = 4, -\frac{9}{2}$

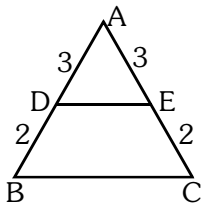
$\therefore$ Number of integral value of p is 1.

163. In a triangle ABC, points D and E are on sides AB and AC respectively such that BCED is trapezium. If AE : EC = 3 : 2, then the ratio of area of ΔADE and trapezium BCED is

(1) 9 : 16 (2) 9 : 4 (3) 9 : 25 (4) 16 : 25

Ans. (1)

Sol.



$$\frac{\text{ar.}\Delta ADE}{\text{ar.}\Delta ABC} = \left(\frac{AD}{AB}\right)^2 = \left(\frac{3}{5}\right)^2 = \frac{9}{25}$$

So, $\frac{\text{ar.}(\Delta ADE)}{\text{ar.}(\text{trap}BCED)} = \frac{9}{25-9} = \frac{9}{16}$

164. The value of λ satisfying of the relation $y = \lambda x - 5$, where x and y are the solution of pair of equations $x + 2y = 10$ and $3x + 4y = 360$ is

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

Ans. (4)

Sol. $x + 2y = 10$ .....(1)

$3x + 4y = 360$ ....(2)

Multiply (1) equation by (2), we get

$2x + 4y = 20$

$3x + 4y = 360$

Subtracting, we get

$x = 340$, and $y = -165$

Now, $y = \lambda x + 5$

$-165 = 340\lambda + 5$

$-\frac{170}{340} = \lambda$

$\lambda = -\frac{1}{2}$

165. Three spheres of radii 6 cm, x cm and y cm are melted to form a single sphere of radius 12 cm. If xy is equal to 80, then the value of x + y is

(1) 21 (2) 18 (3) 24 (4) 42

Ans. (2)

Sol. $\text{Volume}_1 + \text{Volume}_2 + \text{Volume}_3 = \text{vol. of bigger sphere}$

$\frac{4}{3}\pi(6)^3 + \frac{4}{3}\pi(x^3) + \frac{4}{3}\pi(y^3) = \frac{4}{3}\pi(12)^3$

$6^3 + x^3 + y^3 = 12^3$

$x^3 + y^3 = 1728 - 216$

$x^3 + y^3 = 1512$

By solving, we get

$(x + y)^3 - 3xy(x + y) = 1512$

So, $x + y = 18$, as, $xy = 80$

166. If $\cos\theta + \sin\theta = p$ and $\sec\theta + \operatorname{cosec}\theta = V$, then the value of V is :

(1) $\frac{p^2}{2p-1}$ (2) $\frac{2p-1}{p^2}$ (3) $\frac{2p}{p^2-1}$ (4) $\frac{p^2-1}{2p}$

Ans. (3)

Sol. $\sec\theta + \operatorname{cosec}\theta = V$

So, $V = \frac{1}{\cos\theta} + \frac{1}{\sin\theta}$

$= \frac{\sin\theta + \cos\theta}{\sin\theta\cos\theta}$

$V = \frac{p}{\sin\theta\cos\theta}$

Now, $\sin\theta + \cos\theta = p$

squaring, we get

$\sin^2\theta + \cos^2\theta + 2\sin\theta.\cos\theta = p^2$

$\therefore \quad \sin\theta.\cos\theta = \frac{p^2-1}{2}$

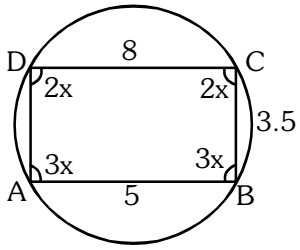
So, $V = \frac{2p}{p^2-1}$

167. Angles A, B, C and D of a cyclic quadrilateral ABCD are in the ratio 3 : 3 : 2 : 2 respectively. If AB = 5 cm, BC = 3.5 cm and CD = 8 cm, then the length of AD is

(1) 5 cm (2) 3.5 cm (3) 8 cm (4) 4 cm

Ans. (2)

Sol.



As, base angles are equal and sum of all angle = 360°

So, 10x = 360°

x = 36°

$\therefore$ angles are = 108°, 108°, 72°, 72°

Now, $\angle A + \angle D = 5x = 5 \times 36° = 180°$

$\therefore$ AB | | CD (co-interor angles)

and base angles are equal so, it must be isosceles tranpezium

$\therefore$ AD = BC = 3.5 cm

168. The median of certain observation 17, 18, 23, 27, x – 3, x + 5, 45, 49, 74 and 85, arranged in ascending order is 35. Later on, it was found that one observation 72 was misread as 27 by mistake. The correct median of the data is :

(1) 36 (2) 38 (3) 42 (4) 47

Ans. (3)

Sol. 17, 18, 23, 27, x – 3, x + 5, 45, 49, 74, 84 ; median = 35

So, $\frac{x-3+x+5}{2} = 35$

$\Rightarrow$ 2x + 2 = 70

2x = 68

x = 34

So, if 27 is replaced by 72.

order will be 17, 18, 23, 31, 39, 45, 49, 72, 74, 84

Median = $\frac{39+45}{2} = \frac{84}{2} = 42$

169. The sides of triangle are 61 cm, 54 cm and 35 cm respectively. The length of its longest altitude is :

(1) $10\sqrt{5}$cm (2) $16\sqrt{5}$cm (3) $24\sqrt{5}$cm (4) $28\sqrt{5}$cm

Ans. (3)

Sol. Longest altitude is always corresponds to shortest side.

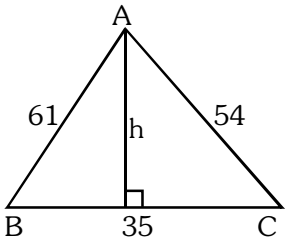
$S = \frac{61+54+35}{2} = 75$

Area = $\sqrt{75\times14\times21\times40}$

$= \sqrt{25\times3\times7\times2\times7\times3\times4\times2\times5}$

$= 5\times7\times3\times2\times2\times\sqrt{5}$

$= 420\sqrt{5}$ cm^2



So, $420\sqrt{5} = \frac{1}{2}\times35\times h$

$h = \frac{840\sqrt{5}}{35} = 24\sqrt{5}$ cm

170. A bag contains two coins. One of them is a regular coin whereas the other has tails on both sides. From this bag, a coin is picked at random and tossed. Then, the probability of getting a head is :

(1) 0 (2) $\frac{1}{4}$ (3) $\frac{1}{2}$ (4) $\frac{3}{4}$

Ans. (2)

Sol. Probability of taking out 1 coin having head on it = $\frac{1}{2}$

Now, P(H) = $\frac{1}{2}$

So, total probability = $\frac{1}{2}\times\frac{1}{2} = \frac{1}{4}$

171. a and b are roots of a quadratic equation $x^2 + 5x + d = 0$, while a and c are the roots of the quadratic equation $x^2 + 6x + 2d = 0$. If there is only one common root in the two equations, then value of d is :

(1) –2 (2) –4 (3) 2 (4) 4

Ans. (4)

Sol. a & b are roots of equation $x^2 + 5x + d = 0$

So, $a + b = -5$ .....(i)

$ab = d$ .....(ii)

and, a & c are root of equation $x^2 + 6x + 2d = 0$

So, $a + c = -6$ .....(iii)

$ac = 2d$ .....(iv)

Form (ii) & (iv), we get

$ac = 2ab$

$\boxed{c = 2b}$

Now, from (iii), we get

$$\begin{array}{r} a + 2b = -6 \\ \_\ a \pm b = \mp 5 \\ \hline b = -1 \end{array}$$

Now, $c = -2$, $a = -4$

So, $d = ab = -4 \times -1 = 4$

172. The mean, mode and the median of the observations 7, 7, 5, 7 and x are the same. Then the observation x is:

(1) 10 (2) 9 (3) 8 (4) 7

Ans. (2)

Sol. Mean $= \frac{7+7+5+7+x}{5} = \frac{26+x}{5}$

Mode = 7, Median = 7

So, $\frac{26+x}{5} = 7$

$\Rightarrow 26 + x = 35$

$\boxed{x = 9}$

173. ABC is a right angled triangle, right angled at B. If D and E are points on side AB such that AD = DE = EB, then the value of $\frac{AC^2 - EC^2}{DC^2 - BC^2}$ is :

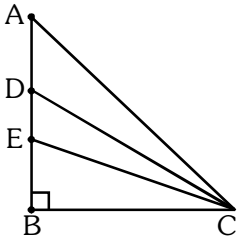
(1) $\frac{3}{1}$ (2) $\frac{5}{2}$ (3) $\frac{9}{4}$ (4) $\frac{2}{1}$

Ans. (4)

Sol. So, $\frac{AC^2 - EC^2}{DC^2 - BC^2} = \frac{AB^2 + BC^2 - BE^2 - BC^2}{BD^2 + BC - BC^2}$

$\Rightarrow \frac{AC^2 - EC^2}{DC^2 - BC^2} = \frac{AB^2 - BE^2}{BD^2}$

$= \frac{(3BE)^2 - BE^2}{(2BE)^2} = \frac{8BE^2}{4BE^2} = \frac{2}{1}$



174. Which one of the following is made of only one type of macromolecule ?

(1) Virus (2) Plasmid (3) Nucleosome (4) Ribosome

Ans. (2)

Sol. Plasmid is makeup of only one type of macromolecule (DNA).

175. Among carbohydrates, lipids, proteins and ATP, the relative energy yield in kcal/gm is best represented by ;

(1) Lipids > Carbohydrates > ATP (2) ATP > Lipids > Proteins

(3) Lipids >ATP > Carbohydrates (4) Lipids > Proteins > ATP

Ans. (1)

Sol. In Kcal/gm relatively highest amount of energy is produced from Lipids > Carbohydrates > ATP.

176. The sub units of ribosomes in cells of nephron of mouse are

(1) 50S & 30S (2) 40S & 23S (3) 70S & 16S (4) 60S & 40S

Ans. (4)

Sol. Ribosomes present in nephron of mouse are 80S type and is madeup of 60S and 40S subunits.

177. Involuntary muscles are not found in

(1) Iris (2) bronchi of lung (3) tongue (4) heart

Ans. (3)

Sol. Involuntary muscles are not found in tongue.

178. Different microorganisms taking part in nitrogen cycle are

(i) Rhizobium in roots (ii) Ammonifying bacteria

(iii) Nitrifying bacteria (iv) Denitrifying bacteria

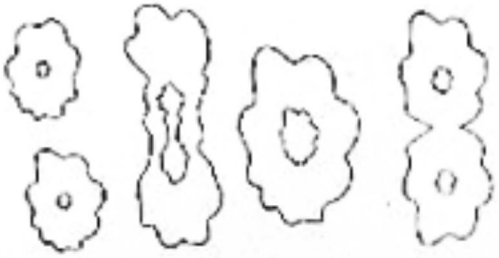
Which of them strictly work under anaerobic conditions ?

(1) only iv (2) i & iv (3) i, ii & iv (4) ii & iv

Ans. (2)

Sol. Rhizobium and denitrifying bacteria (Pseudomonas) stricktly work under anaerobic conditions.

179. The following pictures were drawn by a student to show different stages of binary fission



(i) (ii) (iii) (iv)

The correct sequence of these figures is :

(1) iii, ii, iv, i (2) iii, iv, ii, i (3) ii, iii, iv, i (4) iv, iii, ii, i

Ans. (1)

Sol. This picture represent binary fission in Amoeba and correct sequence is (iii, ii, iv, i)

180. Which of the following is not strictly considered as a part of neuron ?

(1) Dendrite (2) Myelin sheath (3) Axon (4) Cell body

Ans. (2)

Sol. Dendrite, Axon and cell body are the parts of neuron but myelin sheath is not strictly considered as a part of neuron as neuron can be both myelinated and non myelinated.

181. Which of the following statement about autotrophs is incorrect ?

(1) They synthesize carbohydrates from carbon dioxide and water.

(2) They store carbohydrates in the form of starch.

(3) They convert water & CO_2 into carbohydrate only in the absence of light.

(4) They constitute first trophic level in the food chain.

Ans. (3)

Sol. Autotrophs synthesize carbohydrates from CO_2 and H_2O in presence of light known as photosynthesis.

182. Correct pathway of blood in circulatory system is

(1) atria → ventricles → artery → veins

(2) ventricles → atria → veins → arteries

(3) ventricles → veins → atria → arteries

(4) atria → arteries → ventricles → veins

Ans. (1)

Sol. In circulatory system blood flows from atria to ventricles. From ventricles it is pumped to arteries to various parts of the body then returns back to heart through veins.

183. Which of the following is essential for formation of thyroxine hormone in the thyroid gland ?

(1) Sodium (2) Chloride (3) Potassium (4) Iodine

Ans. (4)

Sol. Iodine is essential for formation of thyroxine hormone in the thyroid gland.

184. In a given food chain if frog has 100 J of energy then the energy available with plants and snake respectively will be :

Plants - Insect - Frog - Snake

(1) 1000 J and 10 J (2) 10000 J and 10 J (3) 10 J and 1000 J (4) 1000 J and 100 J

Ans. (2)

Sol. According to ten percent law of energy transfer in a food chain if frog has 100J of energy than the energy in plants will be 10,000J and it will be 10J in snake.

185. Characters that are transmitted from parents to offspring during reproduction show :

(1) Only similarities with parents

(2) Only variations with parents

(3) Both similarities and variation with parents

(4) Neither similarities nor variations with parents

Ans. (3)

Sol. The characters that are transmitted from parents to offspring show both similarities and variation with parents.

186. Rajiv was absent in class due to muscle pain which he claims was due to excess of physical exercise he has done yesterday. The pain is due to :

(1) Formation of Pyruvic Acid

(2) Formation of Acetic Acid

(3) Formation of Lactic Acid

(4) Formation of Hydrochloric Acid

Ans. (3)

Sol. During anaerobic respiration in skeletal muscles lactic acid is formed which causes muscle cramps.

187. Which of the following constitutes a good food chain ?

(1) Grass, Wheat, Mango (2) Grass, Goat, Lion (3) Goat, Cow, Elephant (4) Grass, Fish, Goat

Ans. (2)

Sol. In a grazing food chain correct sequence of transfer of energy is Grass → Goat → Lion where grass is eaten by goat which is eaten by lion.

188. Trippling the speed of a motor car multiplies the distance needed for stopping it by

(1) 3 (2) 6 (3) 9 (4) 12

Ans. (3)

Sol. Let us consider deacceleration of the car is same in both cases.

$v^2 - u_1^2 = 2as_1$

$0 - u_1^2 = 2(-9)s_1$

$s_1 = \frac{u_1^2}{2a}$

$u_2 \rightarrow 3u$

$v^2 - u^2 = 2as$

$0 - 9u_1^2 = 2(-9)s_2$

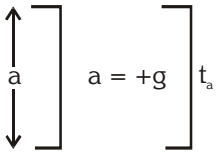
$s_2 = 9s_1$

189. Two bodies of masses m_a and m_b are dropped from different height 'a' and 'b'. The ratio of time taken by them to reach the ground is

(1) $\sqrt{a} : \sqrt{b}$ (2) a : b (3) $\frac{1}{a} : \frac{1}{b}$ (4) $m_a : m_b$

Ans. (1)

Sol. $a = ut_a + \frac{1}{2}at_a^2$

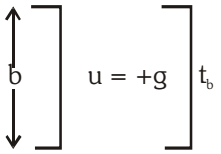


$a = 0 + \frac{1}{2}gt_a^2$

$2a = gt_a^2$

$t_a = \sqrt{\frac{2a}{g}}$ .....(1)

$b = ut_b + \frac{1}{2}at_b^2$



$b = 0 + \frac{1}{2}gt_b^2$

$t_b = \sqrt{\frac{2b}{g}}$ .....(2)

Equation 1 is divided by 2

$\frac{t_a}{t_b} = \frac{\sqrt{a}}{\sqrt{b}}$

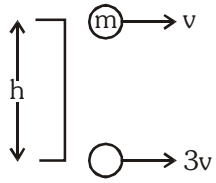
$\boxed{t_a : t_b = \sqrt{a} : \sqrt{b}}$

190. A person throws ball with a velocity 'v' from top of a building in vertically upward direction. The ball reaches the ground with a speed of '3v'. The height of the building is

(1) $\frac{4v^2}{g}$ (2) $\frac{3v^2}{g}$ (3) $\frac{6v^2}{g}$ (4) $\frac{9v^2}{g}$

Ans. (1)

Sol.



$a = +g$

$v^2 - u^2 = 2 \times g \times h$

$(3v)^2 - v^2 = 2 \times g \times h$

$h = \frac{9v^2 - v^2}{2g}$ $h = \frac{8v^2}{2g}$ $h = \frac{4v^2}{g}$

191. A bottle full of water containing an air bubble is rotated in horizontal circle by a string tied to the neck of the bottle. Then air bubble will

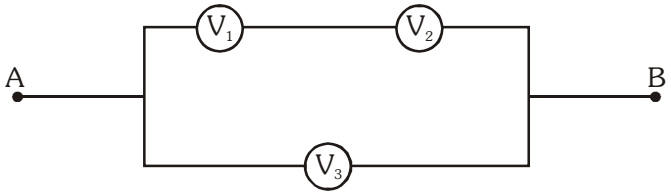
(1) be collected at bottom (2) remain unaffected

(3) be collected at the wall of bottle (4) be collected at the neck

Ans. (4)

Sol. First bubble rises up and due to rotation of bottle liquid will concentrated towards the bottom so air bubble move towards low pressure zone which means air bubble will be collected at the neck.

192. Three voltmeters all having different resistances are joined as shown. When some potential difference is applied across A and B, then readings in voltmeter are V_1, V_2 and V_3



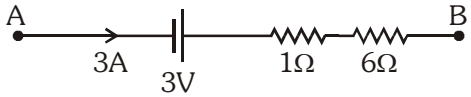
(1) $V_1 = V_2$ (2) $V_1 < V_2$ (3) $V_3 + V_2 = V_3$ (4) $V_1 + V_2 > V_3$

Ans. (3)

Sol. Potential at the terminals is same so

$\boxed{V_1 + V_2 = V_3}$

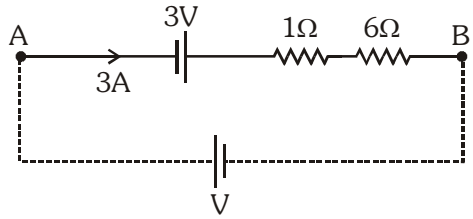
193. What is potential difference across AB?

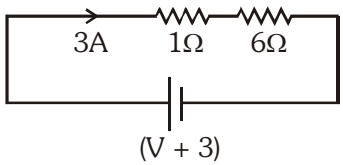


(1) 24 V (2) 0 V (3) 6 V (4) 18 V

Ans. (4)

Sol.





$(V + 3) = 3 \times 7$

$V + 3 = 21$

$V = 18$ V

194. Three equal resistors connected in series across a source of emf dissipate 10 watt. If the same resistors are connected in parallel across the same emf, the power dissipated will be

(1) 10 watt (2) 30 watt (3) $\frac{10}{3}$ watt (4) 90 watt

Ans. (4)

Sol. For series connection

$$H = \frac{V^2}{R_{ser}}t \qquad 10 = \frac{V^2}{3R}t \qquad \frac{V^2t}{R} = 30$$

For parallel connection

$$H = \frac{V^2}{R_p}t = \frac{V^2}{R/3}t = 3\left(\frac{V^2t}{R}\right) = 3\times 30$$

H = 90 watt

195. A long wire carries a steady current. It is then bent into a circle of one turn and magnetic field at the centre of coil is B. Then it is bent into n-turns. Magnetic field at centre of coil will be

(1) $2n^2B$ (2) 2nB (3) n^2B (4) nB

Ans. (3)

Sol. Case-1 : When 1 turn is done

$$B = \frac{\mu_0 I}{4\pi R} \qquad \text{.....(1)}$$

Case-2 : When N turns is done

$2\pi r \times n = 2\pi R$

$R = nr$

$$B' = \frac{\mu_0 I}{2r} = n\frac{\mu_0 I}{2R}\times n = n^2B$$

196. If 'p' and 'q' are distance of object and image from principal focus of a concave mirror then what is the relation between 'p', 'q' and 'f'?

(1) $pq = \sqrt{f}$ (2) pq = f (3) $pq = f^2$ (4) $pq = \frac{1}{f}$

Ans. (3)

Sol. $u = -(p + f)$

$v = -(q + f)$

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

$$\frac{1}{-(p+f)}+\frac{1}{-(q+f)}=\frac{1}{-f}$$

$$\frac{1}{p+f}+\frac{1}{q+f}=\frac{1}{f}$$

$$\frac{q+f+p+f}{(p+f)(q+f)}=\frac{1}{f}$$

$$\frac{2f+p+q}{f^2+pf+qf+pq}=\frac{1}{f}$$

$2f^2 + pf + qf = f^2 + pf + qf + pq$

$f^2 = pq$

$f = \sqrt{pq}$

197. When the object is at distance u_1 and u_2 from a lens a real and virtual images are formed respectively having the same magnification. The focal length of lens is

(1) $u_1 + \frac{u_2}{2}$ (2) $\frac{u_1 - u_2}{2}$ (3) $\frac{u_1 + u_2}{2}$ (4) $u_1 + u_2$

Ans. (3)

Sol. $m = \frac{v}{u}$

$m \rightarrow +ve \rightarrow$ Virtual and erect image

$m \rightarrow -ve \rightarrow$ Real and inverted image

$$m = \frac{v}{u} = \frac{-f}{u_1 - f} = \frac{f}{u_2 - f}$$

$-u_2 + f = u_1 - f$

$2f = u_1 + u_2$

$$f = \frac{u_1 + u_2}{2}$$

198. A pump motor is used to deliver water at a certain rate from a given pipe. To obtain twice as much water from the same pipe in same time, power of motor has to be increased.

(1) 16 times (2) 4 times (3) 8 times (4) 2 times

Ans. (4)

Sol. $P = \frac{W}{t}$

$W = P \times t$

$mgh = P \times t$

$P \propto m$

to obtain twice as much water from the pipe the power of the motor has to increased by 2 times.

199. Ultrasonic, infrasonic and audiowaves travel through a medium with speeds v_1, v_2 and v_3 respectively. Then

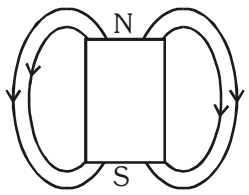
(1) v_1, v_2 and v_3 are nearly equal (2) $v_1 \geq v_3 \geq v_2$

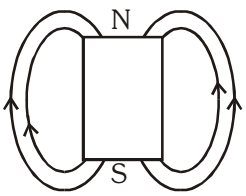
(3) $v_1 \leq v_3 \leq v_2$ (4) $v_3 << v_1$ and $v_1 = v_2$

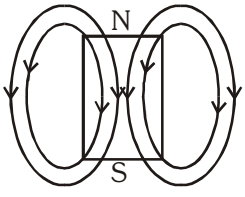
Ans. (1)

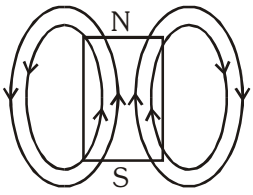
Sol. Speed of ultrasonic. Infrasonic and audiowaves are nearly equal.

200. The magnetic field lines due to a bar magnet are correctly shown in

(a) 

(b) 

(c) 

(d) 

(1) a (2) b (3) c (4) d

Ans. (4)

Sol. The magnetic field lines due to the bar magnet is from North to south from outside and south to north inside the magnet.