NATIONAL TALENT SEARCH EXAMINATION (NTSE-2019) STAGE -1

STATE : UTTAR PRADESH PAPER : SAT

Date: 04/11/2018

Max. Marks: 100 **SOLUTIONS** **Time allowed: 120 mins**

101. An object is placed at the centre of curvature of concave mirror. Its image is formed at-

(1) infinte (2) centre of curvature

(3) principal focus (4) pole of the concave mirror

Ans. (2)

Sol. When an object is placed at the centre of curvature of a concave mirror, the image formed is also at the centre of curvature. The distance between the image and the pole is equal to the radius of curvature of the mirror.

102. In a conducting wire 15 coulomb charge flows in 5 second, The current flowing in conductor is-

(1) 3 Ampere (2) 5 Ampere (3) 15 Ampere (4) 75 Ampere

Ans. (1)

Sol. I = Q/t

I = 15 Coulomb/5 second

I = 3 Ampere

103. The image of an object is formed by the human eye at its

(1) cornea (2) iris (3) pupil (4) retina

Ans. (4)

Sol. Retina acts as a screen in functioning of human eye.

104. One Kilowatt hour is equal to

(1) 1 Kilojoule (2) 36 Kilojoule (3) 3600000 Joule (4) 360000 Joule

Ans. (3)

Sol. 1 kW for 1 hour =1kWh = 1000 ×Wh = 1000 ×3600 Wsec = 3600000 joule

105. The device used for producing electric current is called

(1) generator (2) galvanometer (3) ammeter (4) motor

Ans. (1)

Sol. Generator is a device that works by rotating a wire coil within a magnetic field to produce electric current.

106. Light enters from air to glass. If refractive index of glass is 1.5 and speed of light in air 3×10^8 m/s. Then speed of light in glass will be

(1) 4.5×10^8 m/s (2) 3.0×10^8 m/s (3) 1.5×10^8 m/s (4) 2.0×10^8 m/s

Ans. (4)

Sol. The refractive index of a medium with respect to vacuum is n = c/v (where c is the speed if light in vaciuum and v is the speed of light in medium.

Here, n = 1.5 , c = 3×10^8 . (n is the refractive index of medium glass with respect to vacuum.)

v = c/n

v = $(3 \times 10^8)/1.5$

v = 2×10^8 m/s

107. An electric bulbs is rated 220 V and 100 W. It is operated on 110 V, then the power consumed will be

(1) 100 watt (2) 75 watt (3) 25 watt (4) 50 watt

Ans. (3)

Sol. $P = V^2/R$

If V = 220 V we have

$100\ W = 220^2/R$

$R = 220^2/100\ \Omega = 484\ \Omega$. This is the resistance of the bulb.

When V = 110 V, power consumed = $V^2/R = 110^2/484 = 25$ W.

So, 25 W power is consumed when it is operated on 110 V.

108. The focal length of a convex lens is 20 cm. Its power is-

(1) 20 dioptre (2) 5 dioptre (3) 1/5 Dioptre (4) 1/20 dioptre

Ans. (2)

Sol. f = 20 cm = 0.2 m

$P = 1/f$

$= 1/0.2 = +5$

Power of convex lens is +ve and its magnitude is 5 Dioptre.

109. An object is placed at a distance of 10 cm from a convex mirror of focal length 15 cm. The distance of image from the mirror is-

(1) 15 cm (2) 10 cm (3) 6 cm (4) 4 cm

Ans. (3)

Sol. Given, u = –10 cm ; f = 15 cm ; v = ?

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

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

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

$$v = \frac{30}{5} = 6 \text{ cm}$$

110. If the velocity of sound in air is 340 m/sec and x is the minimum distance between sound source and reflecting surface to get echo from general sound, then-

(1) x = l7m (2) 51 m (3) x = 34 m (4) 68 m

Ans. (1)

Sol. The perception of a sound usually endures in memory for only 0.1 seconds

so, minimum time for echo = 0.1 sec

Here, distance = x

sound have to travel, from listener to reflector then to listener

so total distance travelled = 2x

now, distance = speed×time = 340 ×0.1

$\Rightarrow 2x = 34$

$\Rightarrow x = 17$ m

111. Which of the following cell is used in the communication satellite-

(1) Dry cell (2) Solar cell (3) Voltaic cell (4) Daniel cell

Ans. (2)

Sol. Solar cells are used to provide power when the satellite is in sunlight. These normally consist of large arrays of solar cells often on extended arms. Some satellites may just be covered in solar cells to reduce the overall footprint of the satellite.

112. If V_1 and V_2 are the volume of one gm water at 0℃ and 4℃ respectively, then-

(1) $V_1 > V_2$ (2) $V_1 = V_2$ (3) $V_1 < V_2$ (4) $V_1 \leq V_2$

Ans. (1)

Sol. At 4℃ density of water is maximum due to anomalous expansion of water. Below 4℃ its density will start decreasing and hence volume of water at 4℃ will be less than the volume of water at 0℃.

113. A piece of wire of resistance R is cut into 5 equal parts. These parts are then connected in parallel. It the equivalent resistance of this combination is R^1 then the ratio R/R^1 is

(1) $\frac{1}{25}$ (2) 5 (3) $\frac{1}{5}$ (4) 25

Ans. (4)

Sol. Resistance of a piece of wire is proportional to its length. A piece of wire has a resistance R. The wire is cut into five equal parts. Therefore, resistance of each part = R/5

All the five parts are connected in parallel.

$\therefore$ equivalent resistance (R') is given as

1/R' = 1/R/5 + `1/R/5 + 1/R/5 + 1/R/5 + 1/R/5

1/R' = 25/R

R/R' = 25

114. The formulae of an oxide of an element M is MO. The formulae of its phosphate is-

(1) $M_3(PO_4)_2$ (2) MPO_4 (3) $M_2(PO_4)_3$ (4) M_3PO_4

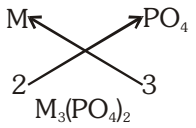
Ans. (1)

Sol. Metal oxide is given as MO

As the valency of Oxygen is 2. So valency of M should be 2.

Valency of Phosphate is 3 and

So the formula of metal phosphate will be $M_2(PO_4)_3$



115. Dry ice is-

(1) Freon (2) Liquid Chlorine (3) Solid Carbon dioxide (4) Plaster of Paris

Ans. (3)

Sol. Dry ice is solid CO_2.

116. Which of the following has the maximum electronegativity?

(1) Cl (2) F (3) Br (4) I

Ans. (2)

Sol. The smaller the element, higher is its nucleus's attraction towards the outer shell. Thus, more will be the electro negativity. And here Fluorine is the first member of the halogen series. So fluorine has highest electronegativity.

117. The metal oxide which decomposes on heating-

(1) ZnO (2) Al_2O_3 (3) MgO (4) HgO

Ans. (4)

Sol. Metal oxides can be decomposed by heat to give the metal and oxygen. This is true of every metal oxide. The more reactive the metal is (the higher in the Electro Chemical Series), the higher the temperature required to do this. For metals like aluminium, magnesium and zinc the temperature is many thousands of degrees Celsius is require. The temperature of a Bunsen flame allows some metal oxides lower in the Electro Chemical Series to undergo thermal decomposition. This is mercury oxide (HgO).

118. Cinnabar is an ore of which metal-

(1) Al (2) Cu (3) Hg (4) Zn

Ans. (3)

Sol. Cinnabar is HgS

119. The functional group of ethanal is-

(1) > C = O (2) –CHO (3) –OH (4) –COOH

Ans. (3)

Sol. It is -CHO

120. The pH value of pure water is-

(1) 0 (2) 14 (3) 1 (4) 7

Ans. (4)

Sol. Pure water is neutral and ionises very slightly to yield equal number of hydronium(H_3O^+) and hydroxyl (OH^-) ions.

The concentration of hydronium (H_3O^+) ions in water is 10^{-7} moles/litre at 25°C

Therefore, pH for water = log(1/H^+ ions) = log[1/10^{-7})] = 7

121. The IUPAC name of C_2H_5OH is-

(1) Ethanol (2) Methanol (3) Methanal (4) Ethanal

Ans. (1)

Sol. Ethanol

122. In which of the following oxalic acid is found naturally?

(1) Curd (2) Tamarind (3) Tomato (4) Lemon

Ans. (3)

Sol. Tomato

123. 15 ml of NaOH solution Gets complete neutrilised with 10 ml of HCl solution What volume of the same HCl solution will be required to neutrilised 30 ml of same NaOH solution?

(1) 5 ml (2) 10 ml (3) 15 ml (4) 20 ml

Ans. (4)

Sol. balanced chemical equation:

NaOH(aq) + HCl(aq) → NaCl(aq) + H2O(ℓ)

15 ml of NaOH neutralizes 10 ml of HCl

From statement we can infer that 1 mol of NaOH reacts with 1 mol of HCl. This means,

nNaOH=nHCl

Let the concentration and volume of NaOH and HCl be C_1V_1 and C_2V_2 respectively.

Since, n= C ×V

$C_1V_1 = C_2V_2$

$C_1 \times 15 = C_2 \times 10$

$C_2 = C_1 \times (15/10)$

$C_2 = 3/2\ C_1$

So, the concentration of HCl is $3/2\ C_1$.

So for the 30 ml of same NaOH solution, The volume of same HCl will be

$C_1V_1 = C_2V_2$

$C_1 \times 30 = C_2 \times V_2$

But $C_2 = 3/2\ C_1$

So, $C_1 \times 30 = 3/2\ C_1 \times V_2$

$V_2 = 20$ ml.

Hence we require 20 ml of HCl of the same concentration to neutralize the 30 ml of NaOH.

124. The chemical formulae of baking Soda is-

(1) NH_4Cl (2) $NaHCO_3$ (3) Na_2CO_3 (4) NaCl

Ans. (2)

Sol. Baking soda- $NaHCO_3$

125. $Fe_2O_3 + 2Al \rightarrow Al_2O_3 + 2\ Fe$

The type of the above reaction is

(1) Addition Reaction (2) Double displacement reaction

(3) Dissociation reaction (4) Displacement reaction

Ans. (4)

Sol. The above reaction is displacement reaction. Al is more reactive than Fe so it can displace Fe from its compound.

126. Aluminium carbide is treated with water, we get-

(1) Ethylene (2) Ethane (3) Methane (4) Acetylene

Ans. (3)

Sol. $Al_4C_3 + 12H_2O \rightarrow 4Al(OH)_3 + 3CH_4$

Methane

127. Number of male gametes present in pollen tube are-

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

Ans. (2)

Sol. In flowering plants, two male gametes are produced from a single pollen grain. One male gamete fuses with egg cell and second male gamete fuses with two polar nuclei.

128. Which of the following is an animal hormone-

(1) Auxin (2) Gibberellin (3) Insulin (4) Abscisic Acid

Ans. (3)

Sol. Insulin is an animal hormone which is produced from pancreas and is responsible for controlling the blood sugar level. Auxin and Gibberellins are plant hormone which stimulate the growth in plant where as Abscisic acid is also plant hormone which act as growth inhibitors.

129. The source of Oxygen released during photosynthesis is-

(1) Carbon dioxide (2) Water (3) Glucose (4) Chlorophyll

Ans. (2)

Sol. Water is the source of oxygen during photosynthesis process. Chlorophyll is pigment which absorbs solar light. This solar energy is used to break water molecule into oxygen and H^+. This process is called as photolysis which occurs in light reaction of photosynthesis.

130. Which of the following is- known 'Currecy of Energy'-

(1) DNA (2) RNA (3) ATP (4) NAD

Ans. (3)

Sol. ATP (Adenosine Tri Phosphate) is known as currency of energy. Glucose is main substrate which is used as energy source during respiration process. Energy is usually liberated from the ATP molecule to do work in the cell by a reaction that removes one of the phosphate groups, leaving adenosine diphosphate (ADP).

131. Food synthesized in leaves is transported by-

(1) Xylem (2) Phloem (3) Cambium (4) Epidermis

Ans. (2)

Sol. Phloem is vascular tissue of plant which is used to transport food from leaf to other parts of body. Xylem is responsible for transport of water from root to leaf. Cambium is the lateral meristem. Epidermis is protective tissue of plant.

132. This organ controls the reflex actions-

(1) Spinal Cord (2) Heart (3) Liver (4) Kidney

Ans. (1)

Sol. Spinal cord is part of CNS which controls reflex action. Heart is muscular organ of CVS which pump the blood in body. Kidney is excretory organ of human.

133. In herbaceous plants 'guttation' takes place by-

(1) Stomata (2) Hydathodes (3) Root hair (4) Flowers

Ans. (2)

Sol. Hydathodes are modified pores, especially on a leaf, which exudes drops of water.

134. Which of the following is also known as the Master gland-

(1) Thyroid gland (2) Parathyroid gland (3) Adrenal gland (4) Pituitary gland

Ans. (4)

Sol. Pituitary gland is known as master gland of body because activity of other endocrine glands is controlled by Pituitary gland. Eg. Pituitary gland produces the TSH (Thyroid Stimulating Hormone) which controls the activity of Thyroid gland in body.

135. Which of the following group of plants also called as naked-seeded plants-

(1) Algae (2) Ferns (3) Gymnosperms (4) Moss

Ans. (3)

Sol. Gymnosperm is type of phanerogamous which has no flowers or fruits, and have "naked" seeds on the surface of scales or leaves. While algae, fungi and moss are the seedless plants which coming under cryptogamous class.

136. Which of the following is the genetic material-

(1) Protein (2) Carbohydrate (3) Vitamin (4) NucleicAcid

Ans. (4)

Sol. Nucleic acid is a complex organic substance present in living cells, especially DNA or RNA, whose molecules consist of many nucleotides linked in a long chain.

137. Who is known as 'father of genetics'-

(1) Johan Gregor Mendel (2) Lamarck (3) Charles Darwin (4) Hugode Vries

Ans. (1)

Sol. Gregor Mendel, the father of genetics, presented his research on experiments in plant hybridization. He used a monastery garden for crossing pea plant varieties having different heights, colors, pod shapes, seed shapes, and flower positions. Mendel's experiments, between 1856 and 1863, revealed how traits are passed down from parents to offsprings.

138. Which of the following food material is made up of fungi-

(1) Chilgoza (2) Mushroom (3) Papaya (4) Mango

Ans. (2)

Sol. Mushroom, is the fleshy, spore-bearing fruiting body of a fungus, typically produced above ground.

139. How many chambers are there in frog's heart-

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

Ans. (3)

Sol. The frog heart has 3 chambers: two atria and a single ventricle. Human has 4 chambered heart, two atria and two ventricles. Fish has 2 chambered heart, one atria and one ventricle.

140. Which of the following phytohormone helps in fruit ripening-

(1) Auxin (2) Gibberallin (3) Cytokinin (4) Ethylene

Ans. (4)

Sol. Ethylene is responsible for the changes in texture, softening, color, and other processes involved in ripening. Auxin promote stem elongation, inhibit growth of lateral buds (maintains apical dominance). Gibberellins are growth hormones that stimulate cell elongation and cause plants to grow taller. Cytokinins (CK) are a class of plant hormones that promote cell division, or cytokinesis, in plant roots and shoots.

141. The sixteen Mahajanpadas a mentioned in-

(1) Mahabharat (2) Ramayana (3) Anguttar Nikaya (4) Lalit Vistar

Ans. (3)

142. Who was the first muslim President Indian National Congress-

(1) Abul Kalam Azad (2) Shaukat Ali (3) Mohammad Ali Jinna (4) BadruddinTyabji

Ans. (4)

Sol. Badruddin Tyabji was the first Muslim President of Indian National Congress.

143. The author of "Hind Swaraj" was -

(1) B. G. Tilak (2) Mahatma Gandhi

(3) Bankim Chandra Chatterji (4) Subhas Chandra Bose

Ans. (2)

Sol. Mahatma Gandhi wrote the book called Hind Swaraj in the year 1909. It expresses his views on swaraj.

144. Father of history is called-

(1) Dymekus (2) Talmy (3) Herodotus (4) None of the above

Ans. (3)

Sol. Herodotus Greek Historian is called as the father of History.

145. Ashtadhyayi is composed by-

(1) Patanjali (2) Panini (3) Kalhar (4) Kalidas

Ans. (2)

Sol. Panini an ancient Sanskrit philologist, grammarian wrote Astaadhyayi.

146. Satyamav Jayate is taken from-

(1) Vedas (2) Mundkopanishad (3) Aranyak (4) Smrities

Ans. (2)

Sol. Satymev Jayte is a mantra in Sanskrit language from ancient Indian scripture Mundaka Upanishad which means Truth alone Triumphs.

147. Old name of Mahabharat is-

(1) Vijay Samhita (2) Parajay Samhita (3) Jay Samhita (4) None of the above

Ans. (3)

Sol. The original text authored by Vyasa was called Jaya Samhita which mentioned only the core invents of Mahabharata.

148. The capital of Vatsamahajanpad was-

(1) Champa (2) Ujjain (3) Kaushambi (4) Patliputra

Ans. (3)

Sol. Kausambi was the capital of Vatsamahajanapada.

149. Red Planet is called-

(1) Mercury (2) Mars (3) Venus (4) Jupiter

Ans. (2)

Sol. Mars is often called the Red Planet which is due to the rust in the Martian rocks and it appears in the sky as an orange red star.

150. Which state has largest coastal line—

(1) Maharashtra (2) Tamil Nadu (3) Kerala (4) Gujarat

Ans. (4)

Sol. Gujarat is the state which has the longest mainline coastline of 2094 km in India.

151. Inkalab Jindabad slogan given

(1) Jawahar Lal Nehru (2) Mahatma Gandhi (3) Sardar Bhagat Singh (4) Subhash Chandra Bose

Ans. (3)

Sol. Sardar Bhagat Singh the young revolutionary of India gave the slogan Inkalab Zindabad .

152. In which year planing commission trartsfarm in Niti Commission-

(1) 2014 A.D. (2) 2015 A.D. (3) 2013 A.D. (4) 2016 A.D.

Ans. (2)

Sol. The Planning Commission transformed into Niti Commission in the year 2015 under the guidance of Prime Minister Narendra Modi.

153. National Song is taken by-

(1) Geetanjali (2) Anandmath (3) Kamayani (4) None of the above

Ans. (2)

Sol. The National Song Vande Matram was written by Bankim Chandra Chatterjee in 1870, which is included in his novel Anandmath.

154. National farmer commission established on-

(1) 2004 A.D (2) 2006 A. D (3) 2001 A.D (4) 2008 A. D

Ans. (1)

Sol. The National Farmers Commission was established in the year 2004, by the Government of India.

155. State flower of Uttar Pradesh is-

(1) Bramh Kamal (2) Palash (3) Rose (4) Burans

Ans. (2)

Sol. Palash is the State flower of Uttar Pradesh.

156. Siraj of east is called-

(1) Varanasi (2) Gorakhpur (3) Baliya (4) Jaunpur

Ans. (4)

Sol. Jaunpur is called as Siraj as it is located in the North-west of the district of Varanasi in the eastern part of the North Indian state Uttar Pradesh.

157. National Youth day associated with-

(1) Rajiv Gandhi (2) Swami Vivekanand (3) Dara Singh (4) Devanand

Ans. (2)

Sol. Swami Vivekanand`s Birthday is associated as National Youth`s day which is celebrated on 12 Januray.

158. Green revolution associated with-

(1) Dr. Verghese Kurien (2) Dr. M. S. Swaminathan

(3) Dr. Salim Ali (4) Dr. Yashpal

Ans. (2)

Sol. Green Revolution is associated with Dr. M.S. Swaminathan

159. Fibre of gold is called-

(1) Silk (2) Jute (3) Cotton (4) None of the above

Ans. (2)

Sol. Jute is called as the Golden Fibre as it is naturally fibre with golden and silky shine

160. Smallest National highway is-

(1) N.H-7 (2) N.H-47A (3) N.H-76 (4) N.H-30

Ans. (2)

Sol. National Highway 47A is the shortest highway in India. It has a length of 6kms, as it links the made isle of Willington Island with Kochi byepass.

161. Dudhawa National Park is situated at-

(1) Uttrakhand (2) Bihar (3) Jharkhand (4) Uttar Pradesh

Ans. (4)

Sol. Dudhawa National park is situated in Uttar Pradesh.

162. Total Number of Rajya Sabha is-

(1) 245 (2) 230 (3) 260 (4) 255

Ans. (1)

Sol. 245 members can be in Rajya Sabha.

163. Which Highcourt has highest number of Judges-

(1) Allahabad (2) Jabalpur (3) Patna (4) Kolkata

Ans. (1)

Sol. Allahabad has the highest number of judges in the High court.

164. How many state has legislative council-

(1) 5 (2) 6 (3) 7 (4) 4

Ans. (3)

Sol. Out of 29 states there are 7 states which has Legislative Council and they are Andhra Pradesh, Jammu and Kashmir, Bihar, Karnataka, Maharashtra , Telangana and Uttar Pradesh.

165. Annapurana scheme when started-

(1) 2002 A.D (2) 2000 A.D (3) 2003 A.D (4) 1998 AD

Ans. (2)

Sol. Annapurna scheme was started in the year 2000 on 1st of April and it aims at providing food security to the senior citizens who are under National Old Age Pension Scheme.

166. Article-356 associated with-

(1) National Emergency (2) Financial Emergency

(3) State Emergency (4) International Emergency

Ans. (3)

Sol. Article 365 is associated as State Emergency when Central Government laws are applicable.

167. Chilka lake is situated in-

(1) Uttar Pradesh (2) Karnatka (3) Tamilnadu (4) Oddisa

Ans. (4)

Sol. Chilika lake is situated in Odisha.

168. Domodar is a tributary river-

(1) Ganga (2) Hugli (3) Yamuna (4) Suravan Rekha

Ans. (2)

Sol. Damodar is the tributary of river Hugli as it meet in West Bengal.

169. Titan is the largest moon or satellite of—

(1) Mars (2) Venus (3) Jupiter (4) Saturn

Ans. (4)

Sol. Titan is the largest moon of Saturn.

170. The richest bio-diversity is found in-

(1) Kashmir Vally (2) Silant Vally (3) Surma Vally (4) Vally of flowers

Ans. (2)

Sol. The richest bio-diversity is found in the Silant Vally.

171. International ozone day is celebrated on-

(1) 16th September (2) 7th December (3) 21st March (4) 22nd April

Ans. (1)

Sol. International Ozone Day is celebrated on 16th September.

172. When the wild life protection Act was passed-

(1) 1965 (2) 1970 (3) 1972 (4) 1977

Ans. (3)

Sol. The Wildlife Protection act was passed in the year 1972.

173. The coast areas of which of the following oceans are called ring of fire—

(1) Atlantic Ocean (2) Pacific Ocean (3) Indian Ocean (4) None of the above

Ans. (2)

Sol. The Coastal areas of Pacific Ocean are called as the Ring of Fire as there are lot of Volcanoes found.

174. As per 2011 census the dencely populated state of India is-

(1) Arunachal Pradesh (2) Sikkim (3) Mizoram (4) Bihar

Ans. (NA)

Sol. As per the 2011 census report the densely populated state in India is Bihar (there is a difference between hindi and english version so answer should be bonus).

175. Which state grow more soyabeen-

(1) Kerala (2) Maharashtra (3) Madhya Pradesh (4) Punjab

Ans. (3)

Sol. Madhya Pradesh is the state which grows Soyabean.

176. Green revolution mainly associated with

(1) Millets Production (2) Pulse Production

(3) Wheat Production (4) Oil Seed (Tilhan) Production

Ans. (3)

Sol. Green Revolution is associated with the production of Wheat.

177. The President of India can nominate-

(1) 10 members to Rajya Sabha (2) 02 members to Rajya Sabha

(3) 15 members to Rajya Sabha (4) 12 members to Rajya Sabha

Ans. (4)

Sol. The President of India can nominate 12 members to the Rajya Sabha.

178. The 52nd amendment to the constitution of India deals with-

(1) Reservation (2) Defection (3) Election (4) Protection of Minorities

Ans. (2)

Sol. The 52^{nd} amendment to the constitution of India deals with Defection.

179. Who among the following belived and Iron policy—

(1) Aibak (2) Balban (3) Razia (4) lltutmish

Ans. (2)

Sol. Balban believed in Blood and Iron policy.

180. The department of public work established for the first time by-

(1) Alauddin Khalji (2) Balban (3) Firozshah Tughlag (4) lltutmish

Ans. (3)

Sol. Firozshah Tughlaq established Public Works for the first time.

181. Find the zeroes of the polynomial $2x^3 + 5x^2 - 9x - 18$ if it is given that the product of its two zeroes is 3 -

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

Ans. (1) Or Bonus (as in english language product of its two zeroes given is 3 instead of –3).

Sol. $2x^3 + 5x^2 - 9x - 18 = P(x)$

for $x = 2$

$P(2) = 2 \times 2^3 + 5 \times 2^2 - 9 \times 2 - 18$

$= 16 + 20 - 18 - 18$

$= 36 - 36$

$= 0$

$\Rightarrow$ $x = 2$ is zero of polynomial P(x)

$\Rightarrow$ $x - 2$ is a factor.

$$x-2 \overline{)\ 2x^3 + 5x^2 - 9x - 18\ (\ 2x^2 + 9x + 9}$$

$$\underline{-2x^3 \mp 4x^2}$$

$$9x^2 - 9x - 18$$

$$\underline{9x^2 - 18x}$$

$$9x - 18$$

$$\underline{9x - 18}$$

$$0$$

$\therefore$ $P(x) = 2x^3 + 5x^2 - 9x - 18$

$= (x - 2)(2x^2 + 9x + 9)$

$= (x - 2)(2x^2 + 6x + 3x + 9)$

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

zero's are 2, –3, $\frac{-3}{2}$

182. If $x = a$, $y = b$ is the solution of the equation $x - y = 2$ and $x + v = 4$ then the values of a and b are respectively-

(1) 3 and 5 (2) 3 and –1 (3) 5 and 3 (4) –3 and –1

Ans. (NA)

Sol. If $x = a$ and $y = b$ then $a - b = 2$ and $a + b = 4$

on adding these equation

we get $2a = 6$,

therefore $a = 3$ and $b = 1$

183. Two vertices of a triangle are (–1, 4) and (5, 2) if the centroid (0, –3) find the third vertex-

(1) (1, 4) (2) (4, 15) (3) (–1, –4) (4) (–4, –15)

Ans. (4)

Sol. $\frac{x_1 + x_2 + x_3}{3} = 0$ and $\frac{y_1 + y_2 + y_3}{3} = 4$

$\frac{-1 + 5 + x_3}{3} = 0$ and $\frac{4 + 2 + y_3}{3} = -3$

$x_3 = -4$ and $y_3 = -15$

184. If $\tan\theta + \sin\theta = m$ and $\tan\theta - \sin\theta = n$ then find the value of $m^2 - n^2$

(1) $4\sqrt{mn}$ (2) 4mn (3) $2\sqrt{mn}$ (4) $\sqrt{mn}$

Ans. (1)

Sol. We have,

$LHS = m^2 - n^2$

$\Rightarrow LHS = (\tan\theta + \sin\theta)^2 - (\tan\theta - \sin\theta)^2$

$\Rightarrow LHS = 4\tan\theta\sin\theta$ $[\because (a+b)^2 - (a-b)^2 = 4ab]$

And,

$RHS = 4\sqrt{nm}$

$\Rightarrow RHS = 4\sqrt{(\tan\theta + \sin\theta)(\tan\theta - \sin\theta)}$

$\Rightarrow RHS = 4\sqrt{(\tan^2\theta - \sin^2\theta}$

$\Rightarrow RHS = 4\sqrt{\frac{\sin^2\theta}{\cos^2\theta} - \sin^2\theta}$

$\Rightarrow RHS = 4\sqrt{\frac{\sin^2\theta - \sin^2\theta\cos^2\theta}{\cos^2\theta}}$

$\Rightarrow RHS = 4\sqrt{\frac{\sin^2\theta(1 - \cos^2\theta)}{\cos^2\theta}}$

$\Rightarrow RHS = 4\sqrt{\frac{\sin^4\theta}{\cos^2\theta}} = 4\frac{\sin^2\theta}{\cos\theta} = 4\sin\theta\frac{\sin\theta}{\cos\theta} = 4\sin\theta\tan\theta$

Thus, we have

$LHS = RHS$, i.e., $m^2 - n^2 = 4\sqrt{mn}$

185. Mean of 35 observation is 75. The mean of first 18 observation is 70 and the mean of last 18 observation is 80 find the 18th observation-

(1) 80 (2) 70 (3) 68 (4) 75

Ans. (4)

Sol. Sum of first 18 observations = $70 \times 18 = 1260$

Sum of last 18 observations = $80 \times 18 = 1440$

Sum of all 35 observations = $75 \times 35 = 2625$

18th observation = $1260 + 1440 - 2625 = 75$

186. If $x = \frac{1}{3-2\sqrt{2}}$ and $y = \frac{1}{3+2\sqrt{2}}$ then find the value of $x + y$

(1) 3 (2) 0 (3) 6 (4) 1

Ans. (3)

Sol. If $x = \frac{1}{3-2\sqrt{2}} \times \frac{3+2\sqrt{2}}{3+2\sqrt{2}}$ and $y = \frac{1}{3+2\sqrt{2}} \times \frac{3-2\sqrt{2}}{3-2\sqrt{2}}$

After rationalization we get $x = 3 + 2\sqrt{2}$ and $y = 3 - 2\sqrt{2}$

Therefore $x + y = 6$

187. The edges of a plane surface are

(1) Lines (2) Points (3) Angles (4) Planes

Ans. (1)

Sol. Edges of any face of finite area of 3-D figures are Line segment. If surface has infinite area then it edges should be called as Lines.

188. If each exterior angle of a regular polygon is 18° find the number of sides of the polygon –

(1) 10 (2) 15 (3) 20 (4) 8

Ans. (3)

Sol. Number of sides of regular polygon are = $\frac{360°}{\text{exterior angle}} = \frac{360°}{18°} = 20$

189. Find mean of $x + 1$, $x + 3$, $x + 4$, $x + 8$ is

(1) $(x + 1)$ (2) $(x + 3)$ (3) $(x + 4)$ (4) $(x + 8)$

Ans. (3)

Sol. Mean = $\frac{(x+1)+(x+3)+(x+4)+(x+8)}{4} = \frac{4x+16}{4} = x + 4$

190. The distance of the point P(–6, 8) from the origin is–

(1) 8 (2) 10 (3) $2\sqrt{7}$ (4) 6

Ans. (2)

Sol. Distance = $\sqrt{(-6-0)^2+(8-0)^2} = \sqrt{36+64} = \sqrt{100} = 10$

191. The ratio of incomes of two persons A and B is 9 : 4 and the ratio of their expenditure is 3 : 1. If each of them manages to save ₹ 1000, then the income of B is–

(1) ₹ 3000 (2) ₹ 4000 (3) ₹ 9000 (4) ₹ 2000

Ans. (NA)

Sol. Let the income of A and B be 9x and 4x

Let the expenditure of A and B be 3y and 1y

Therefore $9x - 3y = 1000$, and $4x - y = 1000$

on solving these equation we get $x = \frac{2000}{3}$

Therefore Income of B = $4x = ₹\frac{8000}{3}$

192. The sum of areas of two squares is 468 cm^2. If the sum of their perimeters is 120 cm, then the difference of their side is –

(1) 1.5 cm (2) 2 cm (3) 4 cm (4) 6 cm

Ans. (4)

Sol. Let sides of squares are 'a' cm and 'b' cm

then $4a + 4b = 120$ and $a^2 + b^2 = 468$

then $a + b = 30$

$(a + b)^2 = a^2 + b^2 + 2ab$

$30^2 = 468 + 2ab$

Therefore $ab = 216$

$(a - b)^2 = (a + b)^2 - 4ab$

$(a - b)^2 = 900 - 864 = 36$

$a - b = 6$

193. The areas of two similar triangles ΔABC and ΔDEF are 48 cm^2 and 12 cm^2 respectively. If EF = 3 cm then BC is –

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

Ans. (1)

Sol. Since ΔABC and ΔDEF are similar

Therefore $\frac{\text{area of } \Delta ABC}{\text{area of } \Delta DEF} = \left(\frac{BC}{EF}\right)^2$

$$\frac{12}{48} = \frac{3^2}{EF^2}$$

$$EF^2 = \frac{48 \times 9}{12} = 36$$

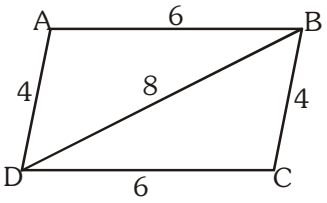
Therefore EF = 6 cm

194. A parallelogram has sides 6 cm and 4 cm and one of its diagonals is 8 cm, then its area is –

(1) 36 cm^2 (2) $3\sqrt{15}\,cm^2$ (3) $6\sqrt{15}\,cm^2$ (4) $12\sqrt{210}\,cm^2$

Ans. (3)

Sol.



If sides 6 cm, 4 cm and diagonal is 8 cm then

area of triangle = $\sqrt{s(s-a)(s-b)(s-c)}$ where s = $\frac{a+b+c}{2}$

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

area of $\Delta ABD = \sqrt{9(9-4)(9-6)(9-8)}$

$= \sqrt{9\times5\times3\times1}$

$= 3\sqrt{15}\,cm^2$

Then Area of Parallelogram = $2 \times 3\sqrt{15} = 6\sqrt{15}\,cm^2$

195. The radii of a right circular cone and a right circular cylinder are in the ratio 4 : 3 and their heights are in the ratio 2 : 3. The ratio of their volumes is –

(1) 32 : 27 (2) 32 : 9 (3) 32 : 81 (4) 27 : 32

Ans. (3)

Sol. Let radius and height of cone be 'r' and 'h'

Let radius and height of cone be 'R' and 'H'

Since r : R = 4 : 3 and h : H = 2 : 3

$$\frac{\text{volume of cone}}{\text{volume of Cylinder}} = \frac{\frac{1}{3}\pi r^2 h}{\pi R^2 H} = \frac{1}{3}\times\left(\frac{r}{R}\right)^2\times\frac{h}{H}$$

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

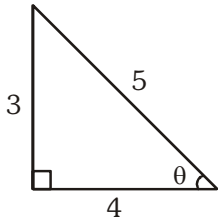
$$\frac{\text{volume of cone}}{\text{volume of Cylinder}} = \frac{32}{81}$$

196. If $\sin\theta = \frac{3}{5}$, then the value of $\sin 2\theta$ is

(1) $\frac{6}{5}$ (2) $\frac{4}{5}$ (3) $\frac{12}{25}$ (4) $\frac{24}{25}$

Ans. (4)

Sol.



If $\sin\theta = \frac{3}{5}$ then $\cos\theta = \frac{4}{5}$ using Pythagoras Theorem

Therefore $\sin 2\theta = 2\sin\theta\cos\theta = 2\times\frac{3}{5}\times\frac{4}{5} = \frac{24}{25}$

197. If a and b are odd integers, then which of the following is an even integer –

(1) ab (2) 2a + b (3) ab + 1 (4) a + 2b

Ans. (3)

Sol. Product of two odd number is odd therefore $a \times b$ = odd

Since 1 is odd

Sum of two odd numbers is even

Therefore ab + 1 = even

198. The sum of $0.\overline{6}$ and $0.\overline{7}$ is

(1) $1.\overline{3}$ (2) 1.3 (3) $1.\overline{4}$ (4) an irrational number

Ans. (3)

Sol. $0.\overline{6} = \frac{2}{3}$ and $0.\overline{7} = \frac{7}{9}$

$0.\overline{6} + 0.\overline{7} = \frac{2}{3} + \frac{7}{9} = \frac{13}{9} = 1.\overline{4}$

199. If $x + \frac{1}{x} = \sqrt{3}$, then the value of $x^3 + \frac{1}{x^3}$ is –

(1) $2\sqrt{3}$ (2) $\sqrt{3}(\sqrt{3-1})$ (3) $3\sqrt{3}$ (4) 0

Ans. (4)

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

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

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

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

200. If $5^{x+1} + 5^{2-x} = 126$ then x is equal to

(1) – 2, – 1 (2) 1, – 2 (3) – 1, 3 (4) 2, – 1

Ans. (4)

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

$$5 \times 5^x + \frac{5^2}{5^x} = 126$$

Let $5^x = y$ then $5y + \frac{25}{y} = 126$

$5y^2 + 25 = 126y$

$5y^2 - 126y + 25 = 0$

Solving this we get $(y - 25)(5y - 1) = 0$

Therefor $y = 25$ or $y = \frac{1}{5}$

If $y = 25$ then $5^x = 5^2$

Therefore $x = 2$

If $y = \frac{1}{5}$ then $5^x = 5^{-1}$

Therefore $x = -1$

So $x = 2$ or -1