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

101. What is the fat point for normal human eyes?

(1) 25 cm   (2) 50 cm   (3) 100 cm   (4) Infinity

Ans. *(4)*

Sol. The far point of the eye is the maximum distance to which the eye can see the objects clearly. The far point of the normal human eye is infinity.

102. Refractive index of water is :-

(1) 1.00   (2) 1.33   (3) 1.52   (4) 2.42

Ans. *(2)*

Sol. Refractive index of water = speed of light in air or vacuum / speed of light in water

Refractive index of water = $3 \times 10^8 / 2.25 \times 10^8 = 4/3 = 1.33$

103. A man used a convex lens of focal length of 20 cm in his spects, the power of this lens is :-

(1) +2D   (2) –2D   (3) +5D   (4) –5D

Ans. *(3)*

Sol. power of a lens = 1/focal length(f) of lens in metres

Given, f = 20cm in metres= (20/100) metres = (1/5) metres.

power of a lens= 1 / (1/5) = + 5D (+ve as convex lens)

104. In an electric circuit, the voltmeters is used :-

(1) in series   (2) in parallel   (3) in both manner   (4) None of these

Ans. *(2)*

Sol. A voltmeter is a high resistance. It is used to measure potential difference between any two points of the circuit. To measure the potential difference between the two points of a circuit, the voltmeter is connected in parallel in the circuit.

105. One horse power (H.P.) is equal to :

(1) 467 watt   (2) 500 watt   (3) 746 watt   (4) 1000 watt

Ans. *(3)*

Sol. The electrical equivalent of one horsepower is 746 watts in the International System of Units (SI)

106. A mangnet attracts :-

(1) only iron   (2) only cobalt   (3) only nickel   (4) All the above

Ans. *(4)*

Sol. Magnets are only attracted to special metals. Iron, cobalt and nickel are magnetic. Metals that have iron in them attract magnets well.

107. Which of the following is the Bio/Gobar gas?

(1) $CH_4 + CO_2$ (2) $CH_4 + NO_2$ (3) $CO + H_2$ (4) $CO_2 + N_2$

Ans. *(1)*

Sol. Biogas is the mixture of gases produced by the breakdown of organic matter in the absence of oxygen (anaerobically), primarily consisting of methane and carbon dioxide.

108. In a electric bulb filament 0.5 ampere current is passed for 10 miniutes, calculate the electric charge passes through the circuit

(1) 5 C   (2) 20 C   (3) 300 C   (4) 500 C

Ans. *(3)*

Sol. Given,

Current (I) = 0.5 A

Time = 10 minutes

Time in minutes can be converted into seconds as follows

Time (t) = $10 \times 60 = 600$ sec

$Q = I \times t$

$Q = 0.5 \times 600$

$Q = 300$ C

109. Which of the following mirror is used by a dentist to examine the patient teeth?

(1) Convex mirro   (2) Concave mirror   (3) Plane mirro   (4) All the above

Ans. *(2)*

Sol. A concave mirror gives the dentist a magnified reflection of the mouth while also refracting a bit of light. This means the image in the mirror is larger, brighter, and, for the dentist, easier to see

110. An electric bulb has rating of 30W, 12V. The maximum current can pass through it, will

(1) 0.4 amp   (2) 2.5 amp   (3) 12 amp   (4) 360 amp

Ans. *(2)*

Sol. Given,

Power (P) = 30 W, Potential difference (V) = 12 V

To find,

Current (I) = ?

As, $P = V \times I$

$30 = 12 \times I$

$I = 30 / 12 = 2.5$ A

111. What is the unit of magnetic field intensity :-

(1) weber   (2) Newton/ampere-metre^2 (3) Tesla   (4) None of these

Ans. *(3)*

Sol. In SI units, magnetic field intensity is measured in Tesla (symbol: T).

112. The size of colloidal particles are

(1) 10^{-3} - 10^{-5} metre
(2) 10^{-6} - 10^{-9} meter
(3) 10^{-10} - 10^{-15} metre
(4) None of the above

Ans. *(2)*

Sol. A solution is said to be in colloidal if particles of one or more components have the size range 10^{-6} m to 10^{-9} m.

113. Synthetic fibre Nylon is a

(1) Poly amides
(2) Polysaccharide
(3) Polyester
(4) Polyethene

Ans. *(1)*

Sol. Nylons are also called polyamides, because of the characteristic amide groups in the backbone chain.

114. Main component of LPG is

(1) Methane + Ethane
(2) Ethane + Propane
(3) Propane + Butane
(4) None of the above

Ans. *(3)*

Sol. LPG is composed of hydrocarbons containing three or four carbon atoms. The normal components of LPG thus, are propane (C_3H_8) and butane (C_4H_{10}).

115. Cinnabar is an ore of which of the following

(1) Mg
(2) Hg
(3) Ag
(4) Au

Ans. *(2)*

Sol. Cinnabar, mercury sulphide (HgS), is the chief ore mineral of mercury.

116. The general formula of Alkanes is-

(1) C_nH_{2n}
(2) C_nH_{2n+2}
(3) C_nH_{2n-2}
(4) $C_{n+2}H_{2n}$

Ans. *(2)*

Sol. Alkanes have the general formula of C_nH_{2n+2} where n is the number of carbon atoms.

117. What is the form when chlorine gas passes through dry slaked lime-

(1) $CaCl_2$
(2) CaO
(3) $CaOCl_2$
(4) None of these

Ans. *(3)*

Sol. When chlorine is passed over dry slaked lime at room temperature, the main reaction product is $CaOCl_2$ (bleaching powder). The reaction is as follows :-

$$Ca(OH)_2 + Cl_2 \rightarrow CaOCl_2 + H_2O.$$
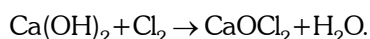
118. Which of the following is a strong base-

(1) NH_4OH
(2) $Ca(OH)_2$
(3) $NaHCO_3$
(4) KOH

Ans. *(4)*

Sol. Some common strong Arrhenius bases include: Potassium hydroxide (KOH) Sodium hydroxide (NaOH) Barium hydroxide ($Ba(OH)_2$)

119. $NaCl_{(Aq)} + AgNO_{3(Aq)} \longrightarrow AgCl \downarrow + NaNO_{3(Aq)}$

Above reaction is a-

(1) Reversible reaction
(2) Decomposition reaction
(3) Addition reaction
(4) Double displacement reaction

Ans. *(4)*

Sol. Since there is an exchange of ions between the reactants, so the type of reaction NaCl + $AgNO_3$ gives AgCl + $NaNO_3$ is a double displacement reaction.

120. An alloy which does not contain copper is

(1) Magnalium   (2) Bronze   (3) Brass   (4) German Silver

Ans. **(1)**

Sol. Magnalium: Al+Mg

Bronze: Cu+Sn

Brass: Cu+Zn

German silver: Cu+Ni+Zn

121. Which of the following is not an allotropic form of carbon-

(1) Diamond   (2) Graphite   (3) Fullerene   (4) None of these

Ans. **(4)**

Sol. Allotropes of Carbon are a) Diamond, b) Graphite, c) C60 (Buckminsterfullerene or bucky ball.

122. A substance which oxidize itself and reduce other is a-

(1) An oxidising Agent   (2) Reducing agent   (3) A Dehydrating Agent   (4) A Catalyst

Ans. **(2)**

Sol. A substance which oxidizes itself and reduces other is known as a reducing agent.

123. Water of crystallization in Gypsum and plaster of Paris are respectively

(1) 2 & 1   (2) 2 & 1/2   (3) 1 & 2   (4) 1/2 & 2

Ans. **(2)**

Sol. Gypsum- $CaSO_4.2H_2O$, Plaster of paris ($CaSO_4. 1/2 H_2O$).

124. Which of the following does not belong to a group-

(1) Li, Na, K   (2) Be, Mg, Ca   (3) N, O, F   (4) He, Ne, Ar

Ans. **(3)**

Sol. 1. Li, Na, K - Alkali metals (Group 1)

2. Be, Mg, Ca -Alkaline earth metals (Group 2)

3. N, O, F- (Period 2)

4. He, Ne, Ar- Noble gases (Group 18)

125. A byproduct of soap industry is-

(1) Sodium hydroxide   (2) Sodium palmitate   (3) Glycerol   (4) Gat or Oil

Ans. **(3)**

Sol. Soaps are sodium or potassium salt of fatty acids, made by hydrolysis of fats and oils with bases. This process yields soap as a product and glycerol as by-product.

triglyceride + Sodium → glycerol + 3 soap molecules
(fat or oil)   hydroxide
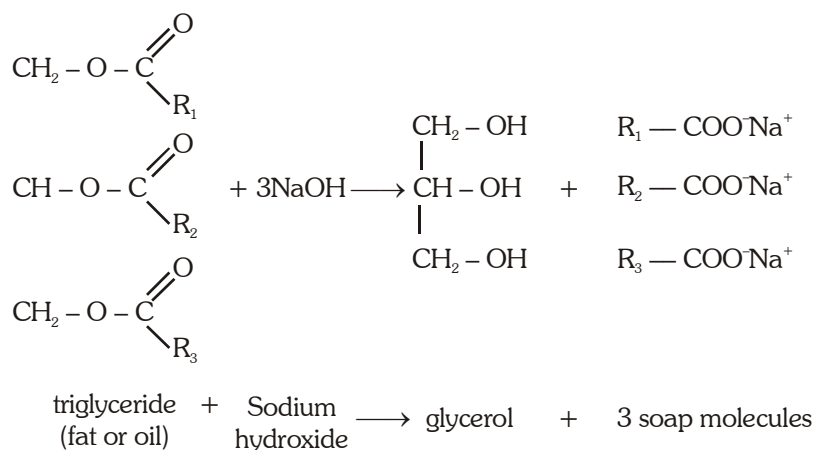
126. Corrosion of copper gives rise to a green coating on it which is-

(1) CuO   (2) $Cu(OH)_2$ (3) $CuCO_3$ (4) $CuCO_3 . Cu(OH)_2$

Ans. *(4)*

Sol. When a copper vessel is exposed to moist air for a long time it develops a green layer on its surface. Copper corrodes by oxidation in which it reacts with oxygen in the air to form copper oxide.

Copper oxide then combines with carbon dioxide to make copper carbonate, which gives it a green colour. This process is called corrosion of copper.

The green material is a mixture of copper hydroxide (Cu(OH)2) and copper carbonate (CuCO3). The following is the reaction :

$$2Cu(s) + H_2O(g) + CO_2 + O_2 \rightarrow Cu(OH)_2 + CuCO_3(s)$$
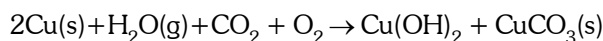
Copper(II) carbonate is a blue-green compound.

127. Which organelle cell is called power house of cell?

(1) Mitochondria   (2) Chloroplast   (3) Ribosome   (4) Lysosome

Ans. *(1)*

Sol. Mitochondria are tiny organelles inside cells that are involved in releasing energy from food. This process is known as cellular respiration. It is for this reason that mitochondria are often referred to as the powerhouses of the cell.

128. Scientist, who proposed five kingdom classifications is

(1) Carolus Linnaeus   (2) Whittaker   (3) Robert Brown   (4) Hugo de Vries

Ans. *(2)*

Sol. Whittaker proposed an elaborate five kingdom classification - Monera, Protista, Fungi, Plantae and Animalia.

129. Nematoblast or stinging cells are found in which phylum of animals

(1) Porifera   (2) Annelida   (3) Cnideria   (4) Arthropoda

Ans. *(3)*

Sol. Cnidocytes, also known as stinging cells, are specialized neural cells that typify the phylum Cnidaria (sea anemones, corals, hydroids, and jellyfish) which often contains poison, is to ward off enemies or to capture prey.

130. Photosynthesis occurs in which cellular organelle

(1) Mitochondria   (2) Ribosome   (3) Golgi body   (4) Chloroplast

Ans. *(4)*

Sol. In plants, photosynthesis takes place in chloroplasts, which contain the chlorophyll, having the property to capture the solar energy and converts to chemical energy in the form of glucose.

131. In which organ, bile juice formation takes place?

(1) Liver   (2) Gall bladder   (3) Pancreas   (4) Stomach

Ans. *(1)*

Sol. Liver is the largest gland of body which produces bile juice that stored into the gallbladder for concentration, storage, or transport into the first region of the small intestine, the duodenum. Bile juice is responsible for emulsification of fat.

132. Where, glycolysis occurs in cell

(1) In Mitochondria   (2) In Chloroplast   (3) In Cytopasm   (4) In Nucleus

Ans. *(3)*

Sol. Glycolysis is the first stage of aerobic and anaerobic respiration where one molecule of glucose is converted into two molecules of pyruvate in the cytoplasm of cell.

133. In which animal, open blood vascular system is found?

(1) In Earthworm   (2) In Periplaneta   (3) In Man   (4) In Fish

Ans. *(2)*

Sol. Belongs to phylum Arthropoda which has open circulatory system i.e. the blood does not flow in blood vessels but flows in a Haemocoel (body cavity). Man, Fish & Earthworms having closed circulatory system.

134. Which endocrine gland is called master gland?

(1) Thyroid   (2) Adrenal   (3) Thymus   (4) Pituitary

Ans. *(4)*

Sol. The pituitary gland is called the "master" gland of the endocrine system because it controls the functions of many of the other endocrine glands.

135. Which plant hormone causes apical dominance ?

(1) Auxine   (2) Gibberelline   (3) Cytokinine   (4) Ethylene

Ans. *(1)*

Sol. Auxin is a plant hormone produced in the stem tip that promotes cell elongation. Auxine promote stem elongation, inhibit growth of lateral buds & maintains apical dominance.

136. Scientist who proposed the theory of natural selection was –

(1) Lamark   (2) Charles Darwin   (3) Waldayer   (4) Muller

Ans. *(2)*

Sol. The theory of natural selection was explored by 19th century naturalist Charles Darwin. Natural selection explains how genetic traits of a species may change over time. This may lead to speciation, the formation of a distinct new species

137. Which gas is used in aerobic respiration?

(1) Oxygen   (2) Carbon di oxide   (3) Nitrogen   (4) Methane

Ans. *(1)*

Sol. The respiration which uses oxygen is called aerobic respiration. In aerobic respiration, the glucose food is completely broken down into carbon dioxide and water by oxidation. Aerobic respiration produces a considerable amount of energy for use by the organism which gets stored in the ATP molecules.

138. Cholera disease caused by which pathogen –

(1) Virus   (2) Bacteria   (3) Fungus   (4) Protozoa

Ans. *(2)*

Sol. Cholera is an acute diarrheal infection caused by ingestion of food or water contaminated with the bacterium Vibrio cholerae.

139. Which group of organism are heterotrophic?

(1) Algae   (2) Fungi   (3) Bryophyta   (4) Pteridophyta

Ans. *(2)*

Sol. Fungi are heterotrophic (saprotrophic) which depends on dead and decay material.

140. Which is called currency of energy?

(1) D.N.A.   (2) R.N.A.   (3) A.T.P.   (4) N.A.D.

Ans. *(3)*

Sol. ATP (Adenosine triphosphate) is commonly referred to as the "energy currency" of the cell, as it provides readily releasable energy in the bond between the second and third phosphate groups.

141. Where is Sancmstupa situated?

(1) Gaya   (2) Lumbini   (3) Samath   (4) Bhopal

Ans. (4)

Sol. Sanchi stupa is situated near Bhopal in Madhya Pradesh.

142. Which relegion did Ashoka adopt?

(1) Buddhism   (2) Hinduism   (3) Jainism   (4) Shaivism

Ans. (1)

Sol. Ashoka adopted Buddhism religion.

143. Which is the oldest language of South India?

(1) Telugu   (2) Kannada   (3) Tamil   (4) Malayalam

Ans. (3)

Sol. The oldest language of South India is Tamil.

144. Who among the following had introduced market control policy ?

(1) Balban   (2) Alauddin Khilji   (3) Muhammad Bin Tuglaq (4) Jalaluddin Khilji

Ans. (2)

Sol. The market control policy was introduced by alauddin khilji

145. Who among the following founded the Vijay Nagar empire?

(1) Vijay Rai   (2) Harihar and Bukka   (3) Pushyamitra Sunga   (4) Rana Sanga

Ans. (2)

Sol. The vijay nagar empire was founded by harihar and bukka

146. Which of the following cities was built by Akbar?

(1) Daulatabad   (2) Fatehpur Sikri   (3) Agra   (4) Delhi

Ans. (2)

Sol. The city that was founded by akbar was fatehpur sikri.

147. Who become the Mughal emperor after Aurangzeb?

(1) Jahandar Shah   (2) Bahadur Shah I   (3) Shah Alam   (4) Bahadur Shah Jafar

Ans. (2)

Sol. Bahadur shah i became the emperor after aurangzeb

148. In which year Vasco da Gama came to India?

(1) 1350 AD   (2) 1450 AD   (3) 1498 AD   (4) 1598 AD

Ans. (3)

Sol. Vasco da gama came in the year 1498 AD

149. Who founded the Indian National Congress?

(1) Mahatma Gandhi   (2) Queen Victoria   (3) Sardar Patel   (4) A.O. Hume

Ans. (4)

Sol. The indian national congress was founded by A.O. Hume.

150. Who wrote "The Discovery of India"?

(1) Jawahar Lal Nehru   (2) Sharat Chandra   (3) Karl Marks   (4) Mahatma Gandhi

Ans. (1)

Sol. The discovery of india was written by Jawahar Lal Nehru.

151. When did Jalianwala Begh incident oc

(1) 1917   (2) 1918   (3) 1919   (4) 1920

Ans. (3)

Sol. The jallian wala bagh incident happened on 13th april 1919.

152. Who started the Dandi March?

(1) Swami Dayananda   (2) Madan Mohan Malviya   (3) Bal Gangadhar Tilak   (4) Mahatma Gandhi

Ans. (4)

Sol. The dandi march was started by Mahatma Gandhi.

153. Which among the following is the autobiography of Gandhiji?

(1) India Divided   (2) Nation in Making   (3) Neel Darpan   (4) My Experiments with Truth

Ans. (4)

Sol. My experiments with truth is the autobiography of mahatma gandhi.

154. Which one of the following is the oldest mountain system?

(1) Nilgiri   (2) Aravali   (3) Satpura   (4) Vindhya

Ans. (2)

Sol. The aravalis in india is the oldest mountain system.

155. The Ragur Soil is also known as:

(1) Red Soil   (2) Yellow Soil   (3) Black Soil   (4) Alluvial Soil

Ans. (3)

Sol. The regur soil is also known as black soil.

156. Which of the following groups represents cash crops?

(1) Wheat, Barley, Gram   (2) Cotton, Jute, Tobacco   (3) Paddy, Pea, Tur   (4) Gram, Maize, Moong

Ans. (2)

Sol. The group that represents cash crops are cotton, jute, tobacco.

157. The state from which the Tropic of Cancer does not pass

(1) Tripura   (2) West Bengal   (3) Mizoram   (4) Manipur

Ans. (4)

Sol. The state from which the tropic of cancer does not pass is manipur.

158. Which one of the following is not correctly matched?

Stat	Mining area
(1) Odisha	Gurumahisani
(2) Jharkhand	Novamandi
(3) Chhatisgarh	Kalahandi
(4) Karnataka	Bababoodan

Ans. (3)

Sol. The one which is incorrectly matched is chhatisgarh as kalahandi is in odisha.

159. Which one the following is the source of Aluminium

(1) Bauxite   (2) Zinc   (3) Lead   (4) Tin

Ans. (1)

Sol. Nauxite is the source of aluminium.

160. Which of the following is the longest river of the world?

(1) Amazon river   (2) Yangtze river   (3) Ganga river   (4) Nile river

Ans. (4)

Sol. Nile is the longest river of the world as its 6466km long.

161. The Toda tribes are the original inhabitants of:

(1) Aravalli hills   (2) Nilgiri hills   (3) Satpura hill   (4) Guru Shikhar

Ans. (2)

Sol. The toda tribes are the original inhabitants of nilgiri hills.

162. The state where shipki-la pass is located

(1) Arunachal Pradesh   (2) Sikkim   (3) Himachal Pradesh   (4) Meghalaya

Ans. (3)

Sol. The state where shipki-la pass located is himachal pradesh.

163. The source of the origin of river Narmada:

(1) Bhedaghat   (2) Brahmgiri   (3) Mahabaleshwar   (4) Amarkantak

Ans. (4)

Sol. The source of the origin of the river narmada is amarkantak.

164. The city where the first Earth summit was organized.

(1) Rio de janeiro   (2) Shangai   (3) Tokyo   (4) Manila

Ans. (1)

Sol. The city where the first earth summit was organised is rio de janerio.

165. The most densely populated state of India?

(1) Uttar Pradesh   (2) Bihar   (3) West Bengal   (4) Kerala

Ans. (3)

Sol. Bengal as per the question given in the paper.

"question is not properly explained" the most densely populated state of india is west bengal and the state which leads in highest population is uttar pradesh.

166. The first meeting of Constituent Assembly was held in-

(1) 09 December 1946   (2) 10 July 1946   (3) 09 August 1946   (4) 20 January 1946

Ans. (1)

Sol. The first meeting of the constituent assembly was held in 9th december, 1946.

167. The architect of the Indian Constitution was-

(1) Dr. B.R. Ambedkar   (2) Dr. Rajendra Prasad   (3) Pt. Jawahar Lal Nehru   (4) Mahatma Gandhi

Ans. (1)

Sol. The architect of the indian constitution was dr. b.r. ambedkar.

168. The Chief Election Commissioner is appointed by-

(1) Election Commission of India   (2) President of India

(3) Prime Minister of India   (4) Chief Justice of Supreme Court

Ans. (2)

Sol. The chief election commissioner is appointed by the president of india.

169. The first speaker of Lok Sabha was-

(1) Ganesh Vasudev Mavalankar

(2) Pt. Govind Vallabh Pant

(3) Ananthasayanam Ayyangar

(4) C.Subramaniam

Ans. **(1)**

Sol. The first speaker of the lok sabha was ganesh vasudev mavalankar.

170. Right to Education Act came into effect on

(1) 2005   (2) 2010   (3) 2008   (4) 2012

Ans. **(2)**

Sol. right to education act came into effect on 2010.

171. The Panchayati Raj System become more powerful in year

(1) 1990   (2) 1993   (3) 1994   (4) 1996

Ans. **(2)**

Sol. The panchayati raj system became more powerful in the year 1993

As decentralisation became more effective after 1992 amendment.

172. Under 'Right to Freedom' _____ types of freedom is given to Indian Citizen.

(1) 5   (2) 6   (3) 4   (4) 8

Ans. **(2)**

Sol. Under right to freedom 6 types of freedom is given to the indian citizen.

173. 'Forward Bloc' is a regional party of-

(1) Odisha   (2) Jharkhand   (3) Wes Bengal   (4) Chhatisgarh

Ans. **(3)**

Sol. forward bloc is the regional party of west bengal.

174. 'National Democratic Alliance' was founded in

(1) May 1998   (2) June 1996   (3) May 1999   (4) June 1997

Ans. **(1)**

Sol. National democratic alliance was founded on may 1998.

175. The Chief Justice of India is

(1) Justice Sharad Arvind Bobde

(2) Justice Ranjan Gogoi

(3) Justice Deepak Mishra

(4) Justice Jagdish Singh Kheher

Ans. **(1)**

Sol. The chief justice of india is Justice Sharad Arvind Bobde.

176. What was the prime objective of first five year plan in India?

(1) Development of Agriculture

(2) Heavy Industry

(3) Population control

(4) Transportation

Ans. **(1)**

Sol. The prime objective of the first five year plan was development of agriculture.

177. Manrega was implemented from the year?

(1) 2005   (2) 2006   (3) 2007   (4) 2008

Ans. **(1)**

Sol. Mgnerega was implemented in the year 2005.

178. Where is the headquarter of Life Insurance Corporation (LIC)?

(1) Delhi   (2) Mumbai   (3) Chennai   (4) Kolkata

Ans. (2)

Sol. The headquarter of lic insurance corporation is mumbai.

179. Which of the following comes under Primary Sector?

(1) Agriculture   (2) Industry   (3) Manufacturing   (4) Trade

Ans. (1)

Sol. Agriculture comes under primary sector.

180. Where is the headquarter of Tea Board located?

(1) Darjeeling   (2) Bengaluru   (3) Kolkata   (4) Mumbai

Ans. (3)

Sol. The headquarter of tea board is kolkata.

181. If $x = 0.\overline{7}$ then what is the value of 2x is

(1) $1.\overline{7}$ (2) $1.\overline{5}$ (3) $1.\overline{54}$ (4) $1.\overline{45}$

Ans. (2)

Sol. If $x = 0.\overline{7}$

$x = 0.777....$

$x = \dfrac{7}{9}$

$2x = \dfrac{14}{9} = 1\dfrac{5}{9}$

$2x = 1.\overline{5}$

182. If $a^x = b$, $b^y = c$ & $c^z = a$, then the value of xyz is

(1) 1   (2) 0   (3) $\dfrac{1}{abc}$ (4) abc

Ans. (1)

Sol. $a^x = b$, $b^y = c$, $c^z = a$

$a^x = b$, $b^y = c$

$\therefore \left(a^x\right)^y = c$

$a^{xy} = c$, $c^z = a$

$\therefore \left(a^{xy}\right)^z = a$

$a^{xyz} = a^1$

$\therefore xyz = 1$

183. If $\dfrac{\sqrt{3}-1}{\sqrt{3}+1} = a + b\sqrt{3}$, then the value of 'a' and 'b' is

(1) a = 2, b = –1   (2) a = 2, b = 1   (3) a = –2, b = 1   (4) a = –2, b = –1

Ans. (1)

Sol. $\dfrac{\sqrt{3}-1}{\sqrt{3}+1} = a + b\sqrt{3}$

$\dfrac{\sqrt{3}-1}{\sqrt{3}+1} \times \dfrac{\sqrt{3}+1}{\sqrt{3}+1} = a + b\sqrt{3}$

$\dfrac{\left(\sqrt{3}-1\right)^2}{\left(\sqrt{3}\right)^2 - 1^2} = a + b\sqrt{3}$

$\dfrac{3+1-2\sqrt{3}}{3-1} = a + b\sqrt{3}$

$\dfrac{4}{2} - \dfrac{2\sqrt{3}}{2} = a + b\sqrt{3}$

$2 - \sqrt{3} = a + b\sqrt{3}$

a = 2,   b = –1

184. The value of $\dfrac{x^{a+b} \cdot x^{b+c} \cdot x^{c+a}}{\left(x^a \cdot x^b \cdot x^c\right)^2}$ is

(1) x^2 (2) x^{a+b+c} (3) x^{abc} (4) *1

Ans. (4)

Sol. $\dfrac{x^{a+b} \cdot x^{b+c} \cdot x^{c+a}}{\left(x^a \cdot x^b \cdot x^c\right)^2} = \dfrac{x^{a+b} \times x^{b+c} \times x^{c+a}}{\left(x^{a+b+c}\right)^2}$

$= \dfrac{x^{a+b+b+c+c+a}}{x^{2a+2b+2c}}$

$= \dfrac{x^{2a+2b+2c}}{x^{2a+2b+2c}}$

$= 1$

185. The solution of the equation $7^{1+x} + 7^{1-x} = 50$ is

(1) 0   (2) 2   (3) ±1   (4) None of these

Ans. (3)

Sol. $7^{1+x} + 7^{1-x} = 50$

$7^1 \times 7^x + \dfrac{7}{7^x} = 50$

Let $7^x = y$

$7y + \dfrac{7}{y} = 50$

$\dfrac{7y^2 + 7}{y} = 50$

$7y^2 + 7 = 50y$

$7y^2 + 7 - 50y = 0$

$7y^2 - 50y + 7 = 0$

$(7y - 1)(y - 7) = 0$

$7y - 1 = 0$ or $y - 7 = 0$

$y = \dfrac{1}{7}$ or $y = 7$

$7^x = 7^{-1}$ or $7^x = 7$

$x = -1$ or $x = +1$

186. Aman's salary is reduced by 10%. In order to have his salary back to the original amount it must be raised by-

(1) 8%   (2) 10%   (3) $11\dfrac{1}{9}\%$ (4) $12\dfrac{3}{7}\%$

Ans. (3)

Sol. Let orignal salary be Rs. 100

Reduced salary $= \left(\dfrac{100 - 10}{100}\right)100$

$= \text{Rs.}90$

If we have to increase Rs 10 to reach orignal salary

Increase $\% = \dfrac{10}{90} \times 100$

$= 11\dfrac{1}{9}\%$

187. 10% of 15% of 20% of Rs. 500 is

(1) 0.50Rs   (2) 3.50Rs.   (3) 1.50Rs.   (4) 2.50Rs.

Ans. (3)

Sol. $10\% \times 15\% \times 20\%$ of 500

$= \dfrac{10}{100} \times \dfrac{15}{100} \times \dfrac{20}{100} \times 500$

$= \text{Rs.}1.5$

188. A shopkeeper purchases 11 pens for Rs. 10 and sell them at the rate of 10 pens for 11 then the profit percent is ;

(1) 18%   (2) 19%   (3) 20%   (4) 21%

Ans. (4)

Sol. C.P. of 1 pen $= Rs.\dfrac{10}{11}$

S.P. of 1 pen $= Rs.\dfrac{11}{10}$

Profit on 1 pen $= \dfrac{11}{10} - \dfrac{10}{11}$

$$= \dfrac{121 - 100}{110}$$

$$= \dfrac{21}{110}$$

Profit % $= \dfrac{\dfrac{21}{110}}{\dfrac{10}{11}} \times 100$

Profit % = 21%

189. If the sum of $\dfrac{1}{3}$ and $\dfrac{1}{4}$ is x times of their difference then the value of x is

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

Ans. (4)

Sol. Sum $= \dfrac{1}{3} + \dfrac{1}{4} = \dfrac{7}{12}$

Diff $= = \dfrac{1}{3} - \dfrac{1}{4} = \dfrac{1}{12}$

x × Diff = Sum

$$x = \dfrac{\dfrac{7}{12}}{\dfrac{1}{12}}$$

x = 7

190. If A's income is 20% more than B. Then B's income is

(1) Same as A's   (2) 20% less than A's   (3) $16\dfrac{2}{3}\%$ less than A's   (4) 15% less than A's

Ans. (3)

Sol. Let B's income be Rs. 100

then A's income $=\left(\dfrac{100+20}{100}\right)$ B's income

$$=\dfrac{120}{100}\times100 = \text{Rs. } 120$$

Diffrence = Rs. 20

decrease % $=\dfrac{\text{Diffrence}}{\text{A's income}}\times100$

$$=\dfrac{20}{120}\times100$$

Decrease% $=16\dfrac{2}{3}\%$

191. What is the probability that a leap year contains 53 Sundays

(1) $\dfrac{2}{7}$ (2) $\dfrac{7}{13}$ (3) $\dfrac{2}{13}$ (4) None of these

Ans. (1)

Sol. In a leap year,

No. of odd days = 2

Possible outcomes = (Sun, Mon), (Mon, Tues), (Tues, Wed), (Wed, Thurs), (Thurs, Fri), (Fri, Sat), (Sat, Sun)

Favourable outcomes = (Sun, Mon), (Sat, Sun)

Probability of getting 53 Sundays $= \dfrac{\text{No. of favourable outcomes}}{\text{Total no. of outcomes}} = \dfrac{2}{7}$

192. The minimum value of $\sin\theta\cos\theta$ is

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

Ans. (3)

Sol. Minimum value of $\sin\theta\cos\theta = ?$

$$\sin\theta\cos\theta = \dfrac{1}{2}\times2\sin\theta\cos\theta$$

$$=\dfrac{1}{2}\sin2\theta$$

$\because$ Min. Value of $\sin2\theta$ is –1,

$\therefore$ Min. Value of $\sin\theta\cos\theta = \dfrac{1}{2}\times-1$

$$=-\dfrac{1}{2}$$

193. When $\left(10^{12}-1\right)$ is divided by 11 to quotient is;

(1) 9009009   (2) 9009009009   (3) 9000009   (4) 900000009

Ans. (2)

Sol. Quotient when $(10^{12} - 1)$ is divided by 111 = ?

$10^{12} - 1 = 1000000000000 - 1$

$= 999999999999$

Qoutient when 999999999999 is divided by 111

$$= \frac{999999999999}{111}$$

$= 9009009009$

194. If $\log 3^{x+4} = \log 729$ then value of x will be

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

Ans. (4)

Sol. $\log 3^{x+4} = \log 729$

$3^{x+4} = 729$

$3^{x+4} = 3^6$

$x + 4 = 6$

$x = 2$

195. If p persons working p hours a day for each of p days produce p units of works, then the units of the work produced by q persons working q hours a day for each q day is

(1) $\dfrac{q^3}{p^2}$ (2) $\dfrac{q^2}{p^3}$ (3) $\dfrac{p^2}{q^2}$ (4) $\dfrac{p^3}{q^2}$

Ans. (1)

Sol. Given, p persons working p hours a day for p days produce p units of work, then 1 person working 1 hour a day

for 1 day will produce $\dfrac{p}{p \times p \times p} = \dfrac{1}{p^2}$ units of work.

Therefore q persons working q hours a day for q days will produce $q \times q \times q \times \dfrac{1}{p^2}$ units

$= \dfrac{q^3}{p^2}$ units of work.

196. If $x^{100} + 2x^{99} + k$ is fully divisible by $(x + 1)$ then value of k will be

(1) 7   (2) –3   (3) 2   (4) 1

Ans. (4)

Sol. Given $x^{100} + 2x^{99} + k$ is fully divisible by $(x+1)$

∴ By factor theorem;

$$x + 1 = 0$$
$$x = -1$$

Value of polynomial at $x = -1$ will be zero.

$$\therefore (-1)^{100} + 2(-1)^{99} + k = 0$$

$$\Rightarrow 1 + 2(-1) + k = 0$$

$$\Rightarrow 1 - 2 + k = 0$$

$$\Rightarrow k = 1$$

197. If radius of a right circular cylinder is increased by 10%, then by what percent it height should be decreased so that its volume remains unchanged

    (1) 17.26%   (2) 17.36%   (3) 17.46%   (4) None of these

Ans. **(2)**

Sol. Let radius and height of right circular cylinder be r and h respectively.

When radius is increased by 10%

New radius $= r + \dfrac{10}{100} \times r = \dfrac{11r}{10}$

Let the decreased in height is x%,

∴ New height $= h - \dfrac{x}{100} \times h = h\left(1 - \dfrac{x}{100}\right)$

According to question,
Original volume = New volume

$$\pi r^2 h = \pi \left(\dfrac{11r}{10}\right)^2 \times h\left(1 - \dfrac{x}{100}\right)$$

$$\pi r^2 h = \pi r^2 h \left(\dfrac{121}{100}\right)\left(1 - \dfrac{x}{100}\right)$$

$$1 = \dfrac{121}{100}\left(1 - \dfrac{x}{100}\right)$$

$$\dfrac{100}{121} = 1 - \dfrac{x}{100}$$

$$\dfrac{x}{100} = 1 - \dfrac{100}{121}$$

$$\dfrac{x}{100} = \dfrac{21}{121}$$

$$x = \dfrac{21}{121} \times 100 = 17.355 = 17.36\% \text{ approx.}$$

198. If $\sqrt{x+1} - \sqrt{x-1} = 1$ then value of x is

(1) $\dfrac{5}{4}$
(2) $\dfrac{2}{3}$
(3) $\dfrac{4}{5}$
(4) $\dfrac{3}{5}$

Ans. **(1)**

Sol. $\sqrt{x+1} - \sqrt{x-1} = 1$

On squaring,

$$\left(\sqrt{x+1} - \sqrt{x-1}\right)^2 = 1^2$$

$$x + 1 + x - 1 - 2\sqrt{(x+1)(x-1)} = 1$$

$$2x - 2\sqrt{x^2 - 1} = 1$$

$$2x - 1 = 2\sqrt{x^2 - 1}$$

$$(2x - 1)^2 = 4(x^2 - 1)$$

$$4x^2 - 4x + 1 = 4x^2 - 4$$

$$-4x + 1 = -4$$

$$-4x = -5$$

$$x = \dfrac{5}{4}$$

199. There are thirty cards numbered from 1 to 30. If a card is drawn at random find the probability that, the drawn card has a prime number-

(1) $\dfrac{1}{2}$
(2) $\dfrac{1}{3}$
(3) $\dfrac{1}{4}$
(4) $\dfrac{1}{5}$

Ans. **(2)**

Sol. Possible outcomes = 1, 2, 3, 4, ..., 30

Favourable outcomes = 2, 3, 5, 7, 11, 13, 17, 19, 23, 29

$$\text{P(getting a prime number)} = \dfrac{\text{No. of favourable outcomes}}{\text{Total no. of outcomes}}$$

$$= \dfrac{10}{30} = \dfrac{1}{3}$$

200. An insect which is climbing on a vertical pole in such a way that on one day it climbs a height of 2 m on next day it comes down 1 m. If height of the pole is 12m, find the no. of days in which it will reach on the top.

(1) 11 days   (2) 12 days   (3) 21 days   (4) 22 days

Ans. **(3)**

Sol. On first day, it climb 2m

On second day, it come down 1m

In overall two days it climb 2 – 1 = 1m

$\therefore$ For climbing first 10m, it takes $= 10 \times 2$ days

$$= 20 \text{ days}$$

On 21st day, it again climb 2 meters

$\therefore$ on **21st day** it reached on top of pole i.e. 10 + 2 = 12 meters.