

Date: 04-November-2018

Max. Marks: 100

## SOLUTIONS

Time allowed: 120 minutes

101. A boy starts from rest is accelerated uniformly for 30s. If  $x_1$ ,  $x_2$ ,  $x_3$  are the distance traveled in first 10s, next 10s and last 10s respectively, then  $x_1 : x_2 : x_3$  is

- (1) 1 : 2 : 3                      (2) 1 : 1 : 1                      (3) 1 : 3 : 5                      (4) 1 : 3 : 9

Ans. (3)

Sol. Distance travelled in first 10 seconds,  $x_1 = ut + 1/2at^2$

$$x_1 = 0 + 1/2 \times a \times (10)^2$$

$$x_1 = 50a \text{ ———(1)}$$

Distance travelled in 20 seconds,  $x_1 + x_2 = 0 + 1/2 \times a \times (20)^2$

$$x_1 + x_2 = 200a$$

$$x_2 = 150a \text{ ———(2)}$$

Distance travelled in 30 seconds  $x_1 + x_2 + x_3 = 0 + 1/2 \times a \times (30)^2$

$$x_1 + x_2 + x_3 = 450a$$

$$x_3 = 250a \text{ ———(3)}$$

From (1), (2) and (3),  $x_1 : x_2 : x_3 = 1 : 3 : 5$

102. A bomb of mass 3m kg explodes into two pieces of mass m kg and 2 m kg. If the velocity of m kg mass is  $16 \text{ ms}^{-1}$ , the total kinetic energy in the explosion is

- (1) 192 mJ                      (2) 96 mJ                      (3) 384 mJ                      (4) 768 mJ

Ans. (1)

Sol. Applying law of conservation of momentum,

$$0 = m \times 16 + 2m \times v$$

$$2mv = -16m$$

$$v = -8 \text{ m/s}$$

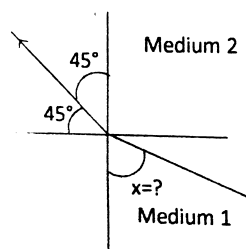
$$\text{Total Kinetic Energy released} = 1/2 m \times (16)^2 + 1/2 m \times (8)^2$$

$$= 128m + 64m$$

$$= 192m \text{ J}$$

103. Figure shows a ray of light as travels from medium 1 to medium 2. If refractive index of medium 1 with

respect to medium 2 is  $\frac{\sqrt{2}}{\sqrt{3}}$  then the value of angle x is



- (1) 30°                      (2) 60°                      (3) 15°                      (4) 45°

**Ans. (2)**

**Sol.** Given:  $n_{12} = n_1/n_2 = \frac{\sqrt{2}}{\sqrt{3}}$

Applying Snell's law,

$$n_1 \sin i = n_2 \sin r$$

$$n_1/n_2 \sin x = \sin 45^\circ$$

$$\frac{\sqrt{2}}{\sqrt{3}} \sin x = \frac{1}{\sqrt{2}}$$

$$\sin x = \frac{\sqrt{3}}{2}$$

$$x = 60^\circ$$

104. Which of the following statements is true ?

- (1) A convex lens with power +4D has a focal length - 0.25 m
- (2) A convex lens with power -4D has a focal length + 0.25 m
- (3) A concave lens with power +4D has a focal length - 0.25 m
- (4) A concave lens with power -4D has a focal length -0.25 m

**Ans. (4)**

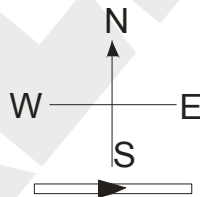
**Sol.** The power and focal length of concave lens is negative.

$$P = 1/f$$

$$-4 = 1/f$$

$$f = -0.25 \text{ m}$$

105. A constant current  $I$  flows in a horizontal wire in the plane of the paper from West to East as shown in the figure. The direction of magnetic field at a point will be South to North.



- (1) directly above the wire
- (2) directly below the wire
- (3) at a point located in the plane of the paper, on the north side the wire
- (4) at a point located in the plane of the paper, on the south side of the wire

**Ans. (2)**

**Sol.** Applying Right hand thumb rule or corkscrew rule, the direction of magnetic field at point directly below the wire is from south to north.

106. If the current through a resistor is increased by 50 % the increase in power dissipated will be (assume the temperature remains constant)

- (1) 225 %
- (2) 200 %
- (3) 250 %
- (4) 125 %

**Ans. (4)**

**Sol.** New value of current,  $I' = 1.5 I$

Power dissipated,  $P = I^2 R$  ———(1)

New Power dissipated,  $P' = I'^2 R$

$$P' = (1.5I)^2 R$$

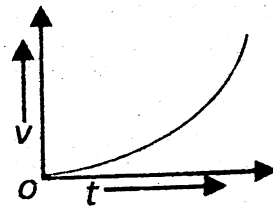
$$P' = 2.25 I^2 R$$

$$P' = 2.25 P$$

Percentage increase in Power dissipation,  $(P' - P)/P \times 100 = 1.25P / P \times 100$

Percentage increase in Power dissipation = 125 %

107. The velocity – time graph of moving body is shown in the figure.



Which of the following statement is true ?

- (1) The acceleration is constant and positive
- (2) The acceleration is constant and negative
- (3) The acceleration is increasing and positive
- (4) The acceleration is decreasing and negative

**Ans. (3)**

**Sol.** Slope of velocity-time graph represents acceleration. As per the graph, the slope of v-t graph is increasing and is positive. Therefore the acceleration is increasing and positive.

108. Which of the following eye defects can be rectified using cylindrical lens?

- (1) Myopia
- (2) Presbyopia
- (3) Astigmatism
- (4) Hyper metropia

**Ans. (3)**

**Sol.** Astigmatism is a defect of eye in which the cornea is irregularly shaped or sometimes the curvature of eye lens is irregular. It can corrected by using cylindrical lens.

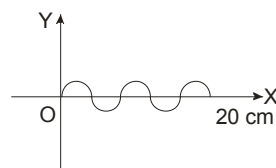
109. The linear distance between a consecutive compression and a rarefaction in longitudinal wave is

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

**Ans. (2)**

**Sol.** The distance between two consecutive compressions or two consecutive rarefactions is called Wavelength ( $\gamma$ ). As compression and rarefaction occurs alternatively, therefore distance between a consecutive compression and rarefaction is half of the wavelength ( $\gamma / 2$ ).

110. For the wave shown in figure, calculate the frequency and wave length of the wave if its speed is  $320 \text{ ms}^{-1}$ .



- (1) 80 cm, 4000 Hz
- (2) 8 cm, 400 Hz
- (3) 80 cm, 400 Hz
- (4) 80 cm, 40 Hz

**Ans. (NA)**

**Sol.** Distance covered in 2.5 oscillation is 20 cm.

$$\text{So, } \lambda = 20/2.5 = 8 \text{ cm} = 0.08 \text{ m}$$

Also, wave speed = frequency x wavelength

$$V = \nu \lambda$$

$$\nu = V/\lambda$$

$$\nu = 320/0.08 = 4000 \text{ Hz}$$

111. If x calories of heat are supplied to 15 g of water, its temperature rises from  $20^{\circ}\text{C}$  to  $24^{\circ}\text{C}$ . If specific heat for water is  $1 \text{ cal g}^{-1}\text{C}^{-1}$ , then the value of x is

(1) 30

(2) 120

(3) 15

(4) 60

**Ans. (4)**

**Sol.** Heat Required,  $H = mc \Delta T$

$$= 15 \times 1 \times (24 - 20)$$

$$= 60 \text{ calories}$$

112. In a hydro-Power plant -

(1) Kinetic energy possessed by the stored water is converted into potential energy.

(2) Potential energy possessed by the stored water is converted into electricity

(3) Water is converted into steam to produce electricity

(4) Heat is extracted from water to produce electricity.

**Ans. (2)**

**Sol.** In Hydro-power plant the potential energy possessed by stored water is converted into electricity with the help of turbine and generator.

113. The mass of a planet is twice and its radius is three times that of the earth. The weight of a body, which has a mass of 5 kg. On that planet will be

(1) 11.95 N

(2) 10.88 N

(3) 9.88 N

(4) 20.99 N

**Ans. (2)**

**Sol.** Let the acceleration due to gravity on earth be ' $g = 9.8 \text{ m/s}^2$ '

$$g = GM/R^2$$

$$g \propto M$$

$$g \propto 1/R^2$$

$$g' = G(2M)/(3R)^2 = 2GM/9R^2$$

$$g' = 2g/9 = 2 \times 9.8/9 = 2.1777... \text{ m/s}^2$$

The weight of the body on planet is,  $W = mg'$

$$= 5 \times 2.1777...$$

$$\text{Thus, } W = 10.88 \text{ N}$$

114. Which of these can be used as ol-factory indicator.

(1) Vanilla

(2) Onion

(3) Clove

(4) All the above three

**Ans. (4)**

**Sol.** Vanilla, onion and clove extract all three can be used as ol- factory indicators as they produce different smell in acid & bases.

115. What will be the products when acid reacts with metals :

(1) Water and hydrogen gas (2) Acid and hydrogen gas (3) Salt and hydrogen gas (4) Base and hydrogen gas

**Ans. (3)**

**Sol.** When metal reacts with acids they produce metal salt and hydrogen gas



116. What happens, when methyl orange solution mixed with HCl.

(1) Solution becomes Yellow (2) Solution becomes Red (3) Solution becomes Blue (4) Solution becomes pink

**Ans. (2)**

**Sol.** HCl is an acid and methyl orange turns Orange to Red in acidic solution.

117. Which of these salts will give acidic solution

(1)  $\text{Na}_2\text{CO}_3$  (2)  $\text{NaCl}$  (3)  $\text{NH}_4\text{Cl}$  (4)  $\text{COONa}$

**Ans. (3)**

**Sol.**  $\text{NH}_4\text{Cl}$  is a salt made by  $\text{NH}_4\text{OH}$  and HCl. HCl being strong acid will give acidic salt and thus acidic solution.

118. Name the metal which offers higher resistance to the passage of electricity than copper.

(1) Gold (2) Silver (3) Mercury (4) None of these

**Ans. (3)**

**Sol.** Mercury offers higher resistance to the passage of electricity than copper.

119. Name two metals both of which are very ductile as well as malleable.

(1) Gold and copper (2) Gold and silver (3) Silver and copper (4) None of these

**Ans. (2)**

**Sol.** Gold and Silver are two most ductile (drawn into wires) and malleable (beaten into thin sheets) metals

120. Tick the arrangement of metals Fe, Cu, Zn, Ag in the order of decreasing reactivity.

(1)  $\text{Fe} > \text{Cu} > \text{Zn} > \text{Ag}$  (2)  $\text{Cu} > \text{Fe} > \text{Zn} > \text{Ag}$  (3)  $\text{Ag} > \text{Zn} > \text{Fe} > \text{Cu}$  (4)  $\text{Zn} > \text{Cu} > \text{Fe} > \text{Ag}$

**Ans. (NA)**

**Sol.** None of the option is correct.

Correct order is  $\text{Zn} > \text{Fe} > \text{Cu} > \text{Ag}$

121. Which metal does not corrode easily?

(1) Gold (2) Silver (3) Platinum (4) All the above

**Ans. (4)**

**Sol.** Gold, Silver and Platinum, all three are noble metals and do not corrode easily.

122. pH is defined as:

(1)  $-\log[\text{H}_3\text{O}^+]$  (2)  $-\log[\text{H}_2\text{O}]$  (3)  $-\log[\text{OH}^-]$  (4)  $-\log[\text{H}^+][\text{OH}^-]$

**Ans. (1)**

**Sol.**  $\text{pH} = -\log[\text{H}_3\text{O}^+]$

123. A solution turns methyl orange into yellow the approximate pH of solution is

(1) 1.2 – 2.8 (2) 3.1 – 4.4 (3) 6.0 – 7.6 (4) 8.3 – 10.0

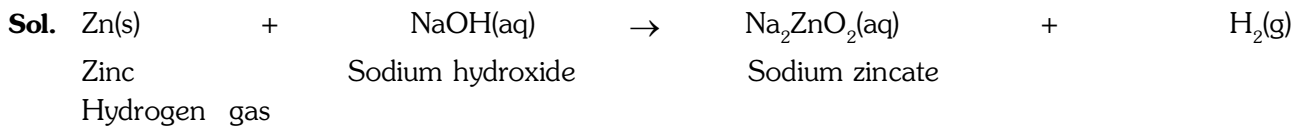
**Ans. (4)**

**Sol.** Methyl orange changes its colour from Orange to Yellow in basic solution, as 8.3 to 10.0 pH is for basic solution, thus the colour changes to yellow.

124. Zinc reacts with NaOH solution to produce.

(1)  $\text{O}_2$  (2)  $\text{H}_2$  (3)  $\text{NH}_3$  (4)  $\text{NO}_2$

**Ans. (2)**



125. Aqueous solution of  $\text{SO}_2$  is

- (1) Acidic                      (2) Basic                      (3) Neutral                      (4) Amphoteric

**Ans. (1)**

**Sol.** Aqueous solution of  $\text{SO}_2$  is acidic

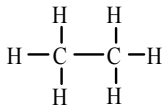


126. Ethane with the molecular formula  $\text{C}_2\text{H}_6$  has.

- (1) 6 Covalent Bond                      (2) 7 Covalent Bond                      (3) 8 Covalent Bond                      (4) 9 Covalent Bond

**Ans. (2)**

**Sol.** Ethane will form 7 covalent bonds.



127. A flagellum is present at one end of a protozoan. It is

- (1) Planaria                      (2) Paramecium                      (3) Hydra                      (4) Leishmania

**Ans. (4)**

**Sol.** Out of the four options given, leishmania is a protozoan and it has flagella.

128. DNA is not present in :

- (1) Chloroplast                      (2) Mitochondria                      (3) Nucleus                      (4) Ribosome

**Ans. (4)**

**Sol.** All the options other than 'Ribosome' contain DNA.

129. The wings of house fly and the wings of a sparrow are an example of

- (1) Analogous organs                      (2) Vestigial organs                      (3) Respiratory organs                      (4) Homologous organs

**Ans. (1)**

**Sol.** Since the wings of housefly and wings of sparrow have same function but dissimilar structure, they would be analogous organs.

130. Which of the following is not the purpose of transpiration ?

- (1) Help in absorption and transportation in plants.  
(2) Prevents loss of water  
(3) Maintains the shape and structure of plants by keeping the cell turgid  
(4) Supplies water for photosynthesis

**Ans. (2)**

**Sol.** Transpiration is the process of loss of excess water from plants, so it doesn't prevent loss of water.

131. Pulmonary vein carries :

- (1) Deoxygenated blood                      (2) Oxygenated blood                      (3) Mixed blood                      (4) None of these

**Ans. (2)**

**Sol.** Pulmonary vein is the only exception in the body where a vein carries oxygenated blood. It carries oxygenated blood from lungs to heart.

132. Cell division in plants is promoted by :  
(1) Abscisic acid                      (2) Gibberlin                      (3) Ethylene                      (4) Cytokinin

**Ans. (4)**

**Sol.** Cytokinin is a growth promoter hormone which promotes division of cells in plants.

133. Loop of Henle is found in  
(1) Lungs                      (2) Liver                      (3) Nephron                      (4) Neuron

**Ans. (3)**

**Sol.** Loop of Henle is a U-shaped structure present in the Nephron.

134. Flight and fight hormone is :  
(1) Adrenalin                      (2) Thyroxine                      (3) Oxytocin                      (4) Insulin

**Ans. (1)**

**Sol.** Adrenaline is an emergency hormone which is secreted during a fight or flight situation.

135. In the food chain given below, if the amount of energy available at fourth trophic level is 5 KJ, what was the energy available at the producer level ?

Grass → Grasshopper → frog → Snake → Hawk

- (1) 5000 KJ                      (2) 500 KJ                      (3) 50 KJ                      (4) 5 KJ

**Ans. (1)**

**Sol.** The fourth trophic level in the given food chain is snake, so the energy available at the producer level i.e. grass would be 5000 kJ because at each level only 10% energy is passed to the next level.

136. Jaya and Ratna are varieties of :  
(1) Maize                      (2) Rice                      (3) Wheat                      (4) Bajra

**Ans. (2)**

**Sol.** Jaya and Ratna are improved varieties of rice.

137. Which of the following is not an ancient water harvesting structure ?  
(1) Kattas                      (2) Sargam                      (3) Kulhs                      (4) Surangam

**Ans. (2)**

**Sol.** All the other given options were used as water harvesting systems except 'Sargam'.

138. ATP is formed by photosynthesizing plant cell by :  
(1) Photophosphorylation                      (2) Oxidative Phosphorylation  
(3) Substrate level phosphorylation                      (4) All of the above

**Ans. (1)**

**Sol.** ATP is formed by addition of Phosphate to ADP in the presence of Light during Photosynthesis. Thus ATP formation by a photosynthesizing plant cell would be known as Photophosphorylation.

139. Breathing rate in human is controlled by :  
(1) Thalamus                      (2) Hypothalamus                      (3) Cerebellum                      (4) Medulla oblongata

**Ans. (4)**

**Sol.** 'Medulla Oblongata' is the part of human brain responsible for controlling the rate of breathing in humans.

140. The number of pairs of nerves which arise from spinal cord is :  
(1) 21                      (2) 31                      (3) 41                      (4) 51

**Ans. (2)**

**Sol.** Nerves arising from the spinal cord are known as spinal nerves. A total of 31 pairs of spinal nerves arise from the spinal cord in our body.

141. If  $a : b = 2 : 3$  and  $x : y = 3 : 4$ , then

$$\frac{2ax - 25by}{3ay + 4bx} \text{ is}$$

$$(1) \frac{24}{5}$$

$$(2) \frac{5}{24}$$

$$(3) -\frac{24}{5}$$

$$(4) \frac{12}{13}$$

**Ans. (3)**

**Sol.** Let  $a = 2k$   $x = 3p$

$$b = 3k \quad y = 4p$$

$$\frac{2ax - 25by}{3ay + 4bx}$$

$$\frac{2 \cdot 2k \cdot 3p - 25 \cdot 3k \cdot 4p}{3 \cdot 2k \cdot 4p + 4 \cdot 3k \cdot 3p}$$

$$\frac{kp(12 - 300)}{kp(24 + 36)} = -\frac{24}{5}$$

142. A square is inscribed in a circle of radius 'a'. another circle is inscribed in that square and again a square is inscribed in this circle. The side of this square is :

$$(1) 2a$$

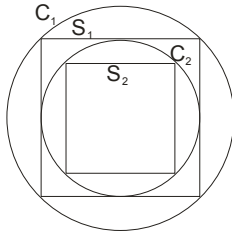
$$(2) \frac{a}{2}$$

$$(3) \frac{a}{\sqrt{2}}$$

$$(4) a$$

**Ans. (4)**

**Sol.**



Radius of  $(C_1)$  is  $r_1 = a$

$$S_1 \sqrt{2} = 2a$$

$$S_1 = a\sqrt{2}$$

$$2r_2 = a\sqrt{2}$$

$$r_2 = \frac{a}{\sqrt{2}}$$

$$2r_2 = a\sqrt{2}$$

$$a\sqrt{2} = S_2\sqrt{2}$$

$$a = S_2$$

143. If  $a \cos \theta - b \sin \theta = c$ , then  $a \sin \theta + b \cos \theta = ?$

$$(1) \pm \sqrt{a^2 + b^2 + c^2}$$

$$(2) \pm \sqrt{a^2 + b^2 - c^2}$$

$$(3) \pm \sqrt{a^2 - b^2 + c^2}$$

$$(4) \pm \sqrt{a^2 - b^2 - c^2}$$

**Ans. (2)**

**Sol.**  $(a \cos \theta - b \sin \theta)^2 = (c)^2$

$$a^2 \cos^2 \theta + b^2 \sin^2 \theta - 2ab \sin \theta \cos \theta = c^2$$

$$a^2(1 - \sin^2 \theta) + b^2(1 - \cos^2 \theta) - 2ab \sin \theta \cos \theta = c^2$$

$$(a \sin \theta + b \cos \theta)^2 = a^2 + b^2 - c^2$$

$$a \sin \theta + b \cos \theta = \pm \sqrt{a^2 + b^2 - c^2}$$



144. If  $x^2 - 3x + 2$  is a factor of  $x^4 - px^2 + q$ , then the value of  $p$  and  $q$  are respectively are

- (1)  $-5, 4$                       (2)  $-5, -5$                       (3)  $5, 4$                       (4)  $5, -4$

**Ans. (3)**

**Sol.**  $\because x^2 - 3x + 2 = (x-1)(x-2)$

$$f(x) = x^4 - px^2 + q$$

$$f(1) = 1 - p + q = 0 \quad \dots (1)$$

$$f(2) = 16 - 4p + q = 0 \quad \dots (2)$$

Solving (1) and (2)  $p = 5, q = 4$

145. If  $x_1, x_2, x_3, \dots, x_n$  are in A.P., then the value of  $\frac{1}{x_1x_2} + \frac{1}{x_2x_3} + \frac{1}{x_3x_4} + \dots + \frac{1}{x_{n-1}x_n}$  is :

- (1)  $\frac{n-1}{x_1x_n}$                       (2)  $\frac{n-1}{x_2x_{n-1}}$                       (3)  $\frac{n}{x_1x_n}$                       (4)  $\frac{n+1}{x_1x_n}$

**Ans. (1)**

**Sol.**  $\frac{1}{x_1x_2} + \frac{1}{x_2x_3} + \frac{1}{x_3x_4} + \dots + \frac{1}{x_{n-1}x_n}$

$$\text{Let } x_2 - x_1 = d \quad \Rightarrow \frac{1}{d} \left[ \left( \frac{1}{x_1} - \frac{1}{x_2} \right) + \left( \frac{1}{x_2} - \frac{1}{x_3} \right) + \dots + \left( \frac{1}{x_{n-1}} - \frac{1}{x_n} \right) \right]$$

$$\Rightarrow \frac{1}{d} \left[ \left( \frac{1}{x_1} - \frac{1}{x_n} \right) \right] \quad \Rightarrow \frac{1}{d} \left( \frac{x_n - x_1}{x_1x_n} \right)$$

$$= \frac{1}{d} \left( \frac{x_1 + (n-1)d - x_1}{x_1x_n} \right) = \frac{n-1}{x_1x_n}$$

146. If  $x^2 + y^2 + \frac{1}{x^2} + \frac{1}{y^2} = 4$ , then the value of  $x^2 + y^2$  is :

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

**Ans. (1)**

**Sol.** Apply AM-GM on  $x^2, \frac{1}{x^2}$

$$\Rightarrow x^2 + \frac{1}{x^2} \geq 2$$

**Equality holds when**  $x^2 = \frac{1}{x^2} \Rightarrow x = \pm 1 \quad \therefore y = \pm 1$

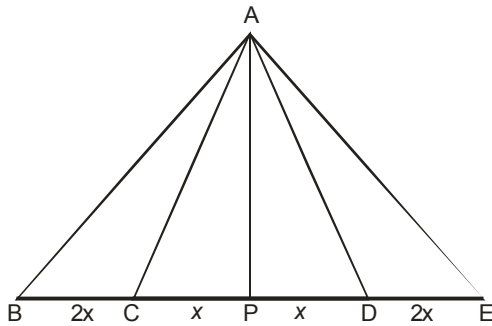
Thus,  $x^2 + y^2 = 2$

147. In the figure,  $BC = CD = DE$  and P is mid point of CD. Then area of  $\Delta APC$  is

- (1)  $\frac{1}{3} ar(\Delta ABC)$       (2)  $\frac{1}{2} ar(\Delta ABD)$       (3)  $\frac{1}{6} ar(\Delta ABC)$       (4)  $\frac{1}{4} ar(\Delta ABD)$

**Ans. (4)**

**Sol.**



$PC = x$  and  $BD = 4x$

Now  $\frac{ar(\Delta APC)}{ar(\Delta ABD)} = \frac{\frac{1}{2} \times PC \times h}{\frac{1}{2} \times BD \times h} = \frac{x}{4x} = \frac{1}{4}$

148. If  $x, y$  and  $z$  are positive real numbers and  $a, b$  and  $c$  are rational numbers, then value of

$\frac{1}{1+x^{b-a}+x^{c-a}} + \frac{1}{1+x^{a-b}+x^{c-b}} + \frac{1}{1+x^{b-c}+x^{a-c}}$  is

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

**Ans. (2)**

**Sol.** 
$$\frac{1}{1+x^{b-a}+x^{c-a}} + \frac{1}{1+x^{a-b}+x^{c-b}} + \frac{1}{1+x^{b-c}+x^{a-c}}$$

$$= \frac{1}{1+\frac{x^b}{x^a}+\frac{x^c}{x^a}} + \frac{1}{1+\frac{x^a}{x^b}+\frac{x^c}{x^b}} + \frac{1}{1+\frac{x^b}{x^c}+\frac{x^a}{x^c}}$$

$$= \frac{x^a}{x^a+x^b+x^c} + \frac{x^b}{x^a+x^b+x^c} + \frac{x^c}{x^a+x^b+x^c} = \frac{x^a+x^b+x^c}{x^a+x^b+x^c} = 1$$

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

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

**Ans. (2)**

**Sol.** Let the height of the cylinder be  $h$  units and the radius of the base be  $r$  units.

The curved surface area of the cylinder with height  $h$  and radius  $r = 2 \pi rh$  sq units.

$$\text{The new height} = \frac{110}{100}h$$

$$\text{New radius} = \frac{90}{100}r$$

$$\text{Hence new surface area} = 2\pi \times \frac{110}{100}h \times \frac{90}{100}r = \left(\frac{99}{100}\right)2\pi rh \text{ sq. units}$$

Therefore the surface area has decreased by 1%.

150. If  $a_1, a_2, a_3, \dots, a_n$  are in A.P. and  $a_1 = 0$ , then the value of  $\left(\frac{a_3}{a_2} + \frac{a_4}{a_3} + \dots + \frac{a_n}{a_{n-1}}\right) - a_2\left(\frac{1}{a_2} + \frac{1}{a_3} + \dots + \frac{1}{a_{n-2}}\right)$  is equal to

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

**Ans. (4)**

**Sol.**  $a_1 = 0, a_2 = d, a_3 = 2d, a_4 = 3d, a_5 = 4d$ .

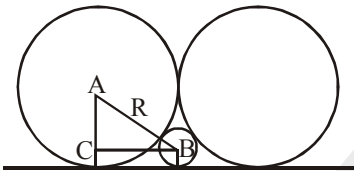
Substituting 'n' as 5 in the above equation and verifying with the options we get the answer as option (4)

151. Three circles touch each other externally and all the three touch a line. If two of them are equal and radius of third circle is 4 cm, then radius of equal circles is :

- (1) 12 cm                      (2) 8 cm                      (3) 16 cm                      (4) 20 cm

**Ans. (3)**

**Sol.**

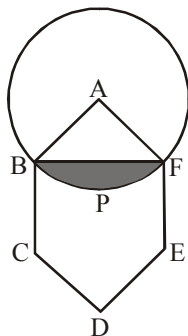


$$AC = R - 4; AB = R + 4; BC = R$$

ABC is a right angled triangle.

Applying Pythagoras theorem, we get  $R = 16\text{cm}$ .

152. In the given figure, the centre of the circle is A and ABCDEF is a regular hexagon of side 6 cm. The approximate area of segment BPF is (Take  $\pi = 3.14$ )

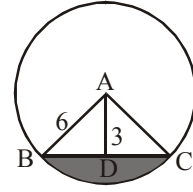


- (1)  $25 \text{ cm}^2$                       (2)  $22 \text{ cm}^2$                       (3)  $32 \text{ cm}^2$                       (4)  $30 \text{ cm}^2$

**Ans. (2)**

**Sol.** Area of the segment = Area of sector ABF – Area  $\Delta$ ABF

$$\begin{aligned}
 &= \frac{\pi \times 6^2 \times 120^\circ}{360^\circ} - \frac{1}{2} \times BC \times AD \\
 &= 12\pi - BD \times AD \\
 &= 12 \times 3.14 - 3\sqrt{3} \times 3 = 22.092 \text{ sq. cm}
 \end{aligned}$$



153. If  $\frac{1}{y+z} + \frac{1}{z+x} = \frac{2}{x+y}$ , then what is the value of  $x^2 + y^2$  ?

(1) 1

(2)  $-2z^2$

(3)  $2z^2$

(4)  $y^2 + z^2$

**Ans. (3)**

**Sol.** 
$$\frac{1}{y+z} + \frac{1}{x+z} = \frac{2}{x+y}$$

$$\frac{x+z+y+z}{(y+z)(x+z)} = \frac{2}{x+y}$$

$$\frac{x+y+2z}{(y+z)(x+z)} = \frac{2}{x+y}$$

$$(x+y+2z)(x+y) = 2(y+z)(x+z)$$

$$(x+y)^2 + 2z(x+y) = 2[xy + yz + zx + z^2]$$

$$x^2 + y^2 + 2xy + 2xz + 2zy = 2xy + 2yz + 2zx + 2z^2$$

$$x^2 + y^2 = 2z^2$$

154. If  $x^2 = y+z$ ,  $y^2 = y+x$  and  $z^2 = x+y$ , then what is the value of  $\frac{1}{x+1} + \frac{1}{y+1} + \frac{1}{z+1}$  ?

(1) 1

(2) 0

(3) -1

(4) 2

**Ans. (1)**

**Sol.**  $X^2 = Y + Z$

$$Y^2 = X + Z$$

$$Z^2 = Y + X$$

$$= \frac{1}{X+1} + \frac{1}{Y+1} + \frac{1}{Z+1}$$

$$= \frac{1+X-X}{X+1} + \frac{1+Y-Y}{Y+1} + \frac{1+Z-Z}{Z+1}$$

$$= 3 - \left\{ \frac{X^2}{X+X^2} + \frac{Y^2}{Y+Y^2} + \frac{Z^2}{Z+Z^2} \right\}$$

$$= 3 - \left\{ \frac{Y+Z}{X+Y+Z} + \frac{X+Z}{X+Y+Z} + \frac{Z^2}{X+Y+Z} \right\}$$

$$= 3 - \left\{ \frac{2(X+Y+Z)}{X+Y+Z} \right\}$$

$$= 3 - 2 = 1$$

155. If  $\alpha, \beta, \gamma$  are the roots of the equation  $x^3 + 4x + 1 = 0$ , then  $(\alpha + \beta)^{-1} + (\beta + \gamma)^{-1} + (\gamma + \alpha)^{-1}$  is equal to

(1) 2

(2) 4

(3) 3

(4) 5

**Ans. (2)**

**Sol.**  $\alpha + \beta + \gamma = 0$

$$\alpha\beta + \beta\gamma + \gamma\alpha = 4$$

$$\alpha\beta\gamma = -1$$

Now  $(\alpha + \beta)^{-1} + (\beta + \gamma)^{-1} + (\gamma + \alpha)^{-1}$

$$\Rightarrow (-\gamma)^{-1} + (-\alpha)^{-1} + (-\beta)^{-1}$$

$$\Rightarrow -\left[\frac{1}{\alpha} + \frac{1}{\beta} + \frac{1}{\gamma}\right]$$

$$\Rightarrow -\left[\frac{\alpha\beta + \beta\gamma + \gamma\alpha}{\alpha\beta\gamma}\right] = -\left[\frac{4}{-1}\right] = 4$$

156. If  $x, y, z$  are three positive number then the minimum value of  $\frac{y+z}{x} + \frac{z+x}{y} + \frac{x+y}{z}$  is

(1) 1

(2) 2

(3) 3

(4) 6

**Ans. (4)**

**Sol.**  $\frac{y+z}{x} + \frac{z+x}{y} + \frac{x+y}{z}$

$$\Rightarrow \left(\frac{y}{x} + \frac{x}{y}\right) + \left(\frac{y}{z} + \frac{z}{x}\right) + \left(\frac{z}{x} + \frac{x}{z}\right)$$

we know that by AM - GM

$$\left(a + \frac{1}{a}\right) \geq 2$$

thus for minimum  $2 + 2 + 2 = 6$

157. The minimum value of the expression  $\frac{3b+4c}{a} + \frac{4c+a}{3b} + \frac{a+3b}{4c}$ , ( $a, b, c$  are +ve)

(1) 1

(2) 4

(3) 6

(4) 8

**Ans. (3)**

**Sol.**  $\frac{3b+4c}{a} + \frac{4c+a}{3b} + \frac{a+3b}{4c}$

$$\left(\frac{3b}{a} + \frac{a}{3b}\right) + \left(\frac{4c}{a} + \frac{a}{4c}\right) + \left(\frac{4c}{3b} + \frac{3b}{4c}\right)$$



161. When was the democracy restored in Chile ?

- (1) 1973                                      (2) 1988                                      (3) 1957                                      (4) 1991

**Ans. (2)**

**Sol. (1988)**

162. Which of the following country is not a operational member of security council ?

- (1) Russia                                      (2) China                                      (3) Germany                                      (4) America

**Ans. (3)**

**Sol.** (Germany)

163. Who among the following was not a member of the constituent assembly ?

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

**Ans. (1)**

**Sol.** ( Mahatma Gandhi)

164. Which of the following Secretary General said that “US war on Iraq was not legal”

- (1) Kofi A Anan                                      (2) B.B Ghali                                      (3) U Thant                                      (4) Ban Ki Moon

**Ans. (1)**

**Sol.** (Kofi a. Anan)

165. President can declare emergency when

- (1) Prime minister advises him to do so                                      (2) Parliament advises  
(3) The council of minister, in writing, advises him to do so                                      (4) Home minister ask him to do so

**Ans. (1)**

**Sol.** ( PM advices him to do so)

166. ‘KOSOVO’ was a province of \_\_\_\_\_ before the split

- (1) Vietnam                                      (2) Zimbabwe                                      (3) Sri Lanka                                      (4) Yugoslavia

**Ans. (4)**

**Sol.** ( Yugoslavia)

167. Which of the following state was born bout of culture, ethnicity and geography.

- (1) Kerala                                      (2) Nagaland                                      (3) Mizoram                                      (4) Assam

**Ans. (2)**

**Sol.** (Nagaland)

168. ‘End of Racial Discrimination’ is a part of which fundamental right ?

- (1) Right to freedom                                      (2) Right to equality  
(3) Right against exploitation                                      (4) Right to education and culture

**Ans. (2)**

**Sol.** (Right to equality)

169. The movement for the individual and family right of women is known as

- (1) Mahila Adhikar Aandolan                                      (2) Mahila Shakti Aandolan  
(3) Narivadi Aandolan                                      (4) Nari Shasktikaran Aandolan

**Ans. (4)**

**Sol.** (Nari Shasaktikaran Andolan)

170. What is the meaning of ‘Transparency’?

- (1) When decisions is taken by the ruler  
(2) When decisions are make through leader’s conclusion  
(3) When decisions are made for individual greeds  
(4) When decisions are taken with honesty and proper follow of rules

**Ans. (4)**

**Sol.** (when decisions are taken with honesty and proper follow of rule)

171. The international organization the works for human rights is -

- (1) Amety International (2) Amnesty International (3) Asnesty International (4) Afnesty international

**Ans. (2)**

**Sol.** (Amnesty International)

172. What was 'Livre' ?

- (1) Currency of France (2) Newspaper of France (3) Magazine of France (4) Flag of France

**Ans. (1)**

**Sol.** (Currency of France)

173. Who granted sole right to trade with East to East India Company ?

- (1) James I (2) James II (3) Elizabeth I (4) Elizabeth II

**Ans. (3)**

**Sol.** (Elizabeth I)

174. In which congress session, Non cooperation programme was adopted

- (1) Ahmedabad 1921 (2) Kolkata 1917 (3) Amritsar 1919 (4) Nagpur 1920

**Ans. (4)**

**Sol.** (Nagpur 1920)

175. The first Modern novel published in Malayalam in the year 1889 was

- (1) Indulekha (2) Rajasekhara Caritamu (3) Manju Ghose (4) Pariksha Guru

**Ans. (1)**

**Sol.** (Indulekha)

176. The painting 'Damayanti' was made by

- (1) Abindra Nath Tagore (2) William Jones (3) Raja Ravi Verma (4) Ravindra nath Tagore

**Ans. (3)**

**Sol.** (Raja Ravi Verma)

177. When was Simon Commission arrived in India -

- (1) 1928 (2) 1930 (3) 1931 (4) 1932

**Ans. (1)**

**Sol.** (1928)

178. 'Rinderpest' is a term used for

- (1) A cattle disease (2) Missing of cattle  
(3) indentured Labourer (4) Mass production in a factory

**Ans. (1)**

**Sol.** (Cattle disease)

179. Giuseppe Garibaldi was a famous freedom fighter of -

- (1) Germany (2) Poland (3) Ireland (4) Italy

**Ans. (4)**

**Sol.** (Italy)

180. Gudem Rebellion was led by

- (1) Baba Ramchandra (2) Jawahar Lal Nehru (3) Alluri Sitaram Raju (4) Mahatma Gandhi

**Ans. (3)**

**Sol.** (Alluri sitaram raju)

181. 'The Social Contract' book was written by

- (1) Dantey (2) Rousseau (3) Petrarek (4) Napoleon



**Ans. (2)**

**Sol.** (Rousseau)

182. The principle of the 'Garden City' was developed by

- (1) Raymond Unwin                      (2) Barry Parker                      (3) Ebenezer Howard                      (4) Herbert Baker

**Ans. (3)**

**Sol.** (Ebenezer Howard)

183. Which of the following organization looks after the credit needs of agriculture and rural development in India

- (1) FCI                                      (2) IDBI                                      (3) NABARD                                      (4) SBI

**Ans. (3)**

**Sol.** (NABARD)

184. How many phases are there in circular flow of income ?

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

**Ans. (2)**

**Sol.** (3)

185. Which of the following is considered as social infrastructure ?

- (1) Transport                                      (2) Education                                      (3) Energy                                      (4) Communication

**Ans. (2)**

**Sol.** (Education)

86. Multiple cropping refers to

- (1) Cultivation of Wheat and Rice  
(2) Cultivation of two crops in alternate rows  
(3) Cultivating more than one crop on the same field in a year  
(4) Cultivating crops and rearing animals simultaneously.

**Ans. (3)**

**Sol.** (Cultivating more than one crop on the same field in a year)

187. Infant mortality rate refers to the death of child under the age of

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

**Ans. (1)**

**Sol.** (1 year)

188. In which year was the Integrated Child Development Services (ICDS) introduced

- (1) 1965                                      (2) 1975                                      (3) 1985                                      (4) 1995

**Ans. (2)**

**Sol.** (1975)

189. The first chairman of Planning commission was ?

- (1) Indira Gandhi                                      (2) Dr. Rajendra Prashad                                      (3) Jawahar Lal Nehru                                      (4) Vallabh Bhai Patel

**Ans. (3)**

**Sol.** (Jawahar Lal Nehru)

190. What percent of the total surface area of India is covered by mountains ?

- (1) 33 %                                      (2) 35 %                                      (3) 30 %                                      (4) 25 %

**Ans. (3)**

**Sol.** (30%)

191. Which mineral has excellent dielectric strength, insulating properties, low power loss factor and resistance to high voltage ?

- (1) Aluminium                                      (2) Lime stone                                      (3) Copper                                      (4) Mica

**Ans. (4)**

**Sol.** (Mica)

192. Which of the following is an example of joint sector industry ?

- (1) BHEL (2) OIL (3) SAIL (4) TISCO

**Ans. (2)**

**Sol.** (OIL)

193. Which mode of transport reduces transshipment losses and delays ?

- (1) Railways (2) Road ways (3) Water ways (4) Pipelines

**Ans. (4)**

**Sol.** (pipelines)

194. Which of the following lake lies on the Equator ?

- (1) Lake Victoria (2) Lake Malavi (3) Lake Nasser (4) None of these

**Ans. (1)**

**Sol.** (lake Victoria)

195. The longitudinal valleys lying between Lesser Himalayas and Shivaliks are known as:

- (1) Valleys (2) Coast (3) Passes (4) Duns

**Ans. (4)**

**Sol.** (Duns)

196. In winters, the western cyclonic disturbances originate from which sea ?

- (1) Caspian sea (2) Black sea (3) Mediterranean sea (4) Baltic sea

**Ans. (3)**

**Sol.** (Mediterranean sea)

197. Balancing the need to use resources and also conserve them for future is called :

- (1) Resource development (2) Resource conservation  
(3) Sustainable development (4) Human Resource Development

**Ans. (3)**

**Sol.** (Sustainable development)

198. Which among the following has the maximum number of National Parks ?

- (1) Andaman and Nicobar Island (2) Arunachal Pradesh

- (3) Assam (4) Meghalaya

**Ans. (1)**

**Sol.** (Andaman Nicobar)

199. According to the 'Theory of Plate Tectonics', when some plates come towards each other which one of the following is formed ?

- (1) Convergent boundary (2) Divergent boundary (3) transform boundary (4) None of the above

**Ans. (1)**

**Sol.** (Convergent boundary)

200. The largest producer of cotton in the world is :

- (1) India (2) China (3) Brazil (4) U.S.A.

**Ans. (2)**

**Sol.** (China)