# NATIONAL TALENT SEARCH EXAMINATION (NTSE-2017) STAGE -1
# TAMIL NADU STATE : SAT

***Date: 6/11/2016***

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

# SOLUTIONS

***101.*** When $10x^2 + x - 23$ is divided by $(2x + 3)$, the remainder is :

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

***Ans. (2)***

***Sol.*** On dividing $10x^2 + x - 23$ by $2x + 3$, remainder we get

$$\text{Remainder} = 10\left(\frac{-3}{2}\right)^2 - \frac{3}{2} - 23$$

$$= 10 \times \frac{9}{4} + \frac{-3-46}{2} = \frac{45}{2} - \frac{49}{2}$$

$$= \frac{-4}{2} = -2$$

***102.*** If $\alpha$ and $\beta$ are the zeros of the polynomial $25x^2 - 16$, then $\alpha^2 + \beta^2$ is :

(1) $\frac{32}{25}$ (2) $\frac{25}{32}$ (3) $\frac{25}{16}$ (4) $\frac{16}{25}$

***Ans. (1)***

***Sol.*** Given polynomial $25x^2 - 16 = 0$

$$\alpha + \beta = 0, \alpha\beta = \frac{-16}{25}$$

$$(\alpha + \beta)^2 = \alpha^2 + \beta^2 + 2\alpha\beta$$

$$0 - 2\left(\frac{-16}{25}\right) = \alpha^2 + \beta^2 \Rightarrow \alpha^2 + \beta^2 = \frac{32}{25}$$

***103.*** The sum of $\frac{a^3}{b-a}$ and $\frac{b^3}{a-b}$ is :

(1) $a^2 + ab + b^2$ (2) $-a^2 - ab - b^2$ (3) $a^2 - ab + b^2$ (4) $a^3 - b^3$

***Ans. (2)***

***Sol.*** $$\frac{a^3}{b-a} + \frac{b^3}{a-b} = \frac{a^3}{b-a} - \frac{b^3}{b-a} = \frac{a^3 - b^3}{b-a} = \frac{(a-b)(a^2+b^2+ab)}{(b-a)}$$

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

***104.*** Sum of the digits of a two digit number is 9. The number obtained by interchanging the digits is 18 more than twice the original number. The original number is :

(1) 72 (2) 27 (3) 36 (4) 63

***Ans.*** ***(2)***

***Sol.*** Let the one's digit be x and ten's digit 9 – x

original number = x + 10 (9 – x)

= 90 – 9x

Reversed number = 10x + 9 – x = 9x + 9

According to question

9x + 9 = 18 + 2 (90 – 9x)

9x + 9 = 18 + 180 – 18x

27x = 189

n = 21/3 = 7

original number = 90 – 9 × 7 = 90 – 63 = 27

***105.*** Which of the following are irrational numbers ?

(i) $\sqrt{2+\sqrt{3}}$ (ii) $\sqrt{4+\sqrt{25}}$ (iii) $3\sqrt{5+\sqrt{7}}$ (iv) $\sqrt{6+3\sqrt{8}}$

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

***Ans.*** ***(NA)***

***Sol.*** (i) $\sqrt{2+\sqrt{3}}$ = irrational number

(ii) $\sqrt{4+\sqrt{25}} = \sqrt{4+5} = \sqrt{9} = 3$ = Rational number

(iii) $\sqrt[3]{5+\sqrt{7}}$ = irrational

(iv) $\sqrt{6+3\sqrt{8}} = \sqrt{6+2} = \sqrt{8} = 2\sqrt{2}$ = irrational

Thus, (i), (iii), (iv) are irrational

***106.*** For which value, point A (a, b) lies in the quadrant III :

(1) a > 0, b < 0 (2) a < 0, b < 0 (3) a > 0, b > 0 (4) a < 0, b > 0

***Ans.*** ***(2)***

***Sol.*** For quadrant III a < 0, b < 0

***107.*** If the LCM of 12 and 42 is (10 m + 4), then the value of 'm' is :

(1) 50 (2) 8 (3) $\frac{1}{5}$ (4) 1

***Ans.*** ***(2)***

***Sol.*** LCM of 12, 42

| | |
|---|---|
| 2 | 12, 42 |
| 3 | 6, 21 |
| 2 | 2, 7 |
| 7 | 1, 7 |
| | 1, 1 |

LCM = 2 × 3 × 2 × 7 = 84 = 10 m + 4

80 = 10 m

m = 8

***108.*** If the perimeter of a protactor is 72 cm then it's radius is $\left(\text{take } \pi = \frac{22}{7}\right)$ :

(1) 7 cm (2) 21 cm (3) 14 cm (4) 3.5 cm

***Ans.*** ***(3)***

***Sol.*** $\pi r + 2r = 72$

$$r\left(\frac{22}{7} + 2\right) = 72$$

$$r \times \frac{36}{7} = 72$$

$r = 14$ cm

***109.*** The degree of the polynomial $(x + 1)(x^2 - x - x^4 + 1)$ is :

(1) 2 (2) 3 (3) 4 (4) 5

***Ans.*** ***(4)***

***Sol.*** $(x + 1)(x^2 - x - x^4 + 1) = x^3 - x^2 - x^5 + x + x^2 - x - x^4 + 1$

$= -x^5 - x^4 + x^3 + 1.$

***110.*** Two right circular cones have same radii. Ratio of their slant heights is 4 : 3. Then the ratio of their curved surface areas is :

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

***Ans.*** ***(3)***

***Sol.*** Ratio of curved surfaces $= \frac{\pi r \ell_1}{\pi r \ell_2} = \frac{4}{3}$

***111.*** AB and CD are two chords of a circle which intersect each other externally at P. If AB = 4 cm, BP = 5 cm, PD = 3 cm, then the length of CD is :

(1) 10 cm (2) 12 cm (3) 8 cm (4) 11 cm

***Ans.*** ***(2)***

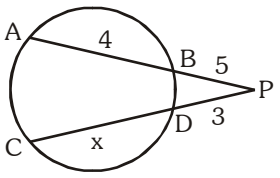
***Sol.*** Let CD = x

$PA \times PB = PC \times PD$

$9 \times 5 = 3 \times (3 + x)$

$15 = 3 + x$

$x = 12$




***112.*** The radii of two concentric circles are 7 cm and 14 cm respectively. The area between the two sectors of the circles whose central angle 60° is :

(1) 154 sq. cm (2) 77 sq. cm (3) 308 sq. cm (4) 98 sq. cm

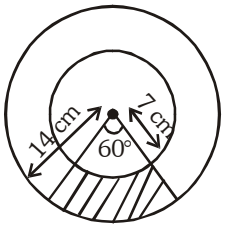
***Ans.*** ***(2)***

***Sol.*** Area of shaded region

$$= \pi 14^2 \frac{60°}{360°} - \pi 7^2 \frac{60°}{360°}$$

$$= \pi \frac{60°}{360°} [14^2 - 7^2]$$

$$= \frac{22}{7} \times \frac{1}{6} (14 + 7)(14 - 7) = \frac{22 \times 2}{6} = 77 \text{ sq. cm}$$



**113.** Arithmetic mean of 20 observations is 15. If each observation is multiplied by $\frac{2}{3}$, then the arithmetic mean of them is :

(1) 10 (2) 30 (3) 45 (4) 15

***Ans.*** ***(1)***

***Sol.*** New arithmetic mean = $\frac{2}{3} \times 15 = 10$

**114.** There are 6 defective items in a sample of 20 items. One item is drawn at random. The probabillity that it is non-defective item is :

(1) $\frac{7}{10}$ (2) 0 (3) $\frac{3}{10}$ (4) $\frac{2}{3}$

***Ans.*** ***(1)***

***Sol.*** Probability that the item drawn in non defective = $\frac{20-6}{20} = \frac{14}{20} = \frac{7}{10}$

**115.** Segment of a quadrant of a circle has area equal to :

(1) $\frac{r^2}{2}\left(\frac{\pi}{2}-1\right)$ sq. units (2) $\left(\frac{\pi}{4}+1\right)r^2$ sq. units

(3) $\left(1-\frac{\pi}{2}\right)\frac{r^2}{2}$ sq. units (4) $\left(\frac{\pi}{4}r^2-1\right)$ sq. units

***Ans.*** ***(1)***

***Sol.*** Segment of a quadrant of a circle has area

$= \frac{1}{4}\pi r^2 - \frac{1}{2}r^2$

$= \frac{r^2}{2}\left(\frac{1}{2}\pi - 1\right)$ sq. units

**116.** $\sqrt{1-\sin^2 A}\,.\sqrt{\sec^2 A-1}\,.\sqrt{1+\cot^2 A}$

(1) 0 (2) 2 (3) 1 (4) –2

***Ans.*** ***(3)***

***Sol.*** $\sqrt{1-\sin^2 A} \times \sqrt{\sec^2 A-1} \times \sqrt{1+\cot^2 A}$

$= \cos A \times \tan A \times \operatorname{cosec} A$

$= 1$

**117.** If $5x = \operatorname{cosec} 0$ and $\frac{5}{x} = \cot\theta$ then $5\left(x^2 - \frac{1}{x^2}\right) =$

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

***Ans.*** ***(3)***

***Sol.*** $5x = \operatorname{cosec}\theta$ ..... (1)

$\frac{5}{x} = \cot\theta$ ..... (2)

squaring and subtracting equation (1) & (2)

$25\left(x^2 - \frac{1}{x^2}\right) = \operatorname{cosec}^2\theta - \cot^2\theta \Rightarrow 25\left(x^2 - \frac{1}{x^2}\right) = 1$

$5\left(x^2 - \frac{1}{x^2}\right) = \frac{1}{5}$

**118.** If $x = a\cos\theta$, $y = a\sin\theta$, then $x^2 + y^2 =$

(1) 1 (2) a (3) $a^2$ (4) $a^2 + b^2$

***Ans.*** ***(3)***

***Sol.*** $x = a\cos\theta$ , $y = a\sin\theta$.

On squaring and adding

$x^2 + y^2 = a^2\cos^2\theta + \sin^2\theta$

$= a^2$.

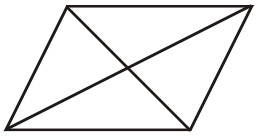
**119.** If the diagonals of a rhombus are 30 cm and 40 cm, then the length of side of rhombus is :

(1) 20 cm (2) 22 cm (3) 25 cm (4) 45 cm

***Ans.*** ***(3)***

***Sol.*** $d_1 = 30\text{ cm} \Rightarrow \frac{d_1}{2} = 15\text{ cm}$

$d_2 = 40\text{ cm} \Rightarrow \frac{d_2}{2} = 20\text{ cm}$

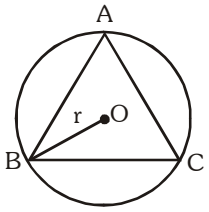


$\text{side} = \sqrt{\left(\frac{d_1}{2}\right)^2 + \left(\frac{d_2}{2}\right)^2}$

$= \sqrt{15^2 + 20^2}$

$= 25\text{ cm}$

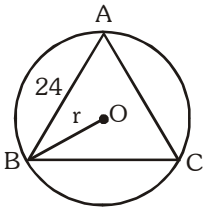
**120.** Equilateral triangle ABC is incribed in a circle. If side of the triangle = 24 cm, then the radius is _____.




(1) $6\sqrt{3}$ cm (2) $12\sqrt{3}$ cm (3) $8\sqrt{3}$ cm (4) 6 cm

***Ans.*** ***(3)***

***Sol.*** Since in equilateral median and altitude coincides each other.




Altitude of the $\Delta = \frac{\sqrt{3}}{2} \times 24$

$= 12\sqrt{3}$

Radius $= \frac{2}{3} \times 12\sqrt{3} = 8\sqrt{3}$ cm

**121.** Two cars A and B accelerate in the ratio of 2: 3 respectively. If they both accelerate for equal time, the ratio of their change in velocity is :

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

***Ans.*** ***(1)***

***Sol.*** $\frac{a_A}{a_B} = \frac{2}{3}, \frac{t_A}{t_B} = \frac{1}{1}\ \frac{V_A}{V_B} = ?$

$a = \frac{v - u}{t}$

$a_A = \frac{v_A - u_A}{t_A}\ a_B = \frac{v_B - u_B}{t_B} \Rightarrow \frac{a_A}{a_B} = \frac{v_A - u_A}{v_B - u_B}$

$\therefore\ \frac{v_A - u_A}{v_B - u_B} = \frac{2}{3}$

***122.*** Two cars X and Y accelerate at the rate of $2m/s^2$ and 3 $m/s^2$ respectively from rest. The ratio of time taken by the cars X and Y is 4 : 5. In that given ratio of time interval if the distance travelled by car X is 100 km then the distance travelled by car Y is :

(1) $\frac{1875}{8}$ km (2) $\frac{375}{2}$ km (3) $\frac{1875}{4}$ km (4) $\frac{375}{4}$ km

***Ans.*** ***(1)***

***Sol.*** $a_x = 2m/s^2$ , $a_y = 3\ m/s^2$ , $u_x = u_y = 0$, $\frac{t_x}{t_y} = \frac{4}{5}$ , $s_x = 100$ km, $s_y = ?$

$$s = ut + \frac{1}{2}at^2$$

$$\frac{s_x}{s_y} = \frac{1/2a_x t_x^{\ 2}}{1/2a_y b_y^2}$$

$$\frac{s_x}{s_y} = \frac{2}{3}\left(\frac{4}{5}\right)^2$$

$$\frac{100 \times 1000}{s_y} = \frac{32}{75}$$

$$s_y = \frac{10^5 \times 75}{32}$$

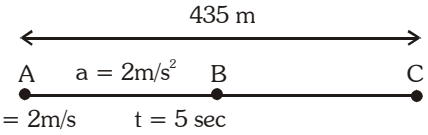
$$s_y = \frac{7500}{32}\ km = \frac{1875}{8}\ km$$

***123.*** A car driver travelling with a uniform velocity of 2 m/s notices a railway level crossing at a distance of 435 m from him. And also he notices that it is going to be closed in 10 seconds. First he decides to cross the level crossing hence he accelerates his car at the rate of 2 $ms^{-2}$ for five seconds. Then he decides to stop the car. So he applies brakes and stops the car exactly before the level crossing (without following the timer). Calculate the minimum rate at which he has to decelerarte the car so that he stops the car exactly before the level crossing.

(1) 1.8 $m/s^2$ (2) 18 $m/s^2$ (3) 0.18 $m/s^2$ (4) 3.6 $m/s^2$

***Ans.*** ***(3)***

***Sol.***




For the first five seconds

$u = 2m/s$, $t = 5s$, $a = 2m/s^2$, $s = ?$ $v = ?$

$v = u + at$

$v = 2 + 2 \times 5 = 12$ m/s.

Now $v^2 = u^2 + 2as$

$144 = 4 + 2 \times 2 \times 5$

$$s = \frac{140}{4} = 35\ m$$

From point B, remaining distance = 435 – 35 = 400 m

$v = 0$

$u = 12$ m/s

$\therefore\ v^2 = u^2 + 2as$

$0 = (12)^2 + 2 \times a \times 400$

$$a = \frac{144}{800} = 0.18\ m/s^2.$$

***124.*** Two flies A and B revolve around a light in concentric circular path. The radius of circular path of A is twice of B. A travels with a uniform linear speed of 4 m/s while B travels with a uniform linear speed of 3 m/s. When A completes three full rounds then B would have completed

(1) 4 rounds (2) 3 rounds (3) 2 rounds (4) 1 round

***Ans.*** ***(1)***

***Sol.*** $r_A = 2r_B$, $v_A = 4$ m/s, $v_B = 3$ m/s

For A, $s_A = 2\pi(r \times 2)$

$v_A = 4$ m/s

$$t_A = \frac{s_A}{v_A} = \frac{4\pi r}{4 m/s} = \pi r \text{ s}$$

For three rounds $t = 3\pi r$ s

For B

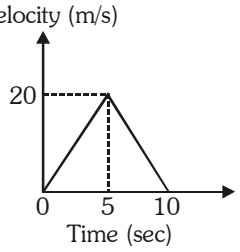
$s_B = v_B \times t_B = 3 \times 3\pi r$

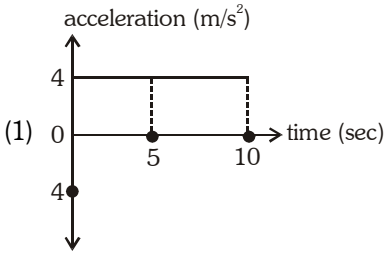
$= 9 \pi r$ m

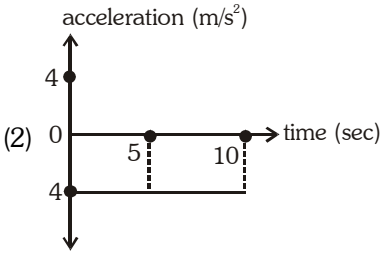
for one round $= s = 2\pi r$

thus 4 round have been completed by fly B.

***125.*** If the under given velocity (vs) time graph can be changed into acceleration (vs) time graph, then which one of the given options represents acceleration (vs) time graph :




(1)



(2)
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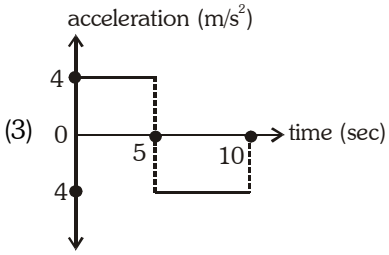


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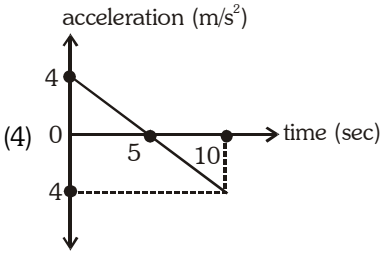



***Ans.*** ***(3)***

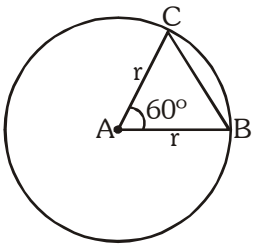
***Sol.*** Constant acceleration upto 5 sec and constant retardation for next 5 sec. is best reprsented by option 3.

**126.** A boy travels along a circular path of radius 'r' m. When his angular displacement is $\frac{\pi}{3}$ radians then his linear displacement is :

(1) $r\sqrt{2}$ m (2) r m (3) $2\sqrt{r}$ m (4) $\frac{\pi r}{3}$ m

***Ans.*** ***(2)***

***Sol.*** Angular displacement = $\frac{\pi}{3} = 60^o$




According to the figure, AB = AC = r

Thus $\angle ABC = \angle ACB = 60^o$

It is an equilateral triangle thus CB = r

**127.** From a tower of height 20 m a boy throws a stone in the vertically upward direction with a velocity of 40 m/s and at the same time a girl drops another identical stone from the same tower. When the momentum of the stone dropped by the girl is maximum what will be displacement of the stone projected in the upward direction from the top of the tower ? (take acceleration due to gravity of earth as 10 m/s$^2$).

(1) 60 m (2) 40 m (3) 20 m (4) 0 m

***Ans.*** ***(1)***

***Sol.*** For the stone dropped downward

u = 0, v = ?, g = 10m/s$^2$ , s = 20 m, t = ?

$s = ut + \frac{1}{2} at^2$

$20 = \frac{1}{2} \times 10 \times t^2$

t = 2s

for the stone thrown upward

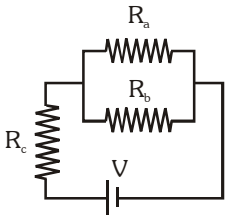
u = 40 m/s, t = 2s, s = ?

$s = ut + \frac{1}{2} gt^2$

$s = 40 \times 2 - \frac{1}{2} \times 10 \times 4$

s = 80 – 20 = 60 m

**128.** If all $R_a = R_b = R_c$ then the number of electrons travelling through $R_a$ in every second is




(1) Half the number of electrons travelling through $R_b$

(2) Equal to the number of electrons travelling through $R_c$

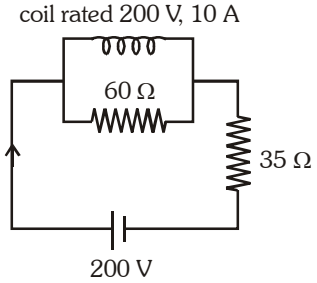
(3) Twice the number of electrons travelling through $R_c$

(4) Half the number of electrons travelling through $R_c$

***Ans.*** ***(4)***

***Sol.*** The current which flows through Rc gets equally divided to $R_a$ and $R_b$ as they are equal. Thus, half the number of electrons travelling through $R_c$ got to $R_A$ and other half go to $R_b$.

***129.*** The heat energy produced by the given coil in the given circuit in five minutes is




(1) $6 \times 10^5$ J (2) $5.4 \times 10^5$ J (3) $6 \times 10^4$ J (4) $5.4 \times 10^4$ J

***Ans.*** ***(4)***

***Sol.*** Resistance of coil = V/I = 20 Ω

Equivalent resistance of circuit =

$$\frac{1}{R_p} = \frac{1}{20} + \frac{1}{60} = \frac{1}{R_p} = \frac{4}{60} = R_p = 15\ \Omega$$

Req. = 15 Ω + 35 Ω. $\Rightarrow$ Req = 50 Ω

$$V = 200\ V \Rightarrow I = \frac{200}{50} = 4A$$

$$\text{Current through coil} = \frac{\text{voltage drop}}{R_{coil}}$$

voltage drop = $R_p \times I = 15 \times 4 = 60$ V

$$\text{current through coil} = \frac{60}{20} = 3A$$

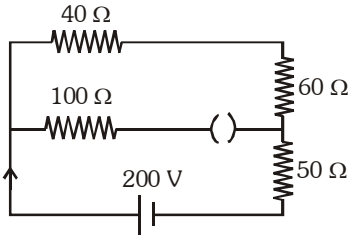
Heat produced = $I^2$ Rt

$= 3 \times 3 \times 20 \times 5 \times 60$

$= 54000$ J

$= 5.4 \times 10^4$ J

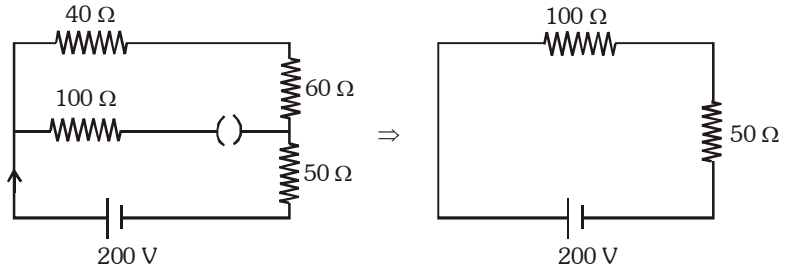
***130.*** The net current in the circuit is :




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

***Ans.*** ***(2)***

***Sol.***




$V = 1\ R \Rightarrow 20 = I \times 150$

$$I = \frac{200}{150} = \frac{4}{3}\ A$$

***131.*** A stone of mass 500 gm is dropped from a certain height. When it is exactly at the midpoint of its free fall, the kinetic energy possessed by it is 800 J. What is the height from where it is dropped ?
(take acceleration due to gravity of earth as 10 $ms^{-2}$)
(1) 320 m (2) 160 m (3) 80 m (4) 240 m

***Ans.*** ***(1)***

***Sol.*** Mass = 500 gm
At mid point ; KE = PE
$KE = mg\ \frac{h}{2}$
$800\ J = \frac{500}{1000} \times 10 \times \frac{h}{2}$
$\frac{800 \times 2}{5} = h$
h = 320 m

***132.*** A car of mass 2,000 kg travelling with a uniform velocity of 2 m/s accelerates till its velocity becomes 22 m/s. The work done on the car is :
(1) 4.8 kJ (2) 480 kJ (3) 48 kJ (4) 500 kJ

***Ans.*** ***(2)***

***Sol.*** m = 2000 kg, u = 2 m/s, v = 22 m/s
$W.D = \frac{1}{2}\ m\ (v^2 - u^2)$
$= \frac{1}{2} \times 2000\ (484 - 4) = 480\ KJ$

***133.*** The engine of a bus of mass 5,000 kg accelerates the bus from 2 m/s to 20 m/s in 120 seconds. The power expended by the bus is :
(1) 8,250 W (2) 8.25 W (3) 82.5 W (4) 825 W

***Ans.*** ***(1)***

***Sol.*** m = 5000 kg, u = 2 m/s, v = 20 m/s, t = 120 sec
$P = \frac{W.D}{t} = \frac{1}{2}\ m\ \frac{(v^2 - u^2)}{t} = \frac{1}{2} \times \frac{5000\ (400 - 4)}{120} = 8250\ W.$

***134.*** Tincture of iodine is a solution used as an antiseptic to clean wounds. This is prepared by dissolving solid iodine in:
(1) alcohol (2) water (3) carbon di sulphide (4) ether

***Ans.*** ***(1)***

***Sol.*** Tincture of iodine is a solution of iodine in alcohol.

***135.*** You are provided with 64 g of sulphur in container A and 64 g of $O_2$ in container B. Which will have more number of molecules ? (Atomic mass of S=32, O=16)
(1) 64 g of S (2) 64 g of $O_2$
(3) both have equal number of molecules (4) cannot calculate with the given information.

***Ans.*** ***(2)***

***Sol.*** Molecular mass of $O_2$ = 32u
Molecular mass of S or $S_8$ = 32 × 8 = 256 u
no. of molecules in 64g of $O_2 = \frac{64}{32} \times N_A = 2\ N_A$
no. of molecules in 64g of $S = \frac{64}{256} \times N_A = \frac{1}{4} N_A$
$2N_A > \frac{1}{4} N_A$

**136.** Shyam and Hari have 2 identical pieces of marble chips with same mass. They take equal volumes of dil. HCl with the same concentration in two different test tubes. Shyam puts the marble piece directly into the acid whereas Hari powdered the marble piece and puts it into the test tube.

What will be the correct observation made ?

(1) Reaction in Shyam's test tube will be faster (2) Reaction in Hari's test tube will be faster

(3) Both reactions will happen in the same speed (4) No reaction happens in both the test tubes

***Ans.*** ***(2)***

***Sol.*** On powdering the marble pieces Hari increases the surface area of marble pieces which increases the rate of reaction.

**137.** pH paper is separately dipped into 2 different solutions X and Y. Colour of pH paper turned pale green in X and blue in Y. X and Y are most probably :

(1) X – water, Y – NaOH (2) X – NaOH, Y – $H_2O$ (3) X – HCl, Y – NaOH (4) X – NaOH, Y – HCl

***Ans.*** ***(2)***

***Sol.*** pH paper shows blue colour in highly basic solution and green colour in neutral solution.

**138.** An element has two shells and has double the number of electrons in its valence shell than the first shell. The valency of the element could be :

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

***Ans.*** ***(2)***

***Sol.*** K shell consists maximum 2 electrons and its double is 4 that is present in valence shell.

Electronic configuration of element = 2, 4

i.e. carbon it has valency – 4

**139.** Priya and Karthick wanted to study about diffusion among liquids. They took identical beakers and poured 100 mL of $H_2O$ in both the beakers. Priya heated the water to 50°C but Karthick maintained the water at room temperature. They both added 5 drops of ink into the beaker, what will they notice ?

(1) Colour of ink spreads faster in Priya's beaker.

(2) Colour of ink spreads faster in Karthick's beaker.

(3) Colour of ink spreads at the same rate in both beakers.

(4) In both the beakers, ink drops settle down at the bottom without spreading.

***Ans.*** ***(1)***

***Sol.*** On heating the temperature energy of particles increases that's why diffusion rate will be faster.

**140.** $^{27}_{13}Al$ looses electrons and froms trivalent cation. This ion will have

(1) 13 electrons and 14 protons (2) 10 electrons and 13 protons

(3) 10 electrons and 10 protons (4) 14 electrons and 13 protons

***Ans.*** ***(2)***

***Sol.*** $^{27}_{13}Al \Rightarrow$ Atomic no. = no. of electron = no. of protons = 13.

trivalent cation means it looses its 3 electrons.

No. of electrons in ion = 10.

**141.** When $CO_2$ gas is passed through lime water, the solution turns milky. This is due to the formation of :

(1) $CaCO_3$ (2) CaO (3) $Ca(HCO_3)_2$ (4) $Ca(OH)_2$

***Ans.*** ***(1)***

***Sol.*** $CO_2 + \underset{\text{(lime water)}}{Ca(OH)_2} \longrightarrow \underset{\text{(Milkiness)}}{CaCO_3} + H_2O$

**142.** A set of students went on a nature trip where one of the students disturbed the honey comb, by throwing a stone on it. Few students were stung by the bee. A person gathering medicinal plants, came to their rescue and applied the extract of some leaves, which relieved the students of their pain. The chemical nature of leaf would have been :

(1) acidic (2) basic (3) neutral (4) mildly acidic

***Ans.*** ***(2)***

***Sol.*** Sting of bee contains formic acid which can be neutralise by basic solution.

**143.** Metal A reacts with water to give B. 'B' is used for white washing. On heating B gives C. C reacts with water to give back B. Identify A, B and C

| | A | B | C |
|---|---|---|---|
| (1) | Ca | CaO | $Ca(OH)_2$ |
| (2) | CaO | Ca | $Ca(OH)_2$ |
| (3) | Ca | $Ca(OH)_2$ | CaO |
| (4) | CaO | $Ca(OH)_2$ | Ca |

***Ans.*** ***(3)***

***Sol.*** $\underset{(A)}{Ca} + H_2O \rightarrow \underbrace{\underset{(B)}{Ca(OH)_2}}_{\text{used as white washing}} + H_2$

$\underset{(C)}{Ca(OH)_2} \xrightarrow{\Delta} CaO + H_2O$

$CaO + H_2O \longrightarrow \underset{(B)}{Ca(OH)_2}$

**144.** P, Q and R are 3 metals that undergo chemical reactions as follows :

$P_2O3 + 2Q \rightarrow Q_2O_3 + 2P$

$2P + 3RO \rightarrow P_2O_3 + 3R$

$2RSO_4 + 2Q \rightarrow Q2(SO_4)_3 + 2R$

observe the reactions and arrange the metals in the increasing order of their reactivity.

(1) R, P, Q (2) Q, P, R (3) P, Q, R (4) Q, R, P

***Ans.*** ***(1)***

***Sol.*** Q can replace P from $P_2O_3$

Q is more reactive than P

P can replace R from RO

P is more reactive than R

$Q > P > R$

**145.** Which among the following is the correct representation of 360 g of water (H=1, O = 16)

(i) 2 moles (ii) 20 moles

(iii) $6.022 \times 10^{23}$ molecules (iv) $1.2044 \times 10^{25}$ molecules

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

***Ans.*** ***(2)***

***Sol.*** no. of moles $\Rightarrow \frac{360}{18}$ 20 moles

no. of molecules = $20 \times 6.022 \times 10^{23} = 1.2044 \times 10$ molecules

**146.** Metallic copper can be used to retrieve silver from silver nitrate solution. This is because

(1) Cu is less reactive than Ag (2) Cu is more reactive than Ag

(3) Cu and Ag have same reactivity (4) Cu doesn't react with $AgNO_3$

***Ans.*** ***(2)***

***Sol.*** Cu is more reactive than silver that's why it can replace Ag from silver nitrate.

**147.** $6CO_2 + \xrightarrow{?} \xrightarrow[?]{\text{Sunlight}}$

$C_6H_{12}O_6 + 6O_2 + 6H_2O$

which two raw materials required for photosynthesis are missing in the above equation ?

(1) Oxygen and Water (2) Oxygen and Calcium

(3) Water and Chlorophyll (4) Chlorophyll and Oxygen

***Ans.*** ***(3)***

***Sol.*** $6CO_2 + 12H_2O \xrightarrow[\text{Chlorophyll}]{\text{Sunlight}} C_6H_{12}O_6 + 6O_2 + 6H_2O$

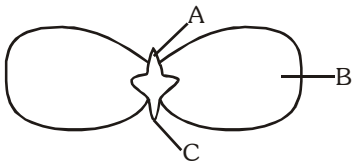
**148.** In a Bamboo plant, the water reaches all the parts of the plant. Name the force that helps in this process :

(1) Diffusion (2) Transpirational pull (3) Gravitational pull (4) Translocation

***Ans.*** ***(2)***

***Sol.*** Transpirational pull is the major force which helps in ascent of sap i.e. water and minerals in tall trees.

**149.** Choose the correct arrangement of the parts A, B and C marked in the given figure.




(1) Cotyledon, Plumule and Radicle (2) Plumule, Cotyledon and Radicle

(3) Radicle, Plumule and Cotyledon (4) Radicle, Cotyledon and Plumule

***Ans.*** ***(2)***

***Sol.*** A is plumule, B is cotyledon and C is radicle.

**150.** The production of orchids by the method of Tissue Culture is also known as :

(1) Vegetative propagation (2) Micro propagation

(3) Fragmentation (4) Regeneration

***Ans.*** ***(2)***

***Sol.*** Tissue culture is also known as micropropagation.

**151.** If a nail is hammered into the tree trunk, then the position of the nail after few years will be :

(1) same (2) above (3) lower (4) nail will disappear

***Ans.*** ***(1)***

***Sol.*** The nail will remain at same position after few years. This is because a plant grows at its tip (stem or root) not from the point at which it joins the ground.

**152.** Which one of the following is the correct Hierarchy of classification ?

(1)

| Kingdom |
|---|
| Division |
| Class |
| Order |
| Family |
| Genus |
| Species |

(2)

| Kingdom |
|---|
| Division |
| Order |
| Class |
| Family |
| Genus |
| Species |

(3)

| Kingdom |
|---|
| Division |
| Class |
| Order |
| Genus |
| Family |
| Species |

(4)

| Kingdom |
|---|
| Division |
| Class |
| Order |
| Family |
| Species |
| Genus |

***Ans.*** ***(1)***

***Sol.*** The correct Hierarchy of classification is

Kingdom ; phylum/division ; class ; order ; family ; genus ; species

***153.*** What will happen to the cell, if the medium has a lower concentration of water than the cell ?

(1) bulge (2) shrink (3) no change (4) cannot be predicted

***Ans. (2)***

***Sol.*** The cell kept in a medium having a lower concentration of water will shrink due to exosmosis.

***154.*** ***Assertion (A) :*** People entering into the burning place die due to suffocation.

***Reason (R) :*** Smoke contains large amount of carbon mono oxide, a toxic gas.

(1) (A) is correct and (R) is wrong

(2) (R) explains (A)

(3) (R) does not explain (A)

(4) (A) is wrong but (R) is correct

***Ans. (2)***

***Sol.*** Carbon monoxide present in smoke cause death due to suffocation as haemoglobin has more affinity for carbon monoxide than oxygen. This prevents haemoglobin from carrying oxygen to tissues thus causing suffocation.

***155.*** Study the relationship of the given pairs and choose the correct option to fill in the blank.

Oestrogen : Oogensis

Prolactin : Lactation

Oxytocin : _____

(1) Thickness of endometrium

(2) Secondary sexual characters

(3) Rhythmic contraction of uterus during delivery of the baby

(4) Provides protection against intestinal and respiratory functions

***Ans. (3)***

***Sol.*** Oxytocin causes rhythmic contraction of uterus during delivery of baby.

***156.*** The carcinogenic toxic gas released during cigarette smoking is :

(1) Nitrogen oxide (2) Methyl Iso cyanate

(3) Methyl mercury (4) Benzopyrene

***Ans. (4)***

***Sol.*** Benzopyrene is a carcinogenic toxic gas released during cigarette smoking.

***157.*** Geetha is unable to walk in a straight line. Which part of the brain is affected ?

(1) Cerebrum (2) Cerebellum (3) Medulla oblongata (4) Hypothalamus

***Ans. (2)***

***Sol.*** Part of the brain responsible for maintaining balance and posture is cerebellum. It also contributes to coordination and precision of body movements.

***158.*** In case of snake bite, doctor treats the patient, with preformed antibodies. What type of immunity it develops ?

(1) Innate immunity

(2) Naturally Active Acquired immunity

(3) Artificially Active Acquired immunity

(4) Naturally Passive Acquired immunity

***Ans. (NA)***

***Sol.*** The immunity which develops when the doctor treats with preformed antibodies will be Artificially Acquired Passive immunity which is not in option.

***159.*** Match the organisms given in Column-I with the nutritional processes given in Column-II.

| ***Column-I*** | ***Column-II*** |
|---|---|
| (a) Leech | (i) Holozoic Nutrition |
| (b) Amoeba | (ii) Autotrophic Nutrition |
| (c) Mushroom | (iii) Parasitic Nutrition |
| (d) Green plant | (iv) Saprophytic Nutrition |

| | ***(a)*** | ***(b)*** | ***(c)*** | ***(d)*** |
|---|---|---|---|---|
| (1) | (ii) | (iv) | (i) | (iii) |
| (2) | (iii) | (i) | (iv) | (ii) |
| (3) | (i) | (iv) | (iii) | (ii) |
| (4) | (iv) | (iii) | (ii) | (i) |

***Ans.*** ***(2)***

***Sol.*** Leech shows parasitic nutrition. Amoeba has holozoic nutrition. Mushroom is a saprophyte which feeds on dead and decaying organisms. Green plant is an autotroph i.e. it makes its own food.

***160.*** Mendel crossed tall plant with dwarf plant in his famous experiment on *Pisum sativum*. In the first generation, he got only tall plants. Because :

(1) The parental plants were heterogenous to their characters

(2) The soil was fertile

(3) The parental plants were pure to their characters

(4) The tallness character was a recessive character

***Ans.*** ***(3)***

***Sol.*** As the parental plants were pure to their characters i.e. they were homozygous tall and dwarf so he got only tall plants in $F_1$ generation.

TT $\times$ tt

$\downarrow$

Tt Tt ($F_1$ generation)

***161.*** The treaty concluded after the II Indo-China war was_____.

(1) Treaty of Nanking (2) Treaty of Peking (3) Treaty of Shimonoseki (4) Treaty of London

***Ans.*** ***(1)***

***Sol.*** Treaty of Nanking was signed after the Second India China war which is also known as the Second Opium War.

***162.*** Mussolini was the editor of Socialist Newspaper called _____.

(1) New India (2) Avanti (3) Mein Kamph (4) Social Contract

***Ans.*** ***(2)***

***Sol.*** Mussolini edited Avanti

***163.*** The working languages of the United Nations are_____.

(1) Arabic and Chinese (2) Chinese and English (3) English and French (4) Russian and Spanish

***Ans.*** ***(3)***

***Sol.*** In the Economic and Social Council, as of 1992, there are six official languages (Arabic, Chinese, English, French, Russian and Spanish) of which three are working languages (English, French, and Spanish). Later, Arabic, Chinese, and Russian were added as working languages in the Economic and Social Council.

***164.*** The Indian who headed the United Nations General Assembly in 1953 was

(1) Mrs. Vijayalakshmi Pandit (2) Moovalur Ramamirdham Ammaiyar

(3) Dr. Muthulakshmi Reddy (4) Dr. S. Dharmambal

***Ans.*** ***(1)***

***Sol.*** Between 1946 and 1968, Mrs. Vijayalakshmi Pandit headed the Indian delegation to the United Nations. In 1953, she became the first woman President of the United Nations General Assembly.

***165.*** Pick the odd one out : Neelakesi, Choolamani, Yapperumkalam, Kundalakesi.

(1) Choolamani (2) Kundalakesi (3) Neelakesi (4) Yapperumkalam

***Ans. (2)***

***Sol.*** Kundalakesi is a fragmentary Tamil Buddhist epic written by Nathakuthanaar. All others are related to Jainism.

***166.*** _____ was known as the 'World's First Compiler of Law'.

(1) Napoleon III (2) Hammurabi (3) Confucius (4) Cheops Khufu

***Ans. (2)***

***Sol.*** Hammurabi is considered as world's first compiler of laws.

***167.*** Plato wrote_____.

(1) The Republic (2) The Law of Twelve Tables

(3) Justinian Code (4) Meditations

***Ans. (1)***

***Sol.*** The Republic is a Socratic dialogue, written by Plato around 380 BC.

***168.*** _____was defeated in the Battle of Waterloo.

(1) Hitler (2) Mussolini (3) Stalin (4) Napoleon Bonaparte

***Ans. (1)***

***Sol.*** Hitler was defeated in the Battle of Waterloo in 1815.

***169.*** The Brahadeeswarar temple was built by the_____.

(1) Cheras (2) Pandyas (3) Pallavas (4) Cholas

***Ans. (4)***

***Sol.*** Built in the year 1010 CE by Raja Raja Chola in Thanjavur, Brihadeshar Temple popularly known as the 'Big Temple' turned 1000 years old in September 2010.

***170.*** The tower temples were also known as_____.

(1) Ziggurats (2) Pyramids (3) Hanging Garden (4) Tower of Babel

***Ans. (1)***

***Sol.*** Tower temples were also known as Ziggurats

***171.*** 'Man is the maker of his own destiny' was stressed by_____.

(1) Gauthama (2) Mahavira (3) Laotze (4) Zoroaster

***Ans. (Bonus)***

***Sol.*** This line was coined by Swami Vivekanand.

***172.*** The Longitude that helps us to calculate the Indian Standard Time is :

(1) 80° E (2) 82° 30' E (3) 82°50' E (4) 81° E

***Ans. (2)***

***Sol.*** It is taken as the standard meridian of India which helps in calculating the Indian Standard Time.

***173.*** 'The Sorrow of Bihar' is :

(1) Kosi (2) Yamuna (3) Brahmaputra (4) Ganga

***Ans. (1)***

***Sol.*** Kosi is the sorrow of Bihar.

***174.*** There is enough for everybody's need and not for anybody's greed.' It was voiced out by :

(1) Mahatma Gandhi (2) Jawaharlal Nehru (3) Medha Patkar (4) Indira Gandhi

***Ans. (1)***

***Sol.*** Mahatma stated this statement

***175.*** The main objective of National Forest Policy is to :

(1) bring 33% of geographical area under forests.

(2) bring 20% of geographical area under forests.

(3) maintain 30% of geographical area under forests.

(4) bring 35% of geographical area under forests.

***Ans.*** ***(1)***

***Sol.*** Indian Forest Policy (Evolution from Timber Management to Community ... stress on having at least 33 percent of land area of the country under forest cover

***176.*** Compressed Natural Gas (CNG) is becoming more popular because :

(1) Available at cheaper rate

(2) Low emission of carbon dioxide

(3) It is used in power and fertilizer Industries

(4) None of the above

***Ans.*** ***(2)***

***Sol.*** CNG is environment friendly fuel and hence is becoming more popular.

***177.*** Choose the correct order of arrangements, the types of coal according to its quality/ carbon content.

(1) Anthracite, Bituminous, Lignite, Charcoal.

(2) Anthracite, Charcoal, Bituminous, Lignite.

(3) Anthracite, Lignite, Charcoal, Bituminous.

(4) Bituminous, Lignite, Anthracite, Charcoal.

***Ans.*** ***(1)***

***Sol.*** As per the given sequence Anthracite has largest carbon content followed by other three.

***178.*** The first state in India which has made roof top rainwater harvesting structure compulsory to all the houses across the state :

(1) Rajasthan (2) Maharashtra (3) Karnataka (4) Tamil Nadu

***Ans.*** ***(4)***

***Sol.*** Tamil Nadu has made roof top rainwater harvesting compulsory.

***179.*** Srirangam is a/an

(1) Island (2) Plateau (3) Coastal Plain (4) Hilly

***Ans.*** ***(1)***

***Sol.*** Srirangam (formerly Vellithirumutha gramam) (Thiruvarangam in Tamil) is an island and a part of the city of Tiruchirapalli, in South India.

***180.*** Shrinking of forest cover is mainly because of :

(1) Over population (2) Urbanization (3) Industrialization (4) Farming activities

***Ans.*** ***(1)***

***Sol.*** An increase in tribal population has resulted in loss of forest cover

***181.*** 'Finland of Tamilnadu' is :

(1) Kancheepuram (2) Villupuram (3) Ooty (4) Tirunelveli

***Ans.*** ***(1)***

***Sol.*** Kancheepuram district is called Finland of Tamil Nadu

***182.*** Geographical surname, "Detroit of Southern Asia" refers to :

(1) Hengaluru (2) Mumbai (3) Chennai (4) New Delhi

***Ans.*** ***(3)***

***Sol.*** Chennai has a very strong "manufacturing" base for auto components; several of the manufacturers have 40 years track record. This made Chennai the Detroit of South Asia.

***183.*** Which Article of our Constitution prohibits any child below the age of 14 from working in dangerous, hazardous employment like mining ?

(1) 19 (3) 24 (2) 23 (4) 26

***Ans. (3)***

***Sol.*** The Constitution of India in the Fundamental Rights and the Directive Principles of State Policy prohibits child labour below the age of 14 years in any factory or mine or castle or engaged in any other hazardous employment (Article 24).

***184.*** Name the Presidency Constituency in which women were enfranchised for the first time in India.

(1) Madras (2) Bombay (3) Calcutta (4) Bengal

***Ans. (1)***

***Sol.*** Women were first elected in Madras presidency

***185.*** The President of World Bank is always the citizen of :

(1) UK (2) USA (3) Russia (4) France

***Ans. (2)***

***Sol.*** The president of World Bank has always been from USA

***186.*** Name the country which has single party system.

(1) China (2) Britain (3) Singapore (4) Ghana

***Ans. (1)***

***Sol.*** China has a single party system, Communist Party rules China

***187.*** Which Indian state has its own Constitution ?

(1) Jammu and Kashmir (2) Maharashtra (3) Uttarakhand (4) Nagaland

***Ans. (1)***

***Sol.*** Jammu and Kashmir has its own Constitution, which is explained in Article 370 of the Indian Constitution.

***188.*** Here are some of the guiding values of the Constitution and their meanings. Match them correctly :

| | ***Guiding*** | | ***Meaning*** |
|---|---|---|---|
| (a) | Sovereign | (i) | Government will not favour any religion. |
| (b) | Republic | (ii) | People have the supreme right to make decision. |
| (c) | Fraternity | (iii) | The state is ruled by the elected representatives. |
| (d) | Secular | (iv) | People should live like brothers and sisters. |

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

***Ans. (4)***

***Sol.*** As per the given sequence , option (4) stands correct

***189.*** What is the role of 'Amnesty International' ?

(1) To work for International peace

(2) To stop arms race in the world

(3) Collecting information about condition of international prisoners

(4) None of the above

***Ans.*** ***(4)***

***Sol.*** Amnesty International is a Human Rights Organisation, and aims at securing human rights.

***190.*** _____is rightly known as the 'Guardian of the Constitution'.

(1) District Court (2) Magistrate Court (3) High Court (4) Supreme Court

***Ans.*** ***(4)***

***Sol.*** Supreme Court is the Guardian or the Custodian of the Constitution.

***191.*** Which state has bicameral legislatures ?

(1) Tamil Nadu (2) Gujrat (3) Bihar (4) Kerala

***Ans.*** ***(3)***

***Sol.*** Seven Indian States, Andhra Pradesh, Telangana, Bihar, Jammu-Kashmir, Karnataka, Maharashtra and Uttar Pradesh, have bicameral Legislatures, these are called legislative councils (Vidhan Parishad)

***192.*** Name the Chief Election Commissioner of India.

(1) Nasim Zaidi (2) Rajesh Lakhoni (3) H.S. Brahma (4) V.S. Sampath

***Ans.*** ***(1)***

***Sol.*** Nasim Zaidi is the current Chief Election Commissioner and other two Election Commissioners are Achal Kumar Jyoti and Om Prakash Rawat. H.S.Brahma retired on 19th April,2015 . After then Dr.Nasim Zaidi took over as 20th Chief Election Commissioner.

***193.*** Pick the odd man out:

(1) Mrs. Sumitra Mahajan (2) Mrs. Sushma Swaraj

(3) Mrs. Meera Kumar (4) Mrs. Najma Heptullah

***Ans.*** ***(2)***

***Sol.*** Mrs. Sushma Swaraj has never been the Speaker of Lok Sabha or the chairman of Rajya Sabha.

***194.*** The growth rate of a country is decided by_____.

(1) The growth in literacy rate (2) The growth in employment opportunities

(3) The quality of the population (4) The growth of the economy

***Ans.*** ***(4)***

***Sol.*** The growth rate of a country is determined by the growth of the economy of that country.

***195.*** The state that has the lowest Infant Mortality Rate in India is :

(1) Andhra Pradesh (2) Tamil Nadu (3) Kerala (4) Rajasthan

***Ans.*** ***(3)***

***Sol.*** Among the states, Goa and Manipur have the lowest IMR of 11, followed by Kerala with 12 deaths per 1,000 live births. Madhya Pradesh has the highest IMR of 59 per 1,000 live births followed by Uttar Pradesh and Odisha with 57 each.

***196.*** The Head of the Planning Commission in India is :

(1) The Vice President (2) The Prime Minister (3) The President (4) A Cabinet Minister

***Ans.*** ***(2)***

***Sol.*** The Prime Minister is the head of the Planning Commission of India.

***197.*** Pick the odd one out :

(1) Income Tax (2) Road Tax (3) Water Tax (4) Property Tax

***Ans.*** ***(1)***

***Sol.*** All other taxes are applied on public facilities.

***198.*** The process of withdrawal of United Kingdom from the European Union is called :

(1) BREXIT (2) BRIXTON (3) BRICS (4) BREXTON

***Ans.*** ***(1)***

***Sol.*** BREXIT - Britain's Exit from the European Union.

***199.*** If a mother is taking care of children and household activities within the walls of the house, what kind of activity is she performing ?

(1) Market activity (2) Non - market activity (3) Economic activity (4) Non - economic activity

***Ans.*** ***(2)***

***Sol.*** A mother taking care of his children is a non economic activity.

***200.*** 'Green Revolution' is associated with the production of :

(1) Sugar (2) Pulses (3) Wheat (4) Cereals

***Ans.*** ***(3)***

***Sol.*** Green Revolution is associated with wheat production which was later extended to Rice.