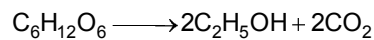


1. A few gram seeds were placed in each of the three pots A, B and C containing soil. The soil in Pot A is mixed with some green twigs and leaves. The soil in pot B is mixed with old cow dung while soil of pot C is mixed with urea. Pots are watered regularly. Which of the following will be observed after 10 days?
1. Lot of growth in A
 2. Not much growth in B
 3. Lot of growth in B but very little growth in C
 4. Very little growth in A but lot of growth in B and C

Sol. 4
Very little growth in A but lot of growth in B and C because B and C have good amount of nutrients in their soil in the form of humus and fertilizers.

2. Barely is ground to powder. The powder is mixed with water and some yeast. The mixture is kept in a closed and moist container. Which of the following will be produced?
1. Sodium bicarbonate
 2. Alcohol only
 3. Carbon dioxide only
 4. Alcohol and carbon dioxide

Sol. 4
The mixture show fermentation reaction and the end products of fermentation are ethyl alcohol and carbon dioxide.



3. Which is the main function of RBC?
1. To fight diseases in the body
 2. To carry oxygen to different parts of the body
 3. To increase levels of WBC
 4. To arrest bleeding

Sol. 2
RBC has haemoglobin. It is a protein that carries oxygen to different parts of the body.

4. Find the odd one out of the following:
1. Cotton
 2. Silk
 3. Wool
 4. Hair

Sol. 1
Cotton is a plant product.

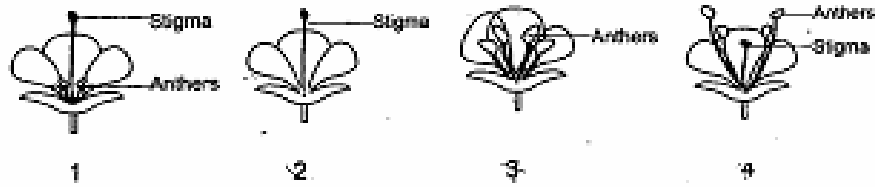
5. Which of the following rotation of crops will reduce dependence on the use of chemical fertilizers?
1. Rice and Chilli
 2. Wheat and Potato
 3. Potato and Rice
 4. Gram and Rice

Sol. 4

6. From the following statements
- A. Carbon dioxide taken in through stomata is used in photosynthesis.
 - B. Oxygen taken in through stomata is used in respiration.
 - C. Water vapour taken in through stomata is used in transpiration.
- Select the correct alternative.
1. A and B
 2. A and C
 3. B and C
 4. A, B and C

Sol. 1

7. From the following drawing of flowers identify the flower which will self pollinate?



Sol. 4

8. Which of the following is a source of instant energy?

1. Salt
2. Glucose
3. Water
4. Starch

Sol. 2

9. The biological treatment of waste water makes use of

1. Aerobic bacteria and fungi
2. Anaerobic bacteria and algae
3. Aerobic and Anaerobic bacteria
4. Anaerobic bacteria and eucalyptus leaves

Sol. 3

The biological treatment of waste water makes use of Aerobic and Anaerobic bacteria at secondary treatment level.

10. A similarity among black buck, gharial, rhinoceros and marsh crocodile is that they are

1. animals with thick chitinous skin
2. oviparous
3. endangered species
4. found in the forests of North-East India

Sol. 3

Black buck, gharial, rhinoceros and marsh crocodile all these are listed under endangered species.

11. The nasal openings in human beings are comparable to

1. gills of fish
2. blood vessels in an earthworm
3. spiracles of the cockroach
4. root hairs of plants

Sol. 3

Spiracles are air channels present in arthropods and comparatively similar structure to human trachea.

12. Rani had an uneven plot of land in which water was scarce. What system could she adopt for irrigation?

1. Canal
2. Sprinkler
3. Drip
4. Hand pump

Sol. 2

For irrigation of an uneven plot of land sprinkler system is the best.

13. Ram was going through a forest and found many similar plants. What amongst the given below could be reason for the observed phenomenon. The plants are
- of many genera.
 - of only one species.
 - capable of interbreeding.
 - capable of crossbreeding.
- Select the correct alternative from the following
- a and b
 - b and c
 - c and d
 - a and d

Sol. 2
Most of the plant of the forest may be related to the same species or produced by the hybridization.

14. Match each item in Column I with appropriate one/s in Column II.

Column I		Column II	
A	Edward Jenner	I	heredity
B	Chromosomes	II	budding
C	Hydra	III	protein biosynthesis
		IV	smallpox vaccine
		V	cell membrane
		VI	binary fission
		VII	antibiotics

Select the correct alternative.

- A-VII, B-I, C-II
- A-IV, B-I, C-II
- A-VII, B-V, C-VI
- A-IV, B-II, C-VI

Sol. 2
Edward Jenner is related to small pox vaccine. Chromosomes are related to heredity. Mode of reproduction in hydra is budding.

15. Which of the following has the same monomer unit?
- Nylon and cellulose
 - Polyester and nylon
 - Rayon and nylon
 - Cellulose and rayon

Sol. 4
Both are natural polymers of plant origin.

16. Which of the following will be suitable for coating dress materials of fire-men?
- Nylon
 - Polyester
 - Melamine
 - Acrylic

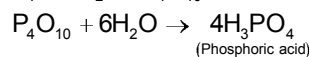
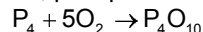
Sol. 3
Because it can withstand high temperature.

17. A highly reactive element X is stored under water. It readily reacts with oxygen of air to give a compound Y which dissolves in water. The aqueous solution of Y changes blue litmus solution to red. The element X
- Sodium
 - Sulphur
 - Phosphorous
 - Potassium

Sol. 3
Sodium and potassium form bases which turns red litmus blue

Sulphur is not very reactive.

So, phosphorous reacts with oxygen to form phosphorous pentoxide.



H₃PO₄ changes blue litmus red.

18. Two elements A and B on burning in air give corresponding oxides. Oxides of both A and B are soluble in water. The aqueous solution of oxide of A is alkaline and reacts with aqueous solution of oxide of B to give another compound. Identify A and B
1. A and B both are metals
 2. A and B are non-metals
 3. A is metal and B is non-metal
 4. A is non-metal and B is metal

Sol. 3

A is metal because the oxide of metal dissolves in H₂O to form alkali. It is reacting with aqueous solution of oxide B, this it is an acid because alkali-alkali reaction is not possible.

19. Match List I (fraction of petroleum) with List II (main use) and select the correct answer for the given alternatives.

List I (fraction of petroleum)		List II (main uses)	
A	Kerosene	I	Metalling of roads
B	Diesel	II	Jet aircraft fuel
C	Paraffin Wax	III	Generation of electricity
D	Bitumen	IV	Lubircants

1. A I, B II, C III, D IV
2. A I, B III, C IV, D II
3. A II, B III, C IV, D I
4. A IV, B II, C III, D I

Sol. 3

20. Coal is a fossil fuel and it cannot be prepared in a laboratory or industry because the formation of coal
- a. is a very slow process.
 - b. needs very low pressure and low temperature.
 - c. needs very high pressure and high temperature.
 - d. causes air pollution.

Select the correct alternative.

1. a and b
2. b and d
3. c and a
4. d and c

Sol. 3

21. The necessary conditions for combustion process of occur are
- a. availability of air/oxygen.
 - b. availability of air/oxygen and fuel.
 - c. temperature of fuel below ignition temperature
 - d. temperature of fuel above ignition temperature

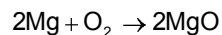
Select the correct alternative.

1. a and b
2. b and d
3. c and a
4. d and a

Sol. 2

Fuel, oxygen or air and a temperature more than ignition temperature of the fuel is required for combustion.

Sol. 2



is a chemical irreversible change, a new product is formed.

28. By blowing between two balloons hanging close to each other you observe that they come closer.

A similar phenomenon is seen in

1. the lifting of an aeroplane.
2. kite flying
3. the lifting of balloon filled with
4. take off of rocket

Sol. 1

Due to pressure difference

29. A stone tied to a string is whirled in a circle. As it is revolving, the string suddenly breaks. The stone then

1. flies off radially outwards.
2. flies off radially inwards
3. flies off tangentially.
4. moves in a circle of larger radius

Sol. 3

Flies off tangentially

30. A person moves a certain distance in a certain time. If $\frac{1}{3}$ of the distance is covered in $\frac{2}{3}$ of the time with speed V_1 , and the rest of the $\frac{2}{3}$ distance in $\frac{1}{3}$ of the time speed V_2 , then V_1/V_2 is

1. $\frac{1}{2}$
2. $\frac{1}{4}$
3. $\frac{4}{9}$
4. $\frac{2}{9}$

Sol. 2

Let total distance is x

$$t_1 = \frac{2t}{3}$$

$$\text{distance is } \frac{x}{3}$$

speed v_1

$$V_1 = \frac{x \times 3}{3 \times 2t}$$

$$\frac{V_1}{V_2} = \frac{\frac{x}{2t}}{\frac{2x}{t}} = \frac{1}{4}$$

$$t_2 = \frac{1}{3}$$

$$\text{distance is } \frac{2x}{3}$$

speed v_2

$$V_2 = \frac{2x \times 3}{3 \times t}$$

31. In an experiment, it was observed that when the length of a wire in an electrical circuit is doubled, everything else remaining same, the current becomes half. On the other hand, if the thickness (diameter) of the wire is doubled, the current becomes 4 times. Two wires W_1 and W_2 of the same metal have the same current passing through them. The thickness of wire W_2 is twice that of W_1 , then the length of the wire W_2 is

1. sixteen times that of W_1
2. four times that of wire W_1
3. two times that of wire W_1
4. same as that of wire W_1

Sol. 3
Both wire have the same current it means resistance of both wire is same.

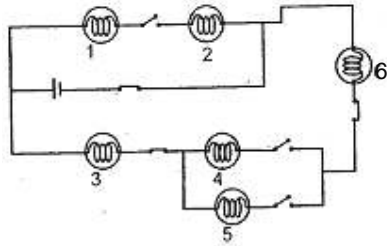
$$R_1 = R_2$$

$$\rho \frac{l_1}{A_1} = \rho \frac{l_2}{A_2} \Rightarrow \frac{l_1}{A_1} = \frac{l_2}{A_2}$$

given $d_2 = 2d_1$

Hence, $l_2 = 4l_1$

32. In the electric circuit shown above



- | | |
|-----------------------------|------------------------------------|
| 1. all the bulbs will glow. | 2. only bulbs 4, 5 and 6 will glow |
| 3. only bulbs 3 will glow | 4. none of the bulbs will glow |

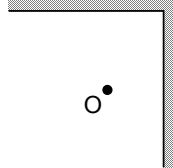
Sol. 4
Circuit is open so none of the bulbs will glow

33. A printed page is seen through a glass slab place on it. The printed words appear raised. This is due to

1. refraction at the upper surface of the slab
2. refraction at the lower surface of the slab
3. partial reflection at the upper surface of the slab
4. partial reflection at the lower surface of the slab

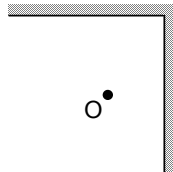
Sol. 1
Refraction at the upper surface of the slab

34. Two mirrors are placed at right angles to each other as shown in the figure. Total number of images of an object O placed between them, that are seen are



1. two
2. three
3. four
4. six

Sol. 2



$$\theta = 90^\circ$$

$$n = \frac{360}{\theta} = \frac{360}{90} = 4(\text{even})$$

$$\begin{aligned} \text{Number of images} &= n - 1 \\ &= 4 - 1 \\ &= 3 \end{aligned}$$

35. Certain observations and certain causes are listed in columns I and II respectively in the following table:

Table

Column I		Column II	
I	Going up an inclined plane is more tiring than walking on a horizontal plane	A	Magnetic force
II	It is difficult to inflate balloon beyond a certain point	B	Pressure
III	Waling on a sandy beach is more tiring than waling on a road	C	Gravitational Force
IV	A compass needle always points in the north-south direction	D	Friction

Select the correct alternative.

1. I-A, II-B, III-C, IV-D
2. I-C, II-B, III-D, IV-A
3. I-B, II-C, III-D, IV-A
4. I-C, II-D, III-B, IV-A

Sol. 2

1 – C, II – B, III – D, IV – A

36. Of the following statements choose the correct combination.
- (a) Grease is used to reduce friction in bicycle chain
 - (b) Ball bearings are used to reduce friction in a fan
 - (c) Oil can be used to increase friction in a car engine.
 - (d) Talc can be used to reduce friction when an object is sliding on a surface.

1. a, b, d
2. a, c, d
3. b, c, d
4. a, b, c

Sol. 1

a, b, d

37. If one puts ones ears to the steel rail, the sound of a coming train can be heard even when the train cannot be seen. One can conclude from this observation that
- a. Sound travels faster in steel than in air.
 - b. Amplitude of sound in the rail is much larger than in air.
 - c. Sound can travel larger distances in solids than in air.
 - d. Quality of sound in rail is better than in air.

The reasonable conclusions are

1. a and c
2. a and b
3. b and c
4. b and c

Sol. 1
a, & c

38. Decibel (dB) is a unit of loudness of sound. It is defined in a manner such that when amplitude of sound is multiplied by a factor of $\sqrt{10}$, the decibel level increase by 10 units. Loud music of 70 dB is being played at a function. To reduce the loudness to a level of 30 dB, the amplitude of the instrument playing music has to be reduced by a factor of
1. 10
 2. $10\sqrt{10}$
 3. 100
 4. $100\sqrt{100}$

Sol. 3

39. Given that there is a relationship between the orbital radius of a planet and its period of revolution and that the periods of revolution of Mercury, Earth, Jupiter and Neptune are nearly 0.24, 1, 11.8 and 165 years. It follows that the period of revolution of
- a. Venus is less than 0.24 years
 - b. Mars is less than 12 years
 - c. Uranus is more than 165 years
 - d. Uranus is less than 165 years but more than 12 years.

Of these the correct statements are:

1. a and c
2. d only
3. c only
4. b and d

Sol. 4
b & d

40. Lunar eclipse occurs when earth comes in between sun and the moon. Solar eclipse occurs when moon comes in between sun and earth. This suggests that
1. both eclipses occurs on a new moon day.
 2. solar eclipse occurs on a new moon day and lunar eclipse on a full moon day.
 3. lunar eclipse occurs on a new moon day and solar eclipse on a full moon day.
 4. both eclipses occur on a full moon day

Sol. 2

41. Which is the greatest number amongst $2^{1/2}$, $3^{1/3}$, $8^{1/8}$ and $9^{1/9}$?
1. $9^{1/9}$
 2. $8^{1/8}$
 3. $3^{1/2}$
 4. $2^{1/2}$

Sol. 3.
LCM of 2, 3, 8, 9 = 72

$$2^2 = 2^{\frac{36}{72}} = (2^{36})^{\frac{1}{72}}$$

$$3^3 = 3^{\frac{24}{72}} = (3^{24})^{\frac{1}{72}}$$

$$8^8 = 8^{\frac{9}{72}} = (8^9)^{\frac{1}{72}}$$

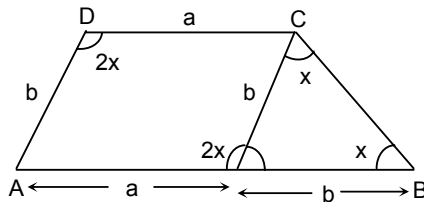
$$9^9 = 9^{\frac{8}{72}} = (9^8)^{\frac{1}{72}}$$

42. If the product of two numbers is 21 and their difference is 4, then the ratio of the sum of their cubes to the difference of their cubes is
- | | |
|--------------|--------------|
| 1. 185 : 165 | 2. 165 : 158 |
| 3. 185 : 158 | 4. 158 : 145 |

Sol. 3.
 $x - y = 4, xy = 21$
 $x^3 - y^3 = (x - y)[x^2 + y^2 + xy - 2xy + 2xy]$
 $= (x - y)[(x - y)^2 + 3xy]$
 $= 4(16 + 63)$
 $= 4 \times 79$
 $= 316$
 $x - y = 4 \Rightarrow x^2 + y^2 - 2xy = 16$
 $\Rightarrow (x + y)^2 - 2xy - 2xy = 16$
 $\Rightarrow x + y = 16 + 4 \times 21$
 $x + y = 10$
 $\therefore x^3 + y^3 = (x + y)[x^2 + y^2 - xy]$
 $= 10(58 - 21) = 10 \times 37 = 370$
 Ratio = $370 : 316 = 185 : 158$

43. In a quadrilateral ABCD, if $AB \parallel CD$, $\angle D = 2\angle B$, $AD = b$ and $CD = a$, then the side AB is of length
- | | |
|-----------------------|-------------|
| 1. $\frac{a}{2} + 2b$ | 2. $a + 2b$ |
| 3. $2a - b$ | 4. $a + b$ |

Sol. 4.



44. Two candles have different lengths and thickness. The shorter lasts 11 hours and the longer 7 hours when both are lit simultaneously. If after 3 hours of their being lit together at the same time, both have the same length, then the ratio of their original lengths is
- | | |
|------------|------------|
| 1. 5 : 8 | 2. 11 : 14 |
| 3. 10 : 13 | 4. 7 : 11 |

Sol. 4.

$$l \propto \frac{1}{T}$$

$$\frac{l_1}{l_2} = \frac{7}{11}$$

45. A lady reaches her office 20 minutes late by traveling at a speed of 20 km/h and reaches 15 minutes early by traveling at 30 km/h. By how much time will she be early or late if she travels at 25 km/h ?
- | |
|-------------------|
| 1. 1 minute early |
| 2. 5 minute early |
| 3. 1 minute late |
| 4. 5 minute late |

Sol. 1.
 Speed₁ = 20 km/h , Speed₂ = 30 km/h

$$S = \frac{d}{t}$$

$$\therefore 20 = \frac{d}{t + \frac{20}{30}}, 30 = \frac{d}{t - \frac{15}{60}}$$

$$d = 20t + \frac{20}{3}, d = 30t - \frac{15}{2}$$

$$\Rightarrow 20t + \frac{20}{3} = 30t - \frac{15}{2}$$

$$\Rightarrow -10t = \frac{-45 - 40}{6} = \frac{-85}{6}$$

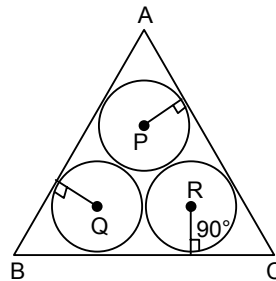
$$\Rightarrow t = \frac{85}{6 \times 10} = \frac{17}{12} \times 60 = 85 \text{ min}$$

$$\therefore d = 20 \times \frac{17}{12} + \frac{20}{3} = \frac{170}{6} + \frac{20}{3} = \frac{85}{3} + \frac{20}{3} = \frac{105}{3} = 35 \text{ km}$$

$$\Rightarrow \text{term taken} = \frac{35}{25} = \frac{7}{5} \times 60 = 84 \text{ min.}$$

46. Three circles each of radius r units are drawn inside an equilateral triangle of side a units, such that each circle touches the other two and two sides of the triangle as shown in the figure, (P, Q and R are the centres of the three circles). Then relation between r and a is

1. $a = 2(\sqrt{3} + 1)r$
2. $a = (\sqrt{3} + 1)r$
3. $a = (\sqrt{3} + 2)r$
4. $a = 2(\sqrt{3} + 2)r$



Sol. 1.
 $\angle A = \angle B = \angle C = 60^\circ$
 $MN = QR = 2r$ in quadrilateral BTQM
 $\angle B + \angle BMQ + \angle MQT + \angle QTB = 360$
 $60 + 90 + 90 + \angle QTB = 360^\circ$

$$\Rightarrow \angle QTB = 120$$

$$\Delta BTQ \cong \Delta BQM$$

$$\Rightarrow \angle TQB = \angle MQB = 60^\circ$$

$$\text{in } \Delta BQM \tan 60^\circ = \frac{BM}{QM} = \frac{x}{r}$$

$$\sqrt{3} = \frac{x}{r} \Rightarrow x = r\sqrt{3}$$

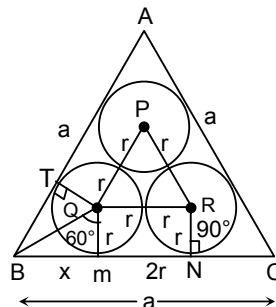
$$\text{similarly } CN = r\sqrt{3}$$

$$BC = BM + MN + CN = a$$

$$2x + 2r = a$$

$$\Rightarrow 2(x + r) = a$$

$$\Rightarrow 2(r\sqrt{3} + r) = a \Rightarrow a = 2r(\sqrt{3} + 1)$$



47. Unit's digit in the number $(12357)^{655}$ is
- | | |
|------|------|
| 1. 1 | 2. 3 |
| 3. 7 | 4. 9 |

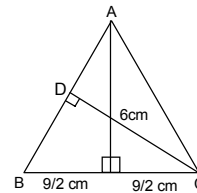
Sol. 2.
 (12357)
 unit digit of $(12357)^{655}$
 $=$ unit digit of $(7^{655}) = 7^{4 \times 163 + 3} = 7^4 \times 143 \times 7^3 =$ unit digit is $(1 \times 3) =$ unit digit is 3.

48. If a cube has surface area S and volume V , then the volume of the cube of surface area $2S$ is
- | | |
|------------------|---------|
| 1. $\sqrt{2} V$ | 2. $2V$ |
| 3. $2\sqrt{2} V$ | 4. $4V$ |

Sol. 3.
 $S = 6a^2$
 \Rightarrow The length of each edge is a .
 Now, $S = 12a^2$
 $= 6 \times 2a^2$
 $= 6(\sqrt{2}a)^2$
 \therefore length of each edge $= 6(\sqrt{2}a)^2$
 Volume $= (\sqrt{2}a)^3 = 2\sqrt{2}a^3 = 2\sqrt{2} V$.

49. $\triangle ABC$ is a triangle with $AB = AC$ and $BC = 9$ cm. If the height from A to BC is 6 cm, then the height from C to AB , in cm, is
- | | |
|--------|--------|
| 1. 6.0 | 2. 7.2 |
| 3. 7.5 | 4. 8.0 |

Sol. 2.
 $\text{ar}(\triangle ABC) = \frac{1}{2} \times 9 \times 6 \text{ cm}^2 = 27 \text{ cm}^2$
 $AB = \sqrt{6^2 + \left(\frac{9}{2}\right)^2} = \sqrt{36 + \frac{81}{4}} \text{ cm} = \sqrt{\frac{144 + 81}{4}} = \frac{15}{2} \text{ cm}$
 $\text{ar}(\triangle ABC) = \frac{1}{2} \times AB \times CD$
 $27 = \frac{1}{2} \times \frac{15}{2} \times CD$



50. How many pairs of natural numbers are there so that difference of their squares is 60 ?
- | | |
|------|------|
| 1. 4 | 2. 3 |
| 3. 2 | 4. 1 |

Sol. 3.
 Let numbers be x and y then $x^2 - y^2 = 60$
 $(x - y)(x + y) = 60$
 $5 \times 12 = 60$
 $2 \times 30 = 60$
 $4 \times 15 = 60$
 $1 \times 60 = 60$
 $3 \times 20 = 60$
 $6 \times 10 = 60$
 Here, pairs "2 and 30" and "6 and 10" satisfying the given condition.

51. The sum of any three distinct natural numbers arranged in ascending order is 200 such that the second number is a perfect cube. How many possible values are there for this number?
 1. 4
 2. 3
 3. 2
 4. 1

Sol. 2.
 Second number can be $2^3, 3^3, 4^3 = 8, 27, 64$.

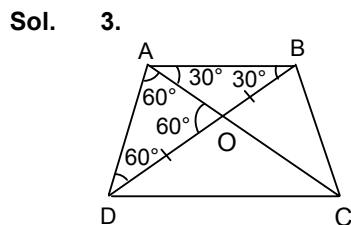
52. If the digits of a three digit number are reserved, then the number so obtained is less than the original number by 297. If the sum of the digits of the number is 8 and its hundred's digit has the largest possible value, then the ten's digit of the number is
 1. 3
 2. 2
 3. 1
 4. 0

Sol. 3.
 Suppose the number is $x + 10y + 100z$
 Now, on reversing the new number = $z + 10y + 100x$
 ATO,
 $x + 10y + 100z - z - 10y - 100x = 297$
 $\Rightarrow z = x + 3$
 Also, $x + y + z = 8$
 So, possible cases are 512, 431 but hundred possible value is 5 (maximum)
 So, tens digit is 1.

53. If the sum of all the angles of a polygon except one angle is 2220° , then the number of sides of the polygon is
 1. 12
 2. 13
 3. 14
 4. 15

Sol. 4.
 $(x - 2) \times 180^\circ =$ Sum of angles of polygon with sides x
 i.e. Sum of angles should be a multiple of 180°
 $\therefore 2220 = 180^\circ \times 12 + 60^\circ$
 $\Rightarrow 2220^\circ + 120^\circ = 2340^\circ$
 $\Rightarrow (x - 2) = \frac{2340^\circ}{180^\circ}$
 $x - 2 = 13^\circ$
 $\Rightarrow x = 15$

54. ABCD is a quadrilateral whose diagonals intersect each other at the point O such that $OA = OB = OD$. If $\angle OAB = 30^\circ$, then the measures of $\angle ODA$ is
 1. 30°
 2. 45°
 3. 60°
 4. 90°



55. A shopkeeper purchased 300 pens and sold one out of four pens at no loss or profit. He sold the remaining pens at a profit of 20%. What is his overall profit or loss percent on the whole transaction?
- | | |
|---------------|-------------|
| 1. 15% profit | 2. 15% loss |
| 3. 12% profit | 4. 12% loss |

Sol. 1.

$$\text{Pens sold at no loss or no profit} = \frac{300}{4} = 75$$

$$\text{Pens sold at 20\% profit} = 225$$

$$\text{Let CP of one pen} = \text{Rs } 1$$

$$\text{CP of 225 pens} = \text{Rs } 225$$

$$\text{SP of 225 pens} = \left(\frac{100+20}{100}\right) \times 225 = \frac{120}{100} \times 225 = \text{Rs } 270.$$

$$\text{Total CP} = \text{Rs } 300$$

$$\text{Total SP} = 270 + 75 = \text{Rs } 345$$

$$\text{Profit \%} = \frac{45}{300} \times 100 = 15.$$

56. The value of the expression $\sqrt{34 - 24\sqrt{2}} \times (4 + 3\sqrt{2})$ is
- | | |
|-------|------|
| 1. -2 | 2. 2 |
| 3. 3 | 4. 4 |

Sol. 2.

$$\begin{aligned} & \sqrt{34 - 24\sqrt{2}} \times (4 + 3\sqrt{2})^2 \\ &= \sqrt{34 - 24\sqrt{2}} \cdot \sqrt{(4 + 3\sqrt{2})^2} \\ &= \sqrt{(34 - 24\sqrt{2})(16 + 18 + 24\sqrt{2})} \\ &= \sqrt{(34 - 24\sqrt{2})(34 + 24\sqrt{2})} \\ &= \sqrt{(34)^2 - (24\sqrt{2})^2} \\ &= \sqrt{1156 - 1152} = \sqrt{4} = 2 \end{aligned}$$

57. If $aabb$ is a four digit number and also a perfect square then the value of $a + b$ is
- | | |
|-------|-------|
| 1. 12 | 2. 11 |
| 3. 10 | 4. 9 |

Sol. 2.

$$\text{Given number is } aabb = 1000a + 100a + 10b + b$$

$$= 1100a + 11b$$

$$= 11(100a + b)$$

For 'aabb' to be a perfect square,

100a + b should be of the type

$11 \times k^2$ where k is natural number

∴ The possible values of $11 \times k^2$ can be:

aabb are 121×16

$$121 \times 25$$

$$121 \times 36$$

$$121 \times 49 \text{ neglected}$$

$$121 \times 64$$

So, 7744 is the given four digit number and $7 + 4 = 11$.

58. For the data 1, 2, 2, 3, 3, 3, 4, 4, 4, 4, ..., 9, 9, the product of mean and mode equals
 1. 9
 2. 45
 3. 57
 4. 285

Sol. 3.

$$\begin{aligned} \text{Mean} &= \frac{1+2^2+3^2+4^2+\dots+9^2}{(1+2+3+4+5+6+7+8+9)} \\ &= \frac{9(9+1)(18+1)}{9 \times \frac{(9+1)}{2}} = \frac{3 \times 5 \times 19}{9 \times 5} = \frac{19}{3} \end{aligned}$$

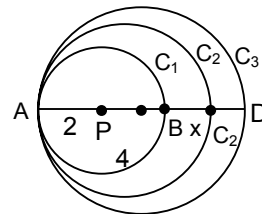
Mode = 9

$\therefore \frac{19}{3} \times 9 = 57$

59. AD is a diameter of a circle. Two more circles pass through A and intersect AD in B and C respectively, such that AB and AC are diameters of these circles and $AD > AC > AB$. If the circumference of the middle circle is average of the circumference of the other two, then given $AB = 4$ units and $CD = 2$ units, what is the area, in sq. units of the largest circle?
 1. 128π
 2. 64π
 3. 48π
 4. 16π

Sol. 4.

$$\begin{aligned} C_2 &= \frac{C_1 + C_3}{2} \\ C_1 &= 2\pi \times 2 = 4\pi \\ AC &= 4 + x \\ r \text{ and } \frac{4}{2} + x \\ C_2 &= 2\pi \frac{(4+x)}{2} = \pi(4+x) \\ C_3 &= 2\pi \frac{(6+x)}{2} = (6+x)\pi \\ \frac{4\pi + (6+x)\pi}{2} &= \pi(4+x) \\ 10 + x &= 8 + 2x \\ x &= 2 \\ \text{Rad. of 1 carper} &= 4 \\ &= \pi 4^2 = 16\pi. \end{aligned}$$



60. If the sum of three consecutive odd numbers is a perfect square between 200 and 400, then the root of this sum is
 1. 15
 2. 16
 3. 18
 4. 19

Sol. 1.

$$\begin{aligned} 200 &< x - 1(x + 2) + (x + 4) < 400 \\ 200 &< (3x + 6) < 400 \\ 200 &< 3(x + 2) < 400 \end{aligned}$$

Respect squares lying between 200 and 400 225, 256, 289, 324, 362, 225 is the multiple of 3.
 $\therefore \sqrt{225} = 15.$

61. Which process did the English East India Company follow just after acquiring the *Diwani* rights in Bengal from the Mughal emperor?
- Mobilize the revenue resources.
 - Redefine the land rights of the people.
 - Produce the cash crops it required.
 - Annexed the territory.
- a and c only
 - a and b only
 - a, b and c only
 - All of the above

Sol. 3
These were the changes made by the British.

62. Which of the following is correct?
- Patola is a cotton cloth with gold thread.
 - Chintz is a printed fine cloth with design.
 - Jamdani is a silk cloth with gold thread and embroidery.
 - Bandanna is a fine cloth with decorative motifs on it.

Sol. 2
Rest all are wrong statements.

63. Match the columns "Name" with "Work" and select the correct alternatives.

Name		Work	
A	James Mill	I	Founded the Asiatic Society of Bengal
B	William Carey	II	Criticized the Oreintalists
C	William Jones	III	Surveyed the progress of education in vernacular schools
D	William Adam	IV	Established the Serampore Mission

- A-II, B-IV, C-I, D-III
- A-III, B-I, C-IV, D-II
- A-III, B-II, C-I, D-IV
- A-III, B-IV, C-II, D-I

Sol. 1
The agencies were formed by the respective people.

64. Which of the following statements regarding the Act of 1858 is incorrect?
- The English East India Company continued to enjoy trading monopolies in India.
 - A Secretary of State for India was appointed with an India Council to advise.
 - The British Crown became the direct ruler of India.
 - The Governor-General was given the title of the Viceroy.

Sol. 1
The trading monopolies of the English East India were abolished.

65. Why was the Delhi Durbar organized in 1877 with pomp and show?
- The Viceroy wanted to display the wealth and prosperity of India.
 - The British wanted to threaten the people by displaying their army strength.
 - The British wanted to replace the Mughal emperor from the minds of the people as their rulers.
 - The Viceroy wanted to appease Queen Victoria.

Sol. 3
Mughal emperor continued to hold important position for the people of India.

66. Arrange the following social reform organization chronologically on the basis of their foundation.
- | | |
|---------------|----------------------------------------|
| a. Arya Samaj | b. Prartjama Samaj |
| c. Veda Samaj | d. Sree Narayan Dharma Pariplana Yogam |
| 1. a, d, c, b | 2. a, b, c, d |
| 3. d, c, b, a | 4. c, b, a, d |

Sol. 4
That is the order in which the agencies were founded.

67. Why did the cotton factories in India grow during the World War I?
1. Masses refused to wear foreign clothes because of Swadeshi appeal.
 2. Textile imports from Britain declined because the demand of military supplies from Indian factories increased.
 3. The Government in England lowered the import duties on Indian cotton textiles.
 4. The Indian cotton industries started producing cotton clothes at competitive prices.

Sol. 2
Since many soldiers were recruited in the Indian army, their uniforms and other material for these soldiers was to be sent to India hence the cotton import to India hence the cotton import declined from Britain.

68. Assertion
(A): William Jones and Colebrooke went about discovering the ancient texts of India.

Reason

(R): Because they were orientalists.

1. A is not correct but R is correct.
2. A is correct but R is not correct.
3. A is correct and R is the correct explanation of A.
4. Both A and R are correct but R is not the correct explanation of A.

Sol. 3
William Jones and Colebrook were influenced by the ancient culture of India.

69. The non-Brahmin movement was launched by E. V. Ramaswamy Naicker mainly to
1. create self respect in the minds of Dravidians
 2. oust the Brahmins from Tamilnadu
 3. humiliate the Brahmins
 4. acquire political power.

Sol. 1
Periyar was convinced that untouchables had to fight for their riths.

70. Find out the incorrect statement.
1. The European artists brought with them new styles and new conventions of painting.
 2. The European artists brought with them the idea of realism.
 3. The European used oil painting which produced images that looked real.
 4. The European artists learnt the technique of oil painting from the Indian artists.

Sol. 4
Europeans were the first ones to use oil colours in paintings.

71. Which Five Year Plan gave the maximum thrust on the industrial growth?
- | | |
|-------------------------|--------------------------|
| 1. First Five Year Plan | 2. Second Five Year Plan |
| 3. Third Five Year Plan | 4. Fourth Five Year Plan |

Sol. 2
In 1956 the second five year plant was formulated.

72. Match the following list of subjects which come under the purview of the distribution of powers and select the correct alternative.

List		Subjects	
A	Central List	I	Railways
B	State List	II	Health
C	Concurrent List	III	Foreign affairs
D	Residuary List	IV	Water disputes

- | | |
|---------------------------|---------------------------|
| 1. A-I, B-II, C-III, D-IV | 2. A-I, B-II, C-IV, D-III |
| 3. A-IV, B-III, C-II, D-I | 4. A-III, B-II, C-I, D-IV |

Sol. 2
Residuary list comes under the central list.

73. Which of the following statements are correct about the Planning Commission?
 a. It is a constitutional body created by the Parliament Commission.
 b. It acts as an advisory body to the Union Government.
 c. The Finance Minister is the ex-officio chairman of this body.
 d. Its basic function is to formulate priorities for the Five Year Plan for integrated economic and social development

1. a and c only	2. b and d only
3. a, c and d only	4. d only

Sol. 2
74. What does the 'mixed economy' in India mean?

1. Companies of foreign countries can play an equal role in development of India's economy.
2. Special privileges are given to foreign companies by the government for investment in India.
3. Private companies of India are allowed to invest in public sector.
4. Private sectors play a complementary role along with the public sector.

Sol. 4
Mixed economy was adopted was adopted after the independence.

75. Non-alignment movement which was the basis of Nehru's foreign policy meant that

1. India would remain neutral in world politics.
2. India would not participate in any way, not even as mediator, to end conflicts between USA and the Soviet Union.
3. India would not participate in power rivalries and ideological conflicts between the USA and the Soviet Union.
4. India, along with other like minded Asian and African countries, would create an equally strong Third Front in world politics in opposition to both the USA and the Soviet Union.

Sol. 1
The soul of the NAM was not to be aligned with any of the super powers.

76. Which of the following best describes "jet streams"?

1. Wind system with seas and reversal of direction.
2. Wind blowing from sub tropical high pressure belts towards the tropical low pressure belts.
3. Narrow meandering bands of winds which blow in mid latitude near the tropopause and encircle the globe.
4. Winds blowing from the tropical high pressure belts towards the equatorial low pressure belts.

Sol. 3

82. Given below are some factors influencing the location of certain industries
- Skilled labour
 - Low transportation cost
 - Clean and dustfree environment
 - Availability of raw material
 - Government policy
- Which among these have more strongly influenced location of IT industry in India?
- a, b and c
 - b, c and d
 - c, d and e
 - a, c and e

Sol. 4
These are the basic requirements for IT industries.

83. Consider the following industrial regions of India.
- Hooghly Industrial region
 - Gurgaon-Delhi-Meerut industrial region
 - Ahmedabad-Baroda industrial region
 - Mumbai-Pune industrial region
 - Bangalore-Tamilnadu industrial region
 - Chotanagpur industrial region
 - Vishakhapatnam-Guntur industrial region
- Which of these lies outside peninsular India?
- a, b, d and f
 - b, c, d and f
 - b, d, f and g
 - a, b, c and f

Sol. 4
These industrial regions are situated out of the peninsular India.

84. The following list of towns where steel plants are located in India.
- Bhilai
 - Jamshedpur
 - Durgapur
 - Bhadravati
 - Rourkela
 - Bokaro
 - Salem
 - Vijay Nagar
- Which of the following sequence is located within South India?
- C, D and F
 - A, D and H
 - D, G and H
 - E, G and H

Sol. 3

85. Column I shows the types of natural vegetation while column II shows the climate type.

Column I		Column II	
A	Evergreen Forests	I	Arid
B	Deciduous	II	Semi-humid
C	Grasslands	III	Humid
D	Thorny bushes	IV	Semi arid

Sol. 2

86. Assertion (A): The tropical rainforests are mostly evergreen.
Reason (R): The regions of tropical rainforests get abundant rainfall and have low temperature through the region.
- Both A and R are true and R explains A.
 - Both A and R are true but R does not explain A.
 - A is true but R is false.
 - A is false but R is true

Sol. 3
Tropical rainforests have high temperature.

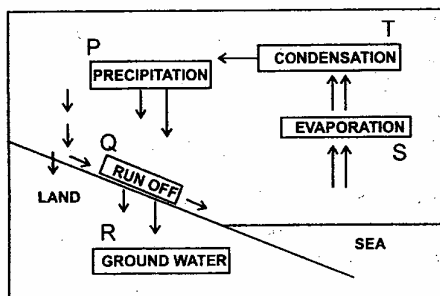
87. Consider the following statements.
A. In India, cropland occupies 57% of total area.
B. Pastures account for 56% area in Australia
C. About 2/3rd area in Japan is under forests
What should be understood from the above statements?
- India has an efficient land use system while most of the land in Australia and Japan is rendered waste.
 - India has subsistence agricultural economy, animal husbandry is the main stay of economy in Australia and forestry is main activity in Japan.
 - Most of the cultivation; in Australia cultivation of crops is confined to small proportion and most of the land is used for grazing. Japan has conserved its forest resources.
 - India has a faulty land used system, Australia has extensive land use and Japan has small cultivable land.

Sol. 2
The explanation is supported by the statements.

88. Consider the following statements:
A. In the Tundra region, animals have thick fur the thick skin.
B. Most of the animals in grasslands are herbivores.
C. In tropical rainy forests, many animals live on trees.
Which of the following best explains these statements?
- Dependence of animals on natural vegetation.
 - Exploitation of wildlife and natural vegetation.
 - Relationship between density of vegetation and wildlife.
 - Adaptation of natural environment

Sol. 4
All the statements show adaptive characters of animals related to their environment.

89. Study the figure below showing the components of water cycle represented by P, Q, R, S, T.



Which of the following can be harnessed to conserve rain water?

- Q, S
- P, Q
- P, S
- S, T

Sol. 2
Only run off part of the precipitated water can be harnessed to conserve rain water.

90. Mulching is associated with use of
1. material to maintain soil moisture
 2. soil to build barrier.
 3. trenches to collect water.
 4. piled up rocks to slow down the flow of water.

Sol. 1
Mulching is a process where straw is used to keep the land moist.

91. High Court in the following cities were established at one time or the other. Identify the sequence in which they appeared.

- a. Allahabad
- b. Bombay (Now Mumbai)
- c. Delhi
- d. Nainital

1. a, c, d, b
2. c, d, a, b
3. b, a, c, d
4. d, b, a, c

Sol. 3
The other options are invalid.

92. Fundamental Law of the land is called
1. State
 2. Constitution
 3. Parliament Act
 4. Ordinance

Sol. 2
The other options are invalid.

93. India is a
- a. Socialist
 - b. Secular
 - c. Sovereign
 - d. Democratic Republic

Identify the correct sequence as maintained in the Preamble of the Indian Constitution

1. c, a, b, d
2. b, c, a, d
3. c, a, d, b
4. a, b, c, d

Sol. 1
This is the order in which these words appear in the preamble.

94. Right to the enjoyment of pollution free water as interpreted by the Supreme Court in Supreme Court in Subhas Kumar Vs. State of Bihar (1991) falls under

1. Right to Equality
2. Right to Liberty
3. Right against Exploitation
4. Right to Life and Personal liberty

Sol. 4

95. Freedom of media is guaranteed under
1. Liberal system
 2. Rule by the proletariat
 3. Benevolent ruler
 4. Religious ruler

Sol. 1
Liberal system allows the freedoms to express.

96. Economic presence of the government in social realm is found under
1. Fundamental Rights
 2. Fundamental Duties
 3. Directive Principles of State Policy
 4. Policy for determining citizenship

Sol. 3

97. Assertion
(A): The people in between the producers and the final consumers are traders.
Reason
(R): The people who finally sell the commodities to the consumers are retailers.
1. Both A and R are true and R is the correct explanation of A.
 2. Both A and R are true and R is not the correct explanation of A
 3. A is true but R is false
 4. A is false but R is true

Sol. 2

98. The Principle of 'checks and balances' is related to
1. Rule of law
 2. Fundamental law
 3. Fundamental Duties
 4. Separation of Powers

Sol. 4
The separation of powers helps in keeping check over the centre.

99. Which one of the following is not an elected member of the House?
1. Speaker of the Lok Sabha
 2. Deputy Speaker of the Lok Sabha
 3. Chairman of the Rajya Sabha
 4. Deputy Chairman of the Rajya Sabha

Sol. 3
Chairman of the Rajya Sabha is the Vice president of India.

100. India has
1. basic democracy
 2. controlled democracy
 3. guided democracy
 4. liberal democracy

Sol. 4
Indian democracy gives complete freedom of expression and other fundamental rights.