

Date: 17.11.2019

Max. Marks: 100

**SOLUTIONS**

Time allowed: 120 mins

**PHYSICS**

1. A house hold consumes 1 kwh of energy per day. This energy in joules is:

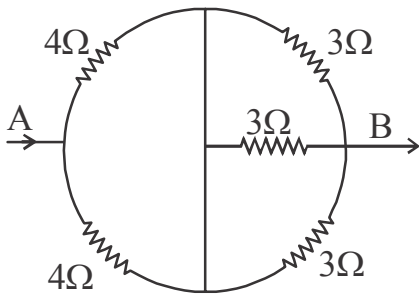
- (1)  $3.6 \times 10^5$  J    (2)  $6.3 \times 10^5$  J  
 (3)  $6.3 \times 10^6$  J    (4)  $3.6 \times 10^6$  J

Ans. (4)

Sol.  $1 \text{ kWh} = 3.6 \times 10^6 \text{ J}$

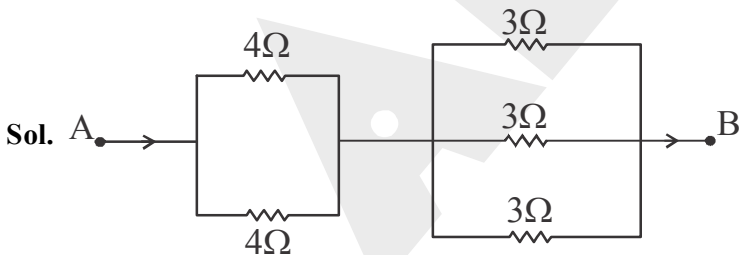
2. Resistors are connected as shown in the circuit diagram.

The effective resistance between A and B is :



- (1)  $3 \Omega$     (2)  $3.5 \Omega$   
 (3)  $11 \Omega$     (4)  $5.5 \Omega$

Ans. (1)



(4, 4) Parallel    ]  
                           ] Series  
 (3, 3, 3) Parallel ]



$R_{eq} = 3 \Omega$

3. Two steel balls of mass 1 kg and 2 kgs and a lead ball of 10 kgs are released together from the top of tower 30 m high. Assuming the path to be in vacuum:
- (1) The lead ball reaches the ground earlier.      (2) The 1 kg iron ball reaches the ground earlier.  
(3) All the balls reach the ground simultaneously.      (4) The 2 kgs steel ball reaches the ground earlier.

**Ans. (3)**

**Sol.**  $t = \sqrt{\frac{2h}{g}}$  is independent of mass of the body. Hence all the balls reach the ground simultaneously.

4. The maximum number of 60 W bulbs that can be run from the main supply of 220 V if you do not want to overload a 5A fuse:
- (1) 18      (2) 11  
(3) 20      (4) 10

**Ans. (1)**

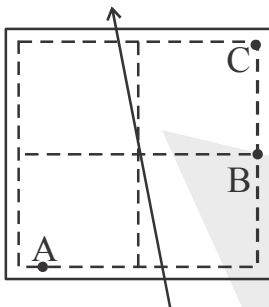
**Sol.** Let there are N bulbs in parallel.

Hence total power = NP = VI

$$N = \frac{VI}{P} = \frac{220 \times 5}{60} = 18.33$$

So, maximum bulbs if you do not want to overload a 5A fuse will be 18

5. The diagram shows a current carrying wire passing through the centre of a square card board. The magnetic field at points A, B and C is :



- (1) Equal at A, B and C      (2) Stronger at B than A, equal at B and C  
(3) Stronger at B than C, weaker at B than A      (4) Stronger at B than A, weaker at C than A

**Ans. (4)**

**Sol.** Distance of point B is less than A which is less than C

$$r_B < r_A < r_C$$

$$\text{As } B \propto \frac{1}{r} \text{ (if } I = \text{constant)}$$

$$\text{Hence } B_B > B_A > B_C$$

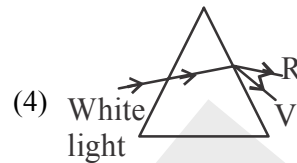
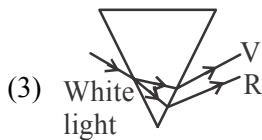
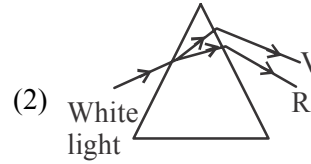
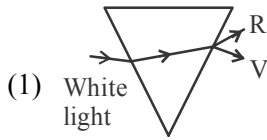
6. The solar constant at a place is 1.4 kW/m<sup>2</sup>. The solar energy received by an area of 4m<sup>2</sup> per second at this place is:
- (1) 6.5 KJ      (2) 6.5 J  
(3) 5.6 J      (4) 5.6 KJ

**Ans. (4)**

**Sol.** Solar constant =  $1.4 \text{ kW/m}^2$

$$\begin{aligned} \text{Solar energy received} &= 1.4 \text{ kW/m}^2 \times 4\text{m}^2 \times 1 \text{ s} \\ &= 5.6 \text{ kJ} \end{aligned}$$

7. While performing an experiment of dispersion of white light through a prism, four students represented the dispersion pattern as shown below. Identify the correct representation :



**Ans. (3)**

**Sol.** Violet deviates the most and red deviates the least and also dispersion takes place at both refracting surface.

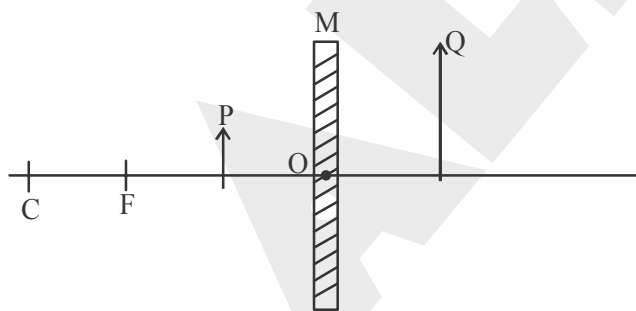
8. A spherical mirror and a thin spherical lens each of focal length  $-10\text{cm}$  are given. The mirror and lens are likely to be :

- (1) The mirror is concave mirror and the lens is concave lens.
- (2) The mirror is convex mirror and the lens is convex lens.
- (3) The mirror is convex mirror and the lens is concave lens.
- (4) The mirror is concave mirror and the lens is convex lens.

**Ans. (1)**

**Sol.** Focal length is negative for concave mirror as well as concave lens.

9. In the following diagram 'M' is a mirror and 'P' is an object and 'Q' is its magnified image of 'P' formed by the mirror. The mirror 'M' is a :



- (1) Concave mirror
- (2) Convex mirror
- (3) Plane mirror
- (4) Plano convex mirror

**Ans. (1)**

**Sol.** For concave mirror, when object is placed between focus and pole then virtual and magnified image is formed which is behind the mirror.

10. A person takes hot coffee by pouring it into the saucer when he is in hurry because he knows that:

- (1) The latent heat of steam is high and the coffee will become cold quickly.
- (2) The evaporation increases with the increase in surface area and the cooling of coffee is faster.
- (3) Part of heat will be absorbed by saucer and coffee become cold quickly.
- (4) The high specific heat of water makes the coffee cold quickly.

**Ans. (2)**

**Sol.** Because of increase in surface area, the rate of cooling or heat transfer increases. Hence, coffee will cool down faster.

11. The energy released when 3g of a material is completely converted into energy during a nuclear reaction is (given, speed of light =  $3 \times 10^8$  m/sec )

- |                           |                           |
|---------------------------|---------------------------|
| (1) $27 \times 10^{16}$ J | (2) $27 \times 10^{14}$ J |
| (3) $27 \times 10^{19}$ J | (4) $27 \times 10^{13}$ J |

**Ans. (4)**

**Sol.**  $E = mc^2$

$$= \frac{3}{1000} \times (3 \times 10^8)^2 = \frac{3 \times 9 \times 10^{16}}{10^3}$$

$$= 3 \times 9 \times 10^{13}$$

$$E = 27 \times 10^{13} \text{ J}$$

12. Consider the following Assertion and the Reason and select the correct alternative :

**Assertion (A) :** Alloys are used in electric heating devices.

**Reason (R) :** Alloys do not oxidise readily at high temperature.

- (1) A is true and R is true but R is not the correct explanation of A.
- (2) Both A and R are false.
- (3) Both A and R are true and R is the correct explanation of A.
- (4) A is false R is true.

**Ans. (3)**

**Sol.** Alloys are used in electrical heating devices rather than pure metals because the resistivity of an alloy is more, they have high melting point and does not burn or oxidise easily even at higher temperature.

13. Consider the following statements and select the correct alternative :

**Statement (A):** The frequency of the sound wave whose wave length is 1.5cm with speed 339 m/s is 22600Hz.

**Statement (B):** The given sound is audible to human beings.

- (1) Statement A is true, Statement B is false
- (2) Both Statements A and B are true
- (3) Statement A is false, Statement B is true
- (4) Both Statements A and B are false

**Ans. (1)**

**Sol.**  $v = f \lambda$

$$f = \frac{v}{\lambda} = \frac{339}{1.5 \times 10^{-2}} = 22600 \text{ Hz}$$

As this 22,600 Hz > 20,000 Hz, this sound is ultrasound which is not audible to human beings.



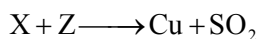
18.  $\text{NH}_3$  gas can be dried by passing it over :

- (1) Concentrated  $\text{H}_2\text{SO}_4$  (2)  $\text{P}_2\text{O}_5$   
 (3) Anhydrous  $\text{CaCl}_2$  (4)  $\text{CaO}$

Ans. (4)

Sol.  $\text{CaO}$  being basic, does not react with  $\text{NH}_3$ . The other compounds react with  $\text{NH}_3$ .  
 So it is used as drying agent.

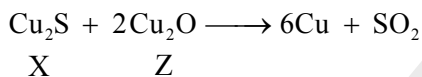
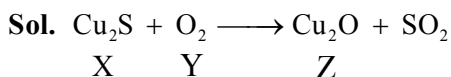
19.  $\text{X} + \text{Y} \longrightarrow \text{Z} + \text{SO}_2$



Identify X, Y and Z :

- (1)  $\text{X}-\text{Cu}_2\text{O}$ ,  $\text{Y}-\text{H}_2\text{SO}_4$  and  $\text{Z}-\text{Cu}_2\text{O}$  (2)  $\text{X}-\text{Cu}_2\text{S}$ ,  $\text{Y}-\text{H}_2\text{S}$  and  $\text{Z}-\text{Cu}_2\text{O}$   
 (3)  $\text{X}-\text{Cu}_2\text{S}$ ,  $\text{Y}-\text{O}_2$  and  $\text{Z}-\text{Cu}_2\text{O}$  (4)  $\text{X}-\text{Cu}_2\text{S}$ ,  $\text{Y}-\text{H}_2\text{SO}_4$  and  $\text{Z}-\text{Cu}_2\text{O}$

Ans. (3)

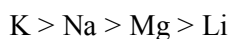
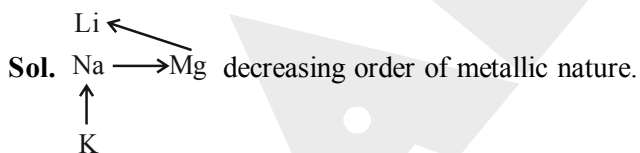


It is self reduction process.

20. Identify the correct order of elements according to their metallic character :

- (1)  $\text{K} > \text{Na} > \text{Li} > \text{Mg}$  (2)  $\text{K} > \text{Na} > \text{Mg} > \text{Li}$   
 (3)  $\text{K} > \text{Mg} > \text{Na} > \text{Li}$  (4)  $\text{K} > \text{Li} > \text{Na} > \text{Mg}$

Ans. (2)



21. Consider the elements of group-14.

Choose the correct alternative :

- (a) Si and Ge are semi conductors (b) Carbon and silicon are non metals  
 (c) Sn and Pb are metals (d) Si and Ge are metalloids  
 (1) a, b, c and d (2) a, b and d  
 (3) a, c and d (4) a, b and c

Ans. (3)

Sol. 'C' is a non-metal but 'Si' is a metalloid.

22. The following statements applies to  $\text{SO}_2$  but NOT to  $\text{H}_2\text{S}$  :

- (1) The gas is soluble in water. (2) It is an oxidising as well as a reducing agent.  
 (3) It is a dibasic acid. (4) It is easily liquifiable.

Ans. (2)

Sol.  $\text{H}_2\text{S}$  acts as reducing agent only.

23. **Statement (A)** : Iron does not burn on heating.

**Statement (B)** : Iron filings burn vigorously, when sprinkled in the flame of the burner.

- (1) Both the statements 'A' and 'B' are true
- (2) Both the statements 'A' and 'B' are false
- (3) Statement 'A' is true, but Statement 'B' is false
- (4) Statement 'A' is false, but Statement 'B' is true

**Ans. (1)**

**Sol.** Direct

24. **Assertion (A)** : Silver articles becomes black after some time when exposed to air.

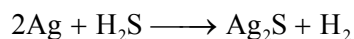
**Reason (R)** : It reacts with oxygen in the air to form a coating of silver oxide.

- (1) 'A' and 'R' are correct and 'R' is the correct explanation of 'A'.
- (2) 'A' and 'R' are correct, but 'R' is not the correct explanation of 'A'.
- (3) 'A' is true but 'R' is false.
- (4) Both 'A' and 'R' are false.

**Ans. (3)**

**Sol. Assertion** : True

**Reason** : It reacts with  $H_2S$  forming  $Ag_2S$  (black) not  $Ag_2O$ .



25. **Assertion (A)** : Calcium ( $Z = 20$ ) and Argon ( $Z = 18$ ) are examples for isobars.

**Reason (R)** : The total number of nucleons is same in the atoms of this pair of elements.

Select the correct option from the given alternatives :

- (1) 'A' and 'R' are correct and 'R' is the correct explanation of 'A'.
- (2) 'A' and 'R' are correct, but 'R' is not the correct explanation of 'A'.
- (3) 'A' is true but 'R' is false.
- (4) Both 'A' and 'R' are false.

**Ans. (1)**

**Sol.** Total number of nucleons is the mass number of that element.

26. The compounds which do not undergo hydrogenation :

- |                                       |                                    |
|---------------------------------------|------------------------------------|
| (1) $C_6H_{12}$ and $C_4H_{10}$       | (2) $C_8H_{10}$ and $C_5H_{12}$    |
| (3) $C_{13}H_{24}$ and $C_{14}H_{28}$ | (4) $C_{14}H_{30}$ and $C_5H_{12}$ |

**Ans. (4)**

**Sol.** Because both are alkanes. As they are saturated, they do not undergo hydrogenation.

## **BIOLOGY**

27. **Assertion (A)**: During the day plants do not release  $CO_2$ .

**Reason (R)**:  $CO_2$  generated during respiration is used for photosynthesis.

- (1) 'A' is true and 'R' is false
- (2) 'A' is false and 'R' true
- (3) Both 'A' and 'R' are true and 'R' explains 'A'
- (4) Both 'A' and 'R' are true but 'R' doesn't explain 'A'

**Ans. (3)**

**Sol.** It is known as  $CO_2$  **compensation point or threshold value**. At this value  $CO_2$  fixed in photosynthesis is equal to  $CO_2$  evolved in respiration and photorespiration.

28. The following statements about blood vessels is / are correct:

- (A) Arteries have thin and less muscular walls.
- (B) Walls of veins are non-elastic.
- (C) Arteries have no valves in their inner lining.
- (D) Veins do not collapse when empty.

- (1) A and D
- (2) Only D
- (3) B and C
- (4) A and C

**Ans. (3)**

**Sol.** Artery - Deep seated, Thick, Non - collapsable, Muscular with lumen, No semi lunar valve  
Vein - Superficial, thin, collapsable, non - muscular with wider lumen

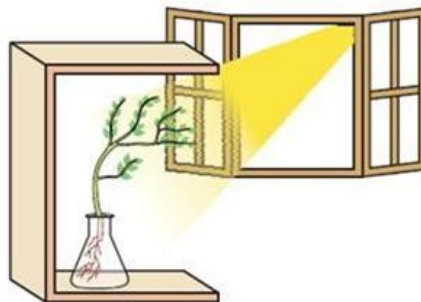
29. Remarkable reduction in blood pressure affects normal functioning of the kidney as follows:

- (1) Reduces secretion of nitrogenous wastes.
- (2) Reduces renal filtration.
- (3) Reduce reabsorption of useful materials
- (4) Reduces tubular secretion.

**Ans. (2)**

**Sol.** Renal filtration is governed by the process of ultrafiltration, if there is reduction in blood pressure it will affect the renal filtration rate.

30. The changes that are likely to happen in the plant in the following picture :



- (A) A hormone abscisic acid is synthesized at the shoot tip.
- (B) When light is coming from one side of the plant, auxin diffuses towards the shady side.of the plant.
- (C) Abscisic acid helps the cells to grow longer.
- (D) Cells grow longer on the side of the shoot which is away from light.

- (1) A and B
- (2) B and C
- (3) C and D
- (4) B and D

**Ans. (4)**

**Sol.** This is the classical experiment done by F.C. Went to study the auxins. Auxin is produced under the influence of sunlight but diffuses to the opposite site where cell division takes places.

Where as ABA is associated with the formation of Abscission Zone.



31. Choose the most appropriate statement from the options listed below that explains the factors which affects transpiration:

- (A) If the wind blows faster, the water vapour released during transpiration is faster.  
 (B) Increase in atmospheric pressure increases the rate of transpiration.  
 (C) Decrease in temperature allows more water to evaporate.  
 (D) High humidity in the air increases the rate of transpiration.

- (1) A only (2) B and C only  
 (3) D only (4) A and D only

**Ans. (1)**

**Sol.** Rate of transpiration  $\propto$  Temperature, sunlight, speed of air

$$\text{Rate of transpiration} \propto \frac{1}{[\text{Humidity}]}, \frac{1}{[\text{Pressure}]}$$

32. Match column-I with column-II and identify the correct answer:

Column-I		Column-II	
<b>A</b>	Insulin	<b>i</b>	Promotes tissue metabolism
<b>B</b>	Thyroxine	<b>ii</b>	Stimulates milk secretion
<b>D</b>	Antidiuretic Hormone (ADH)	<b>iii</b>	Testosterone
<b>D</b>	Oxytocin	<b>iv</b>	Promotes glucose utilization by the body cells
		<b>v</b>	Increase reabsorption of water from kidney

- (1) A – iv, B – i, C – v, D – ii (2) A – ii, B – iii, C – iv, D – i  
 (3) A – iii, B – v, C – i, D – ii (4) A – v, B – i, C – ii, D – iii

**Ans. (1)**

**Sol.** Insulin → Glucose to glycogen, i.e. utilisation of glucose

Thyroxin → Tissue metabolism

ADH → Reabsorption of water by kidney

Oxytocin → Stimulates milk secretion

33. The correct route that sperm follows when it releases from the testis of a mammal:

- (1) Vas deferens → Epididymis → Urethra (2) Urethra → Epididymis → Vas deferens  
 (3) Epididymis → Urethra → Vas deferens (4) Epididymis → Vas deferens → Urethra

**Ans. (4)**

**Sol.** Route of a sperm is : Epididymis → Vas deferens → Urethra

34. Pattern baldness is more common in males than in females due to:

- (1) Dominant genes of such traits are found in the 'X' chromosome.
- (2) Dominant genes of such traits are found in the 'Y' chromosome.
- (3) Recessive genes of such traits are found in the 'X' chromosome.
- (4) Recessive genes of such traits are found in the 'Y' chromosome.

Ans. (3)

Sol. Baldness is inherited from the mother's father. A 50% chance exists for a person to share the same X chromosome as his maternal grandfather. Because women have two X chromosomes, they have two copies of the androgen receptor gene, while men only have one.

35. An useful biological indicator of SO<sub>2</sub> pollution:

- |                |                        |
|----------------|------------------------|
| (1) Bryophytes | (2) Algal bloom        |
| (3) Lichens    | (4) <i>Pseudomonas</i> |

Ans. (3)

Sol. Lichens are the biological indicator of SO<sub>2</sub> pollution.

36. Animal species that is being conserved in 'Dachigam National Park' :

- |                            |                   |
|----------------------------|-------------------|
| (1) Musk deer              | (2) Golden Oriole |
| (3) Hangul or Kashmir stag | (4) Tiger         |

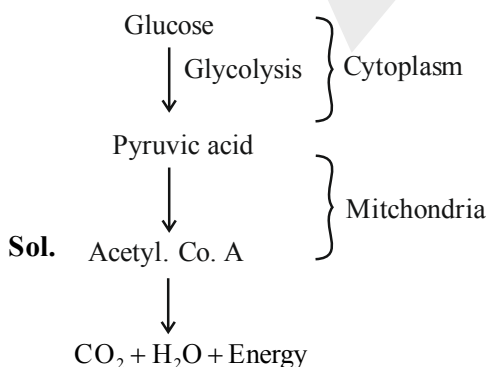
Ans. (3)

Sol. Hangul or Kashmir stag is conserved in Dachigam National Park.

37. The correct sequence of aerobic respiration in yeast is :

- (1) Glucose  $\xrightarrow{\text{Cytoplasm}}$  Pyruvate  $\xrightarrow{\text{Mitochondria}}$  CO<sub>2</sub> + Water + Energy
- (2) Glucose  $\xrightarrow{\text{Cytoplasm}}$  Pyruvate  $\xrightarrow{\text{Cytoplasm}}$  Ethanol + CO<sub>2</sub> + Energy
- (3) Glucose  $\xrightarrow{\text{Cytoplasm}}$  Pyruvate  $\xrightarrow{\text{Mitochondria}}$  Lactic Acid + Energy
- (4) Glucose  $\xrightarrow{\text{Cytoplasm}}$  Pyruvate  $\xrightarrow{\text{Cytoplasm}}$  Ethanol + CO<sub>2</sub>

Ans. (1)



38. Some dinosaurs had feathers although they couldn't fly but birds have feathers that help them to fly. In the context of evolution this means:

- (1) Reptiles have evolved from birds.
- (2) There is no evolutionary connection between reptiles and birds.
- (3) Birds have evolved from reptiles.
- (4) Feathers are homologous structures in both the organisms.

**Ans. (3)**

**Sol.** Dinosaur had feathers but could not fly but birds have feather's that help them to fly proves that birds have enolved from reptiles.

39. Examine the following statements and select the correct option:

Statement (A) : Speciation may take place when variation is combined with geographical isolation.

Statement (B): Traits in one individual may not be inherited separately.

- (1) 'A' is true and 'B' is false.
- (2) 'A' is false and 'B' is true.
- (3) Both 'A' and 'B' are true.
- (4) Both 'A' and 'B' are false.

**Ans. (3)**

**Sol.** Speciation takes place with variation as well as coupled with geographical solution.

Traits in one individual may not be inherited separately (Linkage).

40. The fluid that protects the developing embryo:

- (1) Vitreous humour.
- (2) Aqueous humour.
- (3) Endolymph fluid.
- (4) Amniotic fluid.

**Ans. (4)**

**Sol.** Amniotic fluid protects the developing embryo in mother's womb.

## **HISTORY**

41. Identify the given regions in the map with their corresponding European settlements in India and select the correct option using the codes given below:



- (1) A - Ahmedabad, B - Broach, C - Machlipatnam, D - Chandranagor
- (2) A - Chandranagor, B - Ahmedabad, C - Broach, D - Machlipatnam
- (3) A - Broach, B - Chandranagor, C - Machlipatnam, D - Ahmedabad
- (4) A - Broach, B - Chandranagor, C - Machlipatnam, D - Ahmedabad

**Ans. (1)**

42. Identify the correct statements with regard to the Solanki dynasty:

- (A) Chandradeva was the founder of this dynasty.  
(B) Moolaraja II defeated Mohammed Ghazni near Mount Abu.  
(C) During the rule of this dynasty, the famous Jain scholar Hemachandra compiled Prakruth dictionary 'Deshimala'.  
(D) Ullaf Khan and Nusrath Khan, the military generals of Allauddin Khilji defeated Karnadeva.
- (1) Only A, B and C are correct (2) Only B, C and D are correct  
(3) Only A, C and D are correct (4) Only C and D are correct

**Ans. (4)**

43. The correct family chart in ascending order of the important rulers of Shatavahana dynasty is:

- (1) Simukha, Gautamiputra Shatakarni, Vashishtaputra pulamayi, Yajñashri Shatakarni.  
(2) Simukha, Vashistaputra pulamayi, Gautamiputra Shatakarni, Yajñashri Shatakarni.  
(3) Simukha, Yajñashri Shatakarni, Vashishtaputra pulamayi, Gautamiputra Shatakarni.  
(4) Simukha, Vashistaputra pulamayi, Yajñashri Shatakarni, Gautamiputra Shatakarni.

**Ans. (1)**

44. Read the given Statements and select the correct answer:

Assertion (A): There was a Sun temple in all Inca centres.

Reason (R): The people of Inca believed that the Sun God was the link between the people and God Veerakochoa.

- (1) 'A' is true and 'R' is false.  
(2) 'A' is false and 'R' is true.  
(3) Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'.  
(4) Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'.





**Ans. (2)**

45. Read the given statements and identify the correct option related to them:

- (A) It has Mukhamantapa and Garbhagruha with a Nandi idol in front of this historical temple.  
(B) Garbhagruha on top of the Garbhagruha is a special feature of this temple.  
(C) Henry cousins, the art critic observed the sculpture of Garuda on the door of Garbhagruha and called it a Vaishnava temple.  
(D) Since a saint lived here for a number of days people called it in his name.
- (1) Birla Mandir. (2) Ladhkhan Temple.  
(3) Tulsidas Mandir. (4) Gurunanak Dwara.

**Ans. (2)**

46. Observe the following pictures of social reformers and identify the order of the statements correctly related to them:

			
Annie Besant	Savithri Bhai Phule	Tarabai Shinde	Pandita Rama Bai
<b>i</b>	<b>ii</b>	<b>iii</b>	<b>iv</b>

- (A) Dedicated her life for the betterment of women of India and established 'Mukti Mission'.
- (B) She opposed the exploitation of women in her book 'Stri Purusha Tulana'.
- (C) While treating the patients of plague along with her son, she died of it.
- (D) Called for universal brotherhood without distinction of race, creed, sex, caste and colour.

	<b>i</b>	<b>ii</b>	<b>iii</b>	<b>iv</b>
(1)	B	C	D	A
(2)	A	B	D	C
(3)	C	A	B	D
(4)	D	C	B	A

Ans. (4)

47. The important events those took place during the American war of Independence is depicted in the following flow diagram. Identify the correct chronological sequence:



- A. Cornwallis surrender
- B. The Sugar and Molasses Act
- C. Second Congress of Philadelphia
- D. Boston Tea Party

	<b>i</b>	<b>ii</b>	<b>iii</b>	<b>iv</b>
(1)	B	C	D	A
(2)	B	D	C	A
(3)	A	B	D	C
(4)	C	B	A	D

Ans. (2)

48. Choose the correct sequence to indicate the given statement of the results of the Battle of Plassey as TRUE (T) or FALSE (F):

- (A) The Battle of Plassey brought out the immorality, lack of unity among the Indians and the greed of Indian business men.
- (B) After the Battle of Plassey, Siraj-ud-dulah became the Nawab of Bengal.
- (C) The Company gained exclusive rights to do business in Bengal after the Battle of Plassey.
- (D) Mir Jaffar had to pay a huge amount as a war relief.

- (1) TTTT
- (2) TFTF
- (3) TFFT
- (4) TFTT

**Ans. (4)**

49. Read the given statements and identify the correct Act which is related to all of them:

- (A) This act formulated Bi-cameral legislative body at the centre.
- (B) As per this Act "Diarchy" was allowed at regional government.
- (C) As per this Act High Commissioner was appointed for India.
- (D) As per this Act Provincial budget was separated from Central budget.

- (1) Indian Government Act of 1935
- (2) Indian Council Act of 1909
- (3) Indian Council Act of 1892
- (4) Indian Council Act of 1919

**Ans. (4)**

50. In List-A authors and in List-B their works are given. Choose the correct answer by matching them:

**List – A**

- (A) Charles Dickens
- (B) Emile Zola
- (C) Thomas Hardy
- (D) Charlotte Bronte
- (1) A – ii, B – iii, C – i, D – iv
- (3) A – iv, B – ii, C – i, D – iii

**List – B**

- (i) Mayor of Casterbridge
- (ii) Germinal
- (iii) Jane Eyre
- (iv) Hard times
- (2) A – iv, B – iii, C – ii, D – i
- (4) A – iii, B – ii, C – iv, D – i

**Ans. (3)**

## **GEOGRAPHY**

51. The group of wild life sanctuaries and the states in which they are located is given below. Identify the correctly matched group :

- (1) Manas - Meghalaya  
Bhadra - Karnataka  
Annamalai - Tamilnadu  
Mudumalai - Kerala
- (2) Biligiriranga Hills - Karnataka  
Rathambor - Gujarat  
Nagarjunasagara - Andhra Pradesh  
Jaldapara - Kerala
- (3) Nagarjuna Sagara - Telangana  
Bharathpura - Rajasthan  
Manas - Assam  
Dandeli - Karnataka
- (4) Mudumalai - Tamilnadu  
Periyar - Kerala  
Bharathpur - Gujarat  
Jaldapara - Assam

**Ans. (3)**

52. Identify the correct statements related to 'cotton crop' from the options given below :

- (i) It is grown as a Rabi Crop in India
- (ii) It is tropical and sub-tropical zone crop
- (iii) It requires 10° to 15°C temperature
- (iv) It requires 50 to 100 cm annual rainfall

**Codes :**

- (1) (i) and (ii) only correct
- (2) (iii) and (iv) only correct
- (3) (i) and (iv) only correct
- (4) (ii) and (iv) only correct

**Ans. (4)**

53. Read the following statements and choose the correct answer :

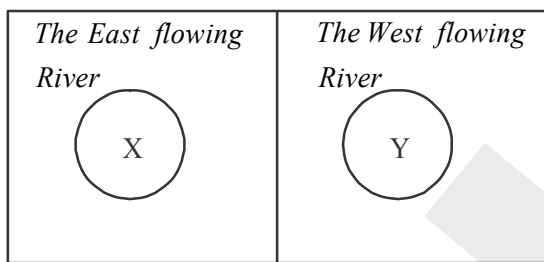
Assertion (A) : Laterite soil is not that much useful for agriculture

Reason (R) : Laterite soil Undergoes more leaching process

- (1) Both (A) and (R) are correct and (R) is the correct explanation of (A)
- (2) Both (A) and (R) are correct but (R) is not the correct explanation of (A)
- (3) (A) is correct, (R) is incorrect
- (4) (A) is incorrect, (R) is correct

**Ans. (1)**

54. Refer to the given circles below, select the correct option regarding 'X' and 'Y' :



- (1) 'X' can be 'Narmada' and 'Y' can be 'Godavari'
- (2) 'X' can be 'Kaveri' and 'Y' can be 'Netravati'
- (3) 'X' can be 'Mahanadi' and 'Y' can be 'Krishna'
- (4) 'X' can be 'Sharavathi' and 'Y' can be 'Tapi'

**Ans. (2)**

55. Match the column 'A' with column 'B' and choose the correct answer :

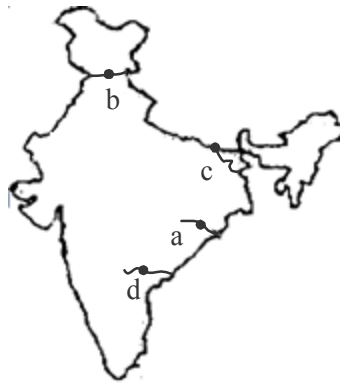
	Column 'A'		Column 'B'
A	Veer Savarkar International Airport	i	Nagpur
B	Lal Bahadur Shastri International Airport	ii	Bhubaneshwar
C	Babasaheb Ambedkar International Airport	iii	Port Blair
D	Sardar Vallabhbhai Patel International Airport	iv	Ahmedabad
		v	Varanasi

Choices :

- (1) A – ii, B – v, C – iv, D – i
- (2) A – iii, B – v, C – i, D – iv
- (3) A – iv, B – iii, C – i, D – ii
- (4) A – iii, B – i, C – iv, D – ii

**Ans. (2)**

56. Match the marked multipurpose river valley projects on the map of India (i, ii, iii, iv) with their respective names



- i. Bhakra Nangal
- ii. Nagarjuna Sagar
- iii. Kosi
- iv. Hirakud

(1) a – ii, b – iii, c – i, d – iv

(2) a – iv, b – i, c – iii, d – ii

(3) a – i, b – iv, c – ii, d – iii

(4) a – iii, b – i, c – iv, d – ii

**Ans. (2)**

57. A tourist was travelling across Indian states. He first visited Pykara hydro electric power station, secondly Jawaharlal Nehru sea port, thirdly Bokaro steel plant station and lastly Govindha Vallaba Panth reservoir. Identify the proper sequence of the states the tourist travelled :

- (1) Maharashtra , Andhra Pradesh, Chhattisgarh, Gujarat
- (2) Andhra Pradesh, Maharashtra , Bihar, Karnataka
- (3) Kerala, Tamil Nadu, Odisha, Gujarat
- (4) Tamil Nadu, Maharashtra , Jharkhand, Uttar Pradesh

**Ans. (4)**

58. While teaching a topic on ' Minerals and Energy Resources' the geography teacher had made the following statement about a particular resource in the class :

"This resource is formed from plant residue and transformed due to high temperature and pressure. It is composed largely of carbon"

The teacher has stated about the resource mentioned below.

- (1) Manganese
- (2) Iron
- (3) Coal
- (4) Bauxite

**Ans. (3)**

59. Read the following statements, and choose the correct answer :

Assertion (A) : The population is high in the Northern plain of India

Reason (R) : The fertility of soil is one of the factors affecting on the distribution of population

- (1) (A) is correct, (R) is incorrect
- (2) (A) is incorrect, (R) is correct
- (3) Both (A) and (R) are 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)

**Ans. (3)**



60. The type of vegetation shown in the picture is found in this type of forests in India :



- |                     |                      |
|---------------------|----------------------|
| (1) Mangrove Forest | (2) Mountain Forest  |
| (3) Monsoon Forest  | (4) Evergreen Forest |

Ans. (1)

**POLITICAL SCIENCE, SOCIOLOGY, ECONOMICS**  
**& BUSINESS STUDIES**

61. The list 'A' contains fundamental rights and the list 'B' their article numbers. Choose the correct option that matches them:

**List 'A'**

- A. Right to Freedom
- B. Right to freedom
- C. Right against exploitation
- D. Cultural and educational rights

**List 'B'**

- i. 23 and 24 articles
- ii. 14 to 18 of religion
- iii. 29 to 30 articles
- iv. 19 to 22 articles
- v. 25 to 28 articles

- |                            |                            |
|----------------------------|----------------------------|
| (1) A-ii, B-iii, C-i, D-iv | (2) A-v, B-i, C-ii, D-iii  |
| (3) A-iv, B-v, C-i, D-iii  | (4) A-i, B-iv, C-iii, D-ii |

Ans. (3)

62. The process of creation of an act in the state's legislature is jumbled up. Find the correct option that shows proper order of process of creation of an act:

- A. A discussion takes place on the bill and sent to respective house committee.
- B. The house approves the bill with 2/3 majority.
- C. The person who tables the bill reads out the text loudly.
- D. The bill is sent to the Governor's office for approval.
- E. The house committee deliberates on the bill and submits report to the legislative house.

- |           |           |
|-----------|-----------|
| (1) ACDBE | (2) CAEBD |
| (3) EACBD | (4) CEBDA |

Ans. (2)

63. He discussed the origin, development and functions of state in his book 'Polities'. Identify the person:

- |              |               |
|--------------|---------------|
| (1) Plato    | (2) Aristotle |
| (3) Socrates | (4) Herodotus |

Ans. (1)

64. One of the following is not a function of Karnataka public service commission:

- A. Appointing the gazetted and non gazetted officers.
- B. Conducting interviews for direct recruitment of candidates.
- C. Conducting departmental exams for state government employees.
- D. Train the teachers on modern skills of teaching.

- (1) A (2) B
- (3) C (4) D

**Ans. (4)**

65. Observe the four statements given. Choose the option which justifies India's relationship with it:

- A. It signed for peace, friendship and co-operation with India in 1971.
- B. It helped in the establishment of Bhilai and Bokaro steel industries.
- C. It co-operated during Tashkent agreement in 1966.
- D. It co-operated in U.N.O. during the liberation of Goa in 1962.

- (1) America (2) England
- (3) Russia (4) France

**Ans. (3)**

66. A set of four statements is given. Identify the one which is not Emile Durkhiem's statement:

- (1) Emile Durkheim considered society as an important unit of sociological study.
- (2) He opines that man's social behaviour has to understand not by personal view but by social background.
- (3) He believed that the capitalist society would be transformed by its victims i.e working class.
- (4) He opines that our duties and practices are defined through society's law and customs.

**Ans. (3)**

67. Jharkand MuktiMorcha' Organization came into being as a result of:

- (1) Long standing demands of people for the separate State.
- (2) Movement against atrocities of police force against innocents.
- (3) Actions of companies that rendered thousands of tribal displacements due to mining.
- (4) Movement for reservation of Schedule caste and Schedule tribe.

**Ans. (3)**

68. Characteristics of culture is given below. Find the one which is not a characteristic of culture:

- (1) Culture is learnt. (2) Culture is transmissive.
- (3) Culture is a static Phenomena. (4) Culture is continuous and cumulative.

**Ans. (3)**

69. The list 'A' contains Environmental Movement and the list 'B5 contains related information to the Movement. Choose the correctly matched option:

**List A**

- A. Silent Valley
- B. Coastal
- C. Chipko movement
- D. Appiko movement

- (1) A-iii, B-iv, C-i, D-ii
- (3) A-v, B-iii, C-ii, D-i

**List B**

- i. Began at Teh ri-Movement Gharwal District
- ii. Started in 1983 by the villagers of Salyani
- iii. Started at the valley of Phalghat
- iv. Started in Mangalore against refineries
- v. It was started against honour killing

- (2) A-ii, B-i, C-iii, D-v
- (4) A-iv, B-v, C-ii, D-iii

**Ans. (1)**

70. **Assertion (A):** Section 17 of the constitution prohibits the practice of untouchability.

**Reason (R):** The Act of 1989 has given some responsibilities for the government in eradication of untouchability.

- (1) A is true and R is false. (2) A is false and R is true.  
(3) Both A and R are true and R is related to A. (4) Both A and R are true and R is not related to A.

**Ans. (3)**

71. A set of four sentences related to Globalisation is given. Choose the correct option:

- A. Globalisation creates free trade zone by removing the import and export duties.  
B. Globalisation creates international agreements.  
C. Globalisation fight out child labour and slavery.  
D. Globalisation promotes specialization in production

- (1) Only A, B and D are correct (2) Only A, B and C are correct  
(3) Only A is correct (4) Only C is correct

**Ans. (1)**

72. The purpose of Pradhan Mantri Mudra Yojana is

- A. To ensure access to financial services in nationalised banks.  
B. To help every rural citizen to open bank account  
C. To provide loan for small businessmen / start ups from 50,000 to 10 Lakh.  
D. To provide life insurance to all citizens between the age of 18 to 50 years.

- (1) A (2) B  
(3) C (4) D

**Ans. (3)**

73. Gender inequality index (GII) is calculated at the international level by one of the following agencies:

- (1) U.N.D.P (2) UNICEF  
(3) UN's General Assembly (4) UNESCO

**Ans. (1)**

74. The main aim of 73rd amendment of the constitution in 1993 with respect to Panchayatraj system is:

- A. Centralization of power and responsibilities of village administration  
B. Abolition of special powers of village administration.  
C. Decentralize and confer constitutional status to the panchayat institutions.  
D. To bring village administration under the direct control of state.

- (1) A (2) B  
(3) C (4) D

**Ans. (3)**

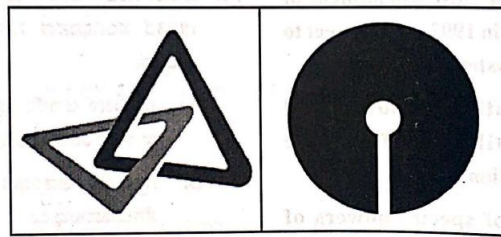
75. **Statement (A):** Foreign direct investment is an investment of foreign assets into domestic structures, equipment and organisations:

**Reason (R):** FDI does not include foreign investment into the stock markets.

- (1) 'A' is wrong 'R' is correct (2) 'A' and 'R' both are wrong  
(3) Only 'A' is correct (4) 'A' is correct, 'R' is the correct explanation of 'A'

**Ans. (4)**

76. The two Nationalised banks logos are given. Identify the correct option that matches.



- A. Syndicate Bank and Canara Bank.
- B. Canara Bank and Punjab National Bank.
- C. Canara Bank and State Bank of India.
- D. State bank of India and H.D.F.C bank

- (1) A
- (2) B
- (3) C
- (4) D

**Ans. (3)**

77. **Assertion (A):** The private sector consists of business owned by individuals or a group of individuals :

**Reason (R):** The private sector may either be partly or wholly owned by the central or state government as per 1991 industrial policy.

- (1) 'A' is right, 'R' is the correct explanation of 'A'
- (2) 'A' is right, 'R' is not the correct explanation of 'A'
- (3) Both 'A' and 'R' are wrong
- (4) Only 'A' is wrong.

**Ans. (2)**

78. One of the privileges of a private limited company is given. Choose the option which is related to it

- A. A private company can be formed by only two members.
- B. Need to issue a prospectus as public is invited to subscribe to shares.
- C. It is mandatory to keep an index of members in private company.
- D. Allotment of shares cannot be done without receiving the minimum subscription.

- (1) A
- (2) B
- (3) C
- (4) D

**Ans. (1)**

79. The benefits of e-banking are listed.

Choose the wrong statement:

- A. Customers of e-bank can make some permitted transaction from office or house.
- B. e-banking inculcates a sense of financial discipline by recording each and every transaction.
- C. Unlimited access to the bank by the customers.
- D. It allows customers to transact only with the government.

- (1) A
- (2) B
- (3) C
- (4) D

**Ans. (4)**

80. Observe the picture and find the suitable statement related to the person:



- A. She is called the 'Queen of Indian television sector'.
- B. The founder chairman of JET Airways.
- C. The founder of Apollo hospitals.
- D. Chairman and managing director of Biocon Ltd.

- (1) A and B only
- (2) B only
- (3) C and D only
- (4) D only

Ans. (4)

### MATHEMATICS

81. If the zeros of polynomial  $f(x) = x^2 - 3x^2 + m$  are in Arithmetic Progression then the value of 'm' is :

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

Ans. (2)

Sol.  $x^2 - 3x^2 + m = 0$

Roots are  $\alpha, \beta$  or  $\gamma$

$$\alpha + \beta + \gamma = 3$$

$$\alpha\beta + \beta\gamma + \alpha\gamma = 0$$

$$\alpha\beta\gamma = -m$$

$\alpha, \beta$  &  $\gamma$  are in AP.

$$\alpha + \gamma = 2\beta, 3\beta = 3, \beta = 1$$

$$\alpha + \gamma + \alpha\gamma = 0$$

$$\alpha + \gamma = -\alpha\gamma = -2\alpha\gamma$$

$$\alpha\gamma = -m = \frac{1}{2}m = 2 = m$$

82. The Least Common Multiple (LCM) and the Highest Common Factor (HCF) of two numbers are 168 and 12 respectively. If the sum of those two numbers is 108, find the difference between them :

- (1) 36 (2) 40  
(3) 60 (4) 64

**Ans. (3)**

**Sol.** Let numbers be  $x$  &  $y$

$$x \times y = 168 \times 12 = xy = 2016$$

$$y = \frac{2016}{x}$$

$$x + y = 108$$

$$x = \frac{2016}{x} = 108$$

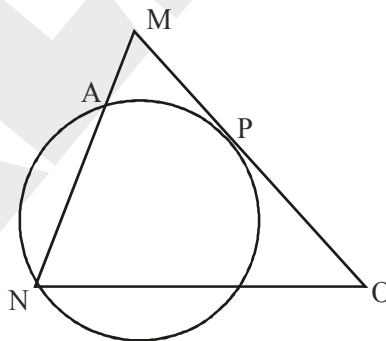
$$x^2 - 108x + 2016 = 0$$

$$(x - 24)(x - 84) = 0$$

$$x = 24, y = 84 \text{ or } x = 84, y = 24$$

$$\text{Difference } x - y = 60$$

83. MNO is an isosceles triangle where  $\overline{MN} = \overline{MO}$ . A circle through the vertex 'N' touches side ' $\overline{MO}$ ' at its middle point 'P' and intersects side ' $\overline{MO}$ ' at point 'A'. If  $\overline{AM} = 3\text{cm}$  then the length of ' $\overline{MO}$ ' is:



- (1) 6 cm (2) 9 cm  
(3) 12 cm (4) 15 cm

**Ans. (3)**

**Sol.** Let  $MO = 2y : AN = x$

$\therefore$  By properties of tangents and chords we have

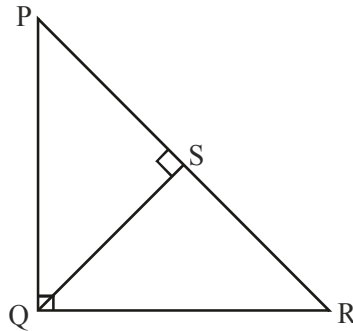
$$3(3 + x) = y^2$$

$$\text{Also, } MN = MO \Rightarrow 3 + x = 2y$$

$$\therefore 3(2y) = y^2$$

$$y = 6 \Rightarrow MO = 12 \text{ cm}$$

84. In  $\Delta PQR$ ,  $\angle PQR = 90^\circ$  and  $\overline{QS} \perp \overline{PR}$ . The true relation among the following :



(A)  $\overline{QS}^2 = \overline{PS} \times \overline{SR}$

(B)  $\overline{PQ}^2 = \overline{RS} \times \overline{PR}$

(C)  $\overline{QR}^2 = \overline{PS} \times \overline{SR}$

(D)  $\overline{PQ} \times \overline{QR} = \overline{QS} \times \overline{PR}$

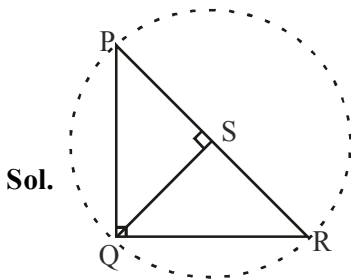
(1) Only A

(2) Only A and B

(3) Only A and C

(4) Only A and D

Ans. (4)



$\overline{PS} = \overline{SR} = \overline{SQ}$  are radii.

$\therefore \overline{QS}^2 = \overline{PS} \times \overline{SR}$

Area of  $\Delta PQR = \frac{1}{2} \times \overline{PQ} \times \overline{QR}$

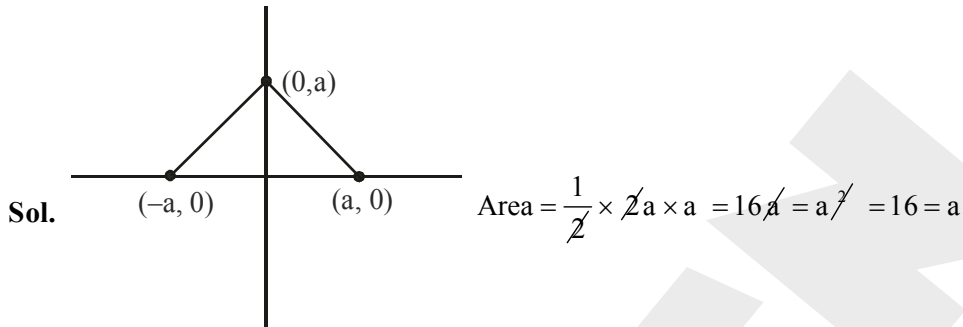
Area of  $\Delta PQR = \frac{1}{2} \times \overline{QS} \times \overline{PR}$

$\overline{PQ} \times \overline{QR} = \overline{QS} \times \overline{PR}$

85. If the area of the triangle formed by joining the points  $(0, a)$ ,  $(-a, 0)$  and  $(a, 0)$  is  $16a$  cm<sup>2</sup>, then the value of 'a' is:

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

Ans. (1)



86. The interior angles of a polygon are in an Arithmetic Progression and the common difference is 10. If the biggest exterior angle is  $85^\circ$ , then the number of sides of the polygon will be:

- (1) 5 (2) 6  
(3) 7 (4) 8

Ans. (2)

Sol.  $\frac{n}{2} [2a + (n-1)d] = (n-2)180$

$\frac{n}{2} [190 + (n-1)10] = (n-2)180$

$\frac{n}{2} [180 + 10n] = 180n - 36n$

$n^2 - 18n + 72 = 0$

$n^2 - 6n - 12n + 72 = 0$

$n = 6, 12$

87. If  $A(0,7)$ ,  $B(-6,0)$  and  $C(0,-4)$  are the vertices of  $\Delta ABC$ , then the distance from centroid of  $\Delta ABC$  to vertex 'A' is :

- (1)  $\sqrt{40}$  (2)  $\sqrt{32}$   
(3)  $\sqrt{68}$  (4)  $\sqrt{60}$

Ans. (1)

Sol.  $A(0,7) B(-6,0) C(0,-4)$

Centroid  $\left( \frac{0-6+0}{3}, \frac{7+0-4}{3} \right) (-2,1)$

Distance A as centroid  $= \sqrt{(0+2)^2 + (7-1)^2} = \sqrt{4+36} = \sqrt{40}$



88. Following two statements speak about Arithmetic Progression.

Statement (A) : In an Arithmetic Progression series :  $20 + 19\frac{1}{3} + 18\frac{2}{3} + \dots$  25 terms is 300

Statement (B) : In an Arithmetic Progression series :  $20 + 19\frac{1}{3} + 18\frac{2}{3} + \dots$  36 terms is 300

Pick the correct option from below :

- |                                  |                                   |
|----------------------------------|-----------------------------------|
| (1) Only statement A is true     | (2) Only statement B is true      |
| (3) Both the statements are true | (4) Both the statements are false |

**Ans. (3)**

**Sol.**  $20 + 19\frac{1}{3} + 18\frac{2}{3} + \dots S = 300$

$$\frac{n}{2} \left[ 2 \times 20 + (n-1) \frac{-2}{3} \right] = 300$$

$$n \left[ 20 + (n-1) \frac{-1}{3} \right] = 300$$

$$20n - \frac{n^2}{3} + \frac{n}{3} - 300 = 0$$

$$x^2 - 61n + 900 = 0$$

$$x^2 - 25n - 36n + 900 = 0$$

$$(n-25)(n-36), \quad n=25, \quad n=36$$

89. The product of mean and median of first five prime numbers is :

- |          |          |
|----------|----------|
| (1) 54.6 | (2) 28   |
| (3) 27   | (4) 10.8 |

**Ans. (2)**

**Sol.** Mean =  $\frac{2+3+5+7+11}{5} = 5.6$

median = 5

Product =  $5.6 \times 5 = 28$

90. If the difference between sum of the roots and product of the roots of a quadratic equation  $(ax)^2 + bx + c = 0$  (where  $a \neq 0$ ) is 'zero', then :

(1)  $-b + c = 0$

(2)  $b + c = 0$

(3)  $a^2 - b + c = 0$

(4)  $a^2 + b + c = 0$

Ans. (2)

Sol.  $a^2x^2 + bx + c = 0$   $\begin{cases} \alpha \\ \beta \end{cases}$

$$\alpha + \beta = -\frac{b}{a^2} \quad \alpha\beta = \frac{c}{a^2}$$

$$(\alpha + \beta) - \alpha\beta = -\frac{b}{a^2} - \frac{c}{a^2}$$

$$0 = \frac{-b - c}{a^2} = b + c = 0$$

91. If  $\sin 52^\circ \cdot \operatorname{cosec}(90^\circ - 2A) = 1$ , then the measure of angle 'A' is:

(1)  $19^\circ$

(2)  $26^\circ$

(3)  $38^\circ$

(4)  $52^\circ$

Ans. (1)

Sol.  $\sin 52 \operatorname{cosec}(90 - 2A) = 1$

$$\sin 52 \sec 2A = 1$$

$$\sin 52 = \frac{1}{\sec^2 A}$$

$$\sin 52 = \cos 2A$$

$$\cos 38 = \cos 2A$$

$$38 = 2A$$

$$19 = A$$

92. The value of 'x' and 'y' for the linear equations:

$$a_1x + b_1y + c_1 = 0 \text{ and } a_2x + b_2y + c_2 = 0 \text{ are}$$

(1)  $x = \frac{b_1c_1 - b_1c_2}{a_1b_2 - a_2b_1}$  and  $y = \frac{c_1a_2 - c_2a_1}{a_1b_2 - a_1b_1}$

(2)  $x = \frac{b_2c_1 - b_2c_2}{a_1b_2 - a_2b_1}$  and  $y = \frac{c_1a_2 - c_2a_1}{a_1b_2 - a_2b_1}$

(3)  $x = \frac{b_2c_1 - b_1c_2}{a_2b_1 - a_1b_2}$  and  $y = \frac{c_1a_2 - c_2a_1}{a_2b_1 - a_1b_2}$

(4)  $x = \frac{b_1c_2 - b_2c_1}{a_1b_2 - a_2b_1}$  and  $y = \frac{c_1a_2 - c_2a_1}{a_1b_2 - a_2b_1}$

Ans. (4)

Sol.  $a_1x + b_1y + c_1 = 0$   $\times a_2$

$$a_2x + b_2y + c_2 = 0 \times a_1$$

$$\begin{array}{r}
 a_1 a_2 x + b_1 a_2 y + c_1 a_2 = 0 \\
 a_2 a_1 x + b_2 a_1 y + c_2 a_1 = 0 \\
 \hline
 (b_1 a_2 - b_2 a_1) y + c_1 a_2 - c_2 a_1 = 0
 \end{array}$$

$$y = \frac{c_2 a_1 - c_1 a_2}{b_1 a_2 - b_2 a_1}$$

$$\text{Similarly } x = \frac{c_2 b_1 - c_1 b_2}{a_1 b_2 - a_2 b_1}$$

93. If  $(\sin \theta + \tan \theta) = a$  and  $(\tan \theta + \sin \theta) = b$  then,  $a^2 - b^2 =$

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

**Ans. (4)**

**Sol.**  $(\sin \theta + \tan \theta) = a$

$$\tan \theta - \sin \theta = b$$

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

$$a^2 - b^2 = 4 \sin \theta \tan \theta$$

$$a^2 - b^2 = \frac{4 \sin^2 \theta}{\cos \theta}$$

$$ab = \tan^2 \theta - \sin^2 \theta$$

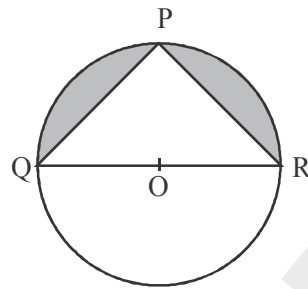
$$= \sin^2 \theta \left( \frac{1}{\cos^2 \theta} - 1 \right)$$

$$= \sin^2 \theta \times \frac{\sin^2 \theta}{\cos^2 \theta}$$

$$= \frac{\sin^4 \theta}{\cos^2 \theta}$$

$$\therefore 4\sqrt{ab} = a^2 - b^2$$

94. 'O' is the centre of the circle. The area of the shaded region in the given figure is  $126 \text{ cm}^2$ ,  $PQ = PR$  then the diameter QR is:



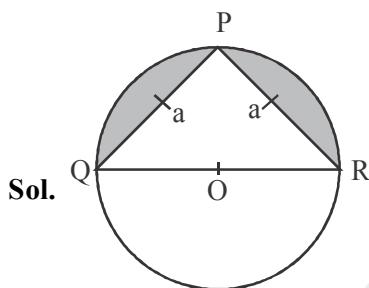
(1) 21 cm

(2)  $21\sqrt{2}$  cm

(3) 7 cm

(4)  $7\sqrt{2}$  cm

Ans. (2)



$$QR = \sqrt{a^2 + a^2}$$

$$= \sqrt{2} a$$

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

Area of shaded = portion

$$= \pi \left( \frac{\sqrt{2}}{2} a \right)^2 - \frac{1}{2} \times a \times a$$

$$126 = \frac{a^2}{2} (\pi - 1)$$

$$\frac{126 \times 2}{\pi - 1} = \frac{a^2}{1}$$

$$a = 21$$

$$QR = 21\sqrt{2}$$

95. The radius of a solid right circular cone increases by 20% and its height decreases by 20%. The percentage change in its volume is:

(1) 15.2 %

(2) 20 %

(3) 25.2 %

(4) 30 %

Ans. (1)

**Sol.** Vol of cone =  $\frac{1}{3} \cdot \pi r^2 h$

Inc.  $r = r + \frac{20}{100} \times r$   
 $= \frac{6r}{5}$

Dec.  $h = h - \frac{20}{100} \times h$   
 $= \frac{4h}{5}$

Vol of new cone =  $\frac{1}{3} \pi \frac{36r^2}{25} \times \frac{4h}{5}$

Change in % =  $\frac{\frac{1}{3} \pi \frac{36r^2}{25} \times \frac{4h}{5} - \frac{1}{3} \pi r^2 h}{\frac{1}{3} \pi r^2 h} \times 100$

$= \frac{\frac{1}{3} \pi r^2 h \left( \frac{144}{125} - 1 \right) \times 100}{\frac{1}{3} \pi r^2 h}$

$= \frac{19}{125} \times 100 = 15.2\%$

96. From the top of a building of height 'h' meter, the angle of elevation of the top of the tower is ' $\alpha$ ' and angle of depression of the foot of the tower is ' $\beta$ '. The height of the tower is:

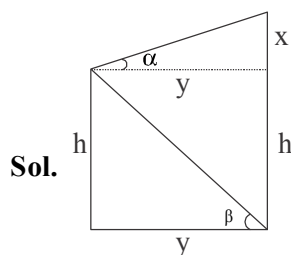
(1)  $\frac{h + (\tan \alpha + \tan \beta)}{\tan \beta}$

(2)  $\frac{h(\tan \alpha + \tan \beta)}{\tan \beta}$

(3)  $\frac{h \tan(\alpha + \beta)}{\tan \beta}$

(4)  $\frac{h + \tan(\alpha + \beta)}{\tan \beta}$

**Ans. (2)**



$\tan \alpha = \frac{x}{y}$        $\tan \beta = \frac{h}{y}$

$$y = \frac{x}{\tan \alpha} \quad (1) \quad y = \frac{h}{\tan \beta} \quad (2)$$

$$\frac{x}{\tan \alpha} = \frac{h}{\tan \beta}$$

$$x = \frac{h \tan \alpha}{\tan \beta}$$

$$\text{Tower height} = x + h$$

$$= \frac{h \tan \alpha}{\tan \beta} + h$$

$$= \frac{h(\tan \alpha + \tan \beta)}{\tan \beta}$$

97. The perimeter of a square is found to be equal to the circumference of a circle. The ratio of the area of that square to the area of that circle would be:

(1) 14 : 11

(2) 22 : 7

(3) 11 : 14

(4) 7 : 22

**Ans. (3)**

**Sol.** Perimeter of sq. =  $4a$

$$\text{Circumference} = 2\pi r$$

$$4a = 2\pi r$$

$$\frac{a}{r} = \frac{\pi}{2} \Rightarrow a = \frac{\pi r}{2}$$

$$\text{Area ratio} = \frac{a^2}{\pi r^2} \Rightarrow \frac{\pi^2 r^2}{4\pi r^2}$$

$$= \frac{\pi}{4} = \frac{22}{7 \times 4} = \frac{11}{14}$$

$$= 11 : 14$$

98. A metal cube is completely submerged in a cylindrical vessel containing water. The diameter of the vessel is

30cm, the level of water is raised by  $1\frac{41}{99}$  cm. The length of the edge of the cube is:

(1) 40 cm

(2) 30 cm

(3) 20 cm

(4) 10 cm

**Ans. (4)**

**Sol.**  $h = \frac{140}{99}$  cm       $r = 15$  cm

$$\text{Vol increase} = \pi r^2 h$$

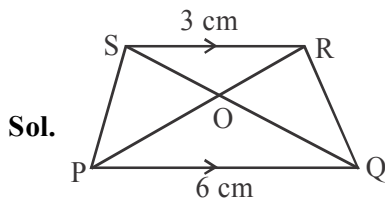
$$= \frac{22}{7} \times 15 \times 15 \times \frac{140}{99}$$

$$a^3 = 1000 \quad \Rightarrow a = 10$$

99. In trapezium PQRS,  $PQ \parallel RS$  and its diagonals intersect at 'O'. If  $PQ = 6$  cm and  $RS = 3$  cm then the ratio of area of  $\Delta POQ$  and  $\Delta ROS$  is

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

Ans. (1)



$\Delta POQ \sim \Delta OSR$  AA prop

$$\therefore \frac{\text{ar } \Delta POQ}{\text{ar } \Delta OSR} = \left(\frac{PQ}{SR}\right)^2 = \frac{4}{1}$$

100. The table below shows the value of probability when three identical coins are tossed. They are not matched correctly:

Column-A	Column-B
i. Getting at most two heads	a. $\frac{4}{8}$
ii. Getting at least two heads	b. $\frac{5}{8}$
iii. Getting exactly one head	c. $\frac{6}{8}$
iv. Getting neither all heads nor all tails	d. $\frac{3}{8}$
	e. $\frac{7}{8}$

Match the columns correctly:

(1) i - e, ii - a, iii - b, iv - d (2) i - d, ii - b, iii - a, iv - e  
 (3) i - d, ii - b, iii - c, iv - e (4) i - e, ii - a, iii - d, iv - c

Ans. (4)

Sol. i.  $P$  (getting at most two heads)  $= \frac{7}{8}$

ii.  $P$  (getting at least two heads)  $= \frac{4}{8}$

iii. P (getting exactly one head)  $= \frac{3}{8}$

iv. P (getting neither all head nor all tail)  $= \frac{6}{8}$

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