1. Slavery was finally abolished in French colonies in ____________.
   (1) 1848  (2) 1815  (3) 1804  (4) 1884
   Ans. (1)

2. Put the following events in sequence.
   (i) Return of Lenin  (ii) October Revolution  (iii) Russian peace with Germany
   (iv) February Revolution  (v) Centralised Planning
   (1) I, III, IV, V, II  (2) iv, i, ii, iii, v  (3) iv, ii, i, iii, v  (4) ii, v, i, iii, v
   Ans. (2)

3. Name the minister of Propaganda under the Hitler Rule.
   (1) Joseph Goebbels  (2) Hindenburg  (3) Hajmar Schacht  (4) Ernest Heimer
   Ans. (1)

4. Name the axis powers in second world
   (1) Germany, Italy, Japan  (2) Germany, Austria, Prussia
   (3) Germany, Austria, Russia  (4) Germany, Japan, Russia
   Ans. (1)

5. Consider the following Indian leaders.
   i. Motilal Nehru  ii. Dada Bhai Naoroji  iii. Raja Ram Mohan Roy  iv. Mahatma Gandhi
   The correct Chronological order in which they appeared on national scene is
   (1) i, ii, iii, iv  (2) iv, iii, ii, i  (3) iii, ii, i, iv  (4) ii, i, iii, iv
   Ans. (3)

6. Who founded SATYA SHODHAK SAMAJ.
   (1) Jyotiba Phule  (2) Raja Ram Mohan Roy  (3) Swami Vivekanand  (4) Swami Dayanand
   Ans. (1)

7. Which of the following picture was page of music book by E.T. Paul
   Ans. (1)

8. Choose the correct statements:
   i. The Zollverein was formed in 1834
   ii. It abolished tariff barriers.
   iii. It reduced the number of currencies from thirty to one
   iv. it was initiative of Prussia and joined by all German states
   (1) i, ii, iii, iv  (2) ii and iii  (3) i, ii and iv  (4) ii, iii and iv
   Ans. (3)

9. The people gathered In Jallianwala Bagh to protest against the arrest of two leaders They were__________
   (1) Bhagat Singh and Dr. Satyapal  (2) Bhagat Singh and Rajguru
   (3) Dr. Saifuddin Kitchlu and Mahatma Gandhi  (4) Dr. Saifuddin Kitchlu and Dr. Satyapal
   Ans. (4)
10. The national assembly of France voted in April 1792 to declare war against ______________.
(1) Germany and Austria  (2) Germany and England  
(3) Prussia and England  (4) Prussia and Austria  
**Ans. (4)**

11. Out of 250 members of Rajya Sabha, how many members are nominated by president.
(1) 11  (2) 10  (3) 14  (4) 12  
**Ans. (4)**

12. Which article in Indian Constitution stipulates that there shall be Vice- President of India
(1) Article 63  (2) Article 65  (3) Article 66  (4) Article 62  
**Ans. (1)**

13. Point out the difference between the local government in India before and after the Constitutional amendment in 1992.
   i. it became mandatory to hold regular elections to the focal government bodies.
   ii. one third positions reserved for women
   iii. Elected officials exercise supreme power in the government.
(1) Only i  (2) i and ii  (3) i, ii and iii  (4) ii and iii  
**Ans. (2)**

14. When did the civil rights movement take place in USA
**Ans. (2)**

15. When was Bhartiya Janta Party formed?
(1) 10th April, 1975  (2) 6th April, 1970  (3) 6th April, 1980  (4) 10th April, 1985  
**Ans. (3)**

16. In the context of democracies, what is successfully done by democracies?
   (1) Eliminated conflicts among people
   (2) Eliminated economic inequalities among people
   (3) Eliminated differences of opinion about how marginalized actions are to be treated.
   (4) Rejected the idea of political inequality  
**Ans. (4)**

17. Who passed “Legal Frame work Order 2002”?
(1) Zanu  (2) Robert Mugabe  (3) General Musharraf  (4) Allende  
**Ans. (3)**

18. Select the right combination of subjects under union list.
   (1) Defence, Atomic energy, Post and telegraphs, war and peace
   (2) Railways, Land, Trade, Police
   (3) Education, Agricultural land, Trade, Defence
   (4) Cyber laws, Adoption, Trade, Forests  
**Ans. (1)**

19. Which one of the following countries was the first one to grant Universal Suffrage?
(1) Russia  (2) Germany  (3) New Zealand  (4) The Netherland  
**Ans. (3)**

20. Which of the following is working capital?
(1) Electricity bill  (2) Tube well  (3) Tractor  (4) Machines  
**Ans. (1)**
21. Coins in India are minted by ______
   (1) Ministry of Finance, Government of India  (2) Reserve Bank of India
   (3) State Bank of India  (4) Central Bank of India
   Ans. (1)

22. What should be included in national Income by expenditure method
   i. Self-produced final product
   ii. Expenditure on second hand goods
   iii. Expenditure on shares i
   iv. Expenditure on intermediate goods
   (1) ii, iii, iv  (2) i and ii  (3) i only  (iv) iii and iv
   Ans. (3)

23. What is the definition of overweight??
   (1) BMI > 25 kg/m^2  (2) BMI = 25kg/m^2
   (3) BMI = 25-29.9 kg/m^2  (4) BMI = 25-30 kg/m^2
   Ans. (1)

24. Name one of the following Agency that develops standards for goods and services.
   (1) COPRA  (2) National Consumer forum
   (3) Consumer protection council  (4) Bureau of Indian Standards
   Ans. (4)

25. National Food For Work Program launched in ____________.
   (1) 2003  (2) 2001  (3) 2004  (4) 2005
   Ans. (3)

26. Which of the following countries has poor natural resources but rich human resources?
   (1) India  (2) Nepal  (3) Japan  (4) Sri Lanka
   Ans. (3)

27. What is the Gross National Product?
   (1) The total value of Goods and services manufactured in the country
   (2) The total value of all the transactions in the country
   (3) Reduction in the total value of goods and services produced in the country
   (4) The total worth of goods and services generated in the country and net factor income from abroad.
   Ans. (4)

28. Which one of the following is an incorrect fact regarding south India.
   (1) Diurnal range of temperature is less
   (2) Annual range of temperature is less
   (3) Temperatures are high throughout the year.
   (4) Extreme climatic conditions are found here.
   Ans. (4)

29. Read the two statements A and B and choose the best answer.
   A. Assertion: Petrochemical Industry is a fast-growing Industry.
   B. Reason: Synthetic rubber, plastics, insecticides etc are the products of Petro chemical industry
   (1) A and B both are correct and B explains A
   (2) A and B are both correct but B does not explain A
   (3) A is correct but B is incorrect
   (4) A and B are both incorrect
   Ans. (1)

30. The process of "Retting" is associated with which of the following?
   (1) Tea  (2) coffee  (3) Jute  (4) Rubber
   Ans. (3)
31. The "Golden Quadrilateral" which connects Delhi-Mumbai-Chennai-and Kolkata passes through ............
(1) AMRITSAR - AHMEDABAD - PUNE - PATNA
(2) JAIPUR - PORBANDER - HYDERABAD - VARANASI
(3) VADODARA - PUNE - VISHAKHAPATNAM - VARANASI
(4) NAGPUR - BHOPAL - SURAT - AMRITSAR
Ans. (3)

32. The Narmada river In the Peninsular plateau flows westward with a remarkably straight channel. It is because ____
(1) Slope gradient in this part controls the over channel pattern
(2) River carries huge amount of water which has created straight channel course
(3) River forms the boundary between central highlands and the Deccan Plateau
(4) River flows through the trough of a rift valley inclined westward
Ans. (4)

33. If it is 12 noon in a city located on 90° W longitude, what would be time in a city located on 105° W longitude
(1) 13:00  (2) 12:30  (3) 11:30  (4) 11:00
Ans. (4)

34. Iron ore from kudermukh is most likely to be exported through
(1) Goa  (2) Kochi  (3) Mangalore  (4) Ennore
Ans. (3)

35. Marble is a type of __________ rock.
(1) Sedimentary (2) Metamorphic (3) Basalt (4) Igneous
Ans. (2)

36. Match the following

<table>
<thead>
<tr>
<th>i</th>
<th>Iron</th>
<th>a. Digholi</th>
</tr>
</thead>
<tbody>
<tr>
<td>ii</td>
<td>Coal</td>
<td>b. Singbhum</td>
</tr>
<tr>
<td>iii</td>
<td>Manganese</td>
<td>c. Balaghat</td>
</tr>
<tr>
<td>iv</td>
<td>Oil</td>
<td>d. Raniganj</td>
</tr>
</tbody>
</table>

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

37. Which of the following is found on foothills and river valley placer deposits:
(1) lead  (2) gypsum  (3) bauxite  (4) gold
Ans. (4)

38. Choose the false statement among the following statements:
(1) The southwest monsoon is a continuation of the southeast trade wind, deflected towards the Indian subcontinent after crossing the equator.
(2) In winter, India is under the influence of North West monsoon due to westerly jet stream.
(3) The southwest monsoon sets in over the Kerala coast by 1st June.
(4) The shift in the position of the ITCZ is related to the phenomena of the withdrawal of the westerly jet stream from its position over the north Indian plain.
Ans. (4)

39. Aus, Aman and Boro, grown thrice in a year are types of _________ crops.
(1) Maize  (2) Rice  (3) Millets  (4) Wheat
Ans. (2)

40. Which of the following is the type of plate boundary of Indian plate along Himalayan mountains?
(1) Ocean-Continent Convergence  (2) Divergent boundary
(3) Transform boundary  (4) Continent -continent convergence
Ans. (4)
41. The process of formation of seed without the act of fertilization is known as:
   (1) Parthenogenesis  (2) Spoliation  (3) Apomixis  (4) Vegetative reproduction
   **Ans. (3)**
   **Sol.** Apomixis is a reproductive mechanism that allows a plant to clone itself through seed.

42. If the tip of sugarcane plant is removed from the field, even then it keeps on growing in length, it is due to the presence of:
   (1) Cambium  (2) Apical Meristem  (3) Lateral Meristem  (4) Intercalary Meristem
   **Ans. (4)**
   **Sol.** Intercalary meristems are located at the nodes which help in increasing the length of the stem of plant.

43. Which among the following has specialized tissue for conduction of water:
   (i) Thallophyta  (ii) Bryophyta  (iii) Pteridophyta  (iv) Gymnosperms
   (1) (i) and (ii)  (2) (ii) and (iii)  (3) (iii) and (iv)  (4) (i) and (iv)
   **Ans. (3)**
   **Sol.** Pteridophytes, gymnosperms and angiosperms are vascular plants and have tissues for the conduction of water and food.

44. If pepsin is lacking in gastric juice then which of the following event in stomach will be affected:
   (1) Digestion of starch into sugars  (2) Digestion of fats into glycerol and fatty acids
   (3) Digestion of Nucleic acids  (4) Digestion of proteins into peptides
   **Ans. (4)**
   **Sol.** Pepsin is an enzyme involved in protein digestion.

45. Colourblindness is more common in males than in females due to:
   (1) Dominant gene of such trait lies on Y chromosome
   (2) Dominant gene of such trait lies on X chromosome
   (3) Recessive gene lies on X chromosome
   (4) Recessive gene lies on Y chromosome
   **Ans. (3)**
   **Sol.** Colorblindness is X-linked recessive disorder and it is more common in males due to only one X-chromosome in males.

46. Three cylinders each closed by a membrane permeable to water and containing a different fluid are placed in same solution. After adjusting to solution the fluid rises in one of the cylinder, remains the same in another and falls in the third. What is the concentration of the solution in which cylinders have been placed:
   (1) 0% salt solution  (2) 2.5% salt solution  (3) 5% salt solution  (4) 10% salt solution
   **Ans. (3)**
   **Sol.** There is no net movement in case of isotonic solutions if concentration of solution is 5% as there is no movement in that case.

47. Mitochondria and chloroplast are:
   (i) Semiautonomous organelles
   (ii) Formed by division of pre-existing organelles and the contain DNA but lack protein synthesizing machinery.
   Which one of the following option is correct:
   (1) Both (i) and (ii) are correct
   (2) (ii) is true, (i) is false
   (3) (i) is true but (ii) is false
   (4) Both (i) and (ii) are false
   **Ans. (3)**
   **Sol.** Mitochondria and chloroplast are semi-autonomous organelles due to presence of their own DNA and ribosomes and these are capable of making proteins themselves.
48. Climbers grow towards and around support is an example of:
   (1) Hydrotropism         (2) Geotropism         (3) Haptotropism         (4) Phototropism

   **Ans. (3)**

   **Sol.** Haptotropism is a process of movement of parts of a plant in response to a touch stimulus.

49. Which of the following statement about transmission of nerve impulse is incorrect:
   (1) Nerve impulse travels from dendritic end towards axonal end
   (2) At the dendritic end electrical impulses bring about the release of some chemicals which generate an electrical impulse at the axonal end of another neuron
   (3) The chemicals released from axonal end of one neuron cross the synapse and generate a similar impulse in a dendrite of another neuron
   (4) A neuron transmits electrical impulses not only to another neuron but also to muscle and gland cell

   **Ans. (2)**

   **Sol.** At the axonal end, some chemicals are released in a neuron, which generate an electrical impulse at the dendritic end of another neuron.

50. Which of the following is an example of homologous organs?
   (1) Wings of a bat and a butterfly
   (2) Wings of a bird and a bat
   (3) Wings of pigeon and a butterfly
   (4) Forelimbs of cow and lizard

   **Ans. (4)**

   **Sol.** Homologous organs are the organs which are similar in structure but perform different functions.

51. As we travel along the food chain, the concentration of DDT
   (1) Increases         (2) Remains constant         (3) Decreases         (4) Fluctuate randomly

   **Ans. (1)**

   **Sol.** Biomagnifications is an increase in concentration of a substance, such as toxic chemical, in the body of an organism at successively higher trophic levels in a food chain.

52. Which among the following statements are true for unisexual flowers?
   (i) They possess both stamens and carpel
   (ii) They possess either stamen or carpel
   (iii) They exhibit cross pollination
   (iv) Unisexual flowers possessing only stamens cannot produce fruits

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

   **Ans. (2)**

   **Sol.** Unisexual flowers are flowers that possesses either stamens or carpels and exhibit cross pollination.

53. Lack of oxygen in muscles often leads to cramps among cricketers. This is due to:
   (1) Conversion of pyruvate to lactic acid
   (2) Conversion of pyruvate to glucose
   (3) Non-conversion of glucose to pyruvate
   (4) Conversion of pyruvate to ethanol

   **Ans. (1)**

   **Sol.** Due to absence or insufficient amount of oxygen while playing glucose is not completely dissociated into CO$_2$ and H$_2$O. Due to this pyruvate converts into lactic acid and often leads to cramps.

54. Choose the correct path of urine in our body:
   (1) Kidney → Ureter → Urinary bladder → Urethra
   (2) Kidney → Ureter → Urethra → Urinary bladder
   (3) Kidney → Urinary bladder → Urethra → Ureter
   (4) Urinary bladder → Kidneys → Ureter → Urethra

   **Ans. (1)**

   **Sol.** Passage of urine in our body is from kidneys → Ureters → Urinary bladder → Urethra
55. The area of the Blades of the magnetic compass as shown in figure will be: (Take $\sqrt{11} = 3.32$)

![Diagram]

\[(1)\ 9\ cm^2 \quad (2)\ 5.58\ cm^2 \quad (3)\ 11\ cm^2 \quad (4)\ 4.98\ cm^2\]

**Ans.** (4)

**Sol.**

\[
OA = \sqrt{25 - \frac{1}{4}} = \frac{99}{4} = \frac{3\sqrt{11}}{2}
\]

\[AC = 3\sqrt{11}\]

\[BD = 1\]

Rhombus ABCD

Area = \[\frac{1}{2} \times d_1 \times d_2 = \frac{1}{2} \times 1 \times 3\sqrt{11}\]

\[= \frac{3}{2} \sqrt{11} = \frac{3}{2} \times 3.32 = \frac{9.96}{2} = 4.98\]

56. By selling 12 oranges for a rupee, a man losses 20%. How many for a rupee should he sell to gain 20%:

(1) Rs.15  
(2) Rs.10  
(3) Rs.8  
(4) Rs. 5

**Ans.** (3)

**Sol.**

SP of one orange = \[\frac{1}{12}\]

\[CP = \frac{1 \times 100}{12 \times (100 - 20)} = \frac{5}{48}\]

New SP = \[\frac{\frac{5}{48} \times 120}{100} = \frac{1}{8}\]

: New SP of one orange = Rs. \[\frac{1}{8}\]

: No. of orange of Rs. 1 = 8

57. In an Arithmetic Progression, the sum of first 'n' terms is \[\frac{3n^2}{2} + \frac{5n}{2}\]. Then the 25th term will be:

(1) 4  
(2) 3  
(3) -4  
(4) 3.5

**Ans.** (Bonus)

**Sol.**

\[S_n = \frac{3n^2}{2} + \frac{5n}{2}\]

\[S_1 = a = 4\]

\[S_2 = 2a + d = 6 + 5 = 11, \quad a_1 + a_2 = 11, \quad a_2 = 7, \quad d = 3\]

\[T_{25} = a + 24d = 4 + 72 = 76\]
58. Probability that a leap year selected at random will contain 53 Sunday is:

(1) $\frac{2}{7}$  
(2) $\frac{53}{365}$  
(3) $\frac{1}{7}$  
(4) $\frac{7}{365}$  

**Ans. (1)**

**Sol.**  
\[
\frac{366}{7} = 52\frac{2}{7}
\]

= $\frac{2}{7}$

59. If $A + B = 90^\circ$ then
\[
\frac{\tan A \tan B + \tan A \cot B}{\sin A \sec B} = \frac{\sin^2 B}{\cos^2 A}
\]

(1) $\cot^2 A$  
(2) $\cot^2 B$  
(3) $-\tan^2 A$  
(4) $-\cot^2 A$

**Ans. (2)**

**Sol.**  
\[
\frac{\tan A \tan B + \tan A \cot B}{\sin A \sec B} = \frac{\tan A \cot A + \tan^2 A}{\sin A \cos ec A} = \frac{\cos^2 A}{\cos^2 A} = 1 + \tan^2 A - 1 = \tan^2 A = \cot^2 B
\]

($\angle B = 90 - \angle A$)

60. $\triangle ABC$ is an Equilateral triangle. We have $BD = EG = DF = DE = EC$; then the ratio of the area of the shaded portion to the area of $\triangle ABC$ is:

(1) $\frac{4}{11}$  
(2) $\frac{7}{9}$  
(3) $\frac{5}{12}$  
(4) $\frac{6}{7}$

**Ans. (2)**

**Sol.**
\[
\frac{\text{ar}(\triangle ABC)}{\text{ar}(\text{shaded})} = \frac{\frac{3a^2 \sqrt{3}}{4}}{\frac{9\sqrt{3}}{4}a^2 - \frac{a^2 \sqrt{3}}{4} - \frac{a^2 \sqrt{3}}{4}} = \frac{\frac{7a^2 \sqrt{3}}{4}}{\frac{9a^2 \sqrt{3}}{4}} = \frac{7}{9}
\]
61. A solid consists of a rectangular cylinder with an exact fitting right circular cone placed on the top. Height of the cone is ‘h’ If total volume of the solid is three times the volume of the cone, then the height of the circular cylinder is:

(1) $\frac{2h}{9}$  
(2) $\frac{2h}{3}$  
(3) $\frac{3h}{2}$  
(4) $\frac{4h}{3}$

**Ans. (2)**

**Sol.**

\[ \pi R^2 h + \frac{1}{3} \pi R^2 h = 3 \times \frac{1}{3} \pi R^2 h \]
\[ \pi R^2 h = \frac{2}{3} \pi R^2 h \]

\[ h = \frac{3}{2} H, \quad H = \frac{2}{3} h \]

62. As aeroplane is flying horizontal at a height of 3150 m above horizontal plane ground. At a particular instant, it passes another plane Vertically below it. At this instant, the angles of elevation of the planes form a point on the ground are 30° and 60°. Hence distance between the two planes at that instant is

(1) 1050 m  
(2) 2100 m  
(3) 4200 m  
(4) 5250 m

**Ans. (2)**

**Sol.**

\[ \tan 30^\circ = \frac{1}{\sqrt{3}} = \frac{3150 - h}{x}, \quad \tan 60^\circ = \sqrt{3} = \frac{3150}{x} \]
\[ (3150 - h)\sqrt{3} = \frac{3150}{\sqrt{3}}, \quad 3(3150 - h) = 3150 \]
\[ 3h = 2 \times 3150 \]
\[ h = 2 \times 1050 \]
\[ h = 2100 \]

63. The compound interest is Rs.6.40 more than the simple interest. If a sum is lent for 2 years at 8% compound interest. The sum will be:

(1) Rs.1800  
(2) Rs. 10,000  
(3) Rs.800  
(4) Rs. 1000

**Ans. (4)**

**Sol.**

\[ P \left( 1 + \frac{R}{100} \right)^n - P = 6.4 + \frac{PRT}{100} \]
\[ P \left( 1 + \frac{8}{100} \right)^2 - P = \frac{64}{10} + \frac{8 \times 2}{100} P \]
\[ P (1.08)^2 - P = 6.4 + 0.16 P \]
\[ P(1.08)^2 - 1 - 0.16 = 6.4 \quad P = \frac{6.4}{0.0064} = 1000 \]
64. If a, b, c, d and e are in continuous proportion, then \( \frac{a}{e} \) is equal to

\[
(1) \frac{a^3}{b^3} \hspace{1cm} (2) \frac{a^4}{b^4} \hspace{1cm} (3) \frac{b^3}{a^3} \hspace{1cm} (4) \frac{b^4}{a^4}
\]

Ans. (2)

Sol.
\[
\frac{a}{b} = \frac{b}{c} = \frac{c}{d} = \frac{d}{e} = k
\]

\[\frac{a}{e} = \frac{a}{b} \cdot \frac{b}{c} \cdot \frac{c}{d} \cdot \frac{d}{e} = k^4 = \left( \frac{a}{b} \right)^4
\]

65. The line segment joining the points (3, -4) and (1,2) is trisected at the points \( P \) & \( Q \). If the coordinates of \( P \) & \( Q \) are \((p, -2)\) & \( \left( \frac{5}{3}, q \right) \) respectively. Find the values of \( p \) & \( q \).

\[
(1) p = 0, q = \frac{7}{3} \hspace{1cm} (2) p = \frac{7}{3}, q = 0 \hspace{1cm} (3) p = 7, q = 3 \hspace{1cm} (4) p = 3, q = 7
\]

Ans. (2)

Sol.
\[
(3, -4) \hspace{1cm} P \hspace{1cm} (1, 2) \hspace{1cm} Q \hspace{1cm} \left( \frac{5}{3}, 0 \right)
\]

\[
P \left( \frac{1+6}{3}, \frac{-2-8}{3} \right) = P \left( \frac{7}{3}, -2 \right) \hspace{1cm} p = \frac{7}{3}
\]

\[
Q \left( \frac{2+3}{3}, \frac{4-4}{3} \right) = Q \left( \frac{5}{3}, 0 \right) \hspace{1cm} q = 0
\]

66. What will be the area of largest triangle that can be inscribed in the semicircle of radius \( \frac{\sqrt{16}}{16} \)?

\[
(1) 16r^2 \hspace{1cm} (2) \frac{r^2}{256} \hspace{1cm} (3) \frac{r^2}{64} \hspace{1cm} (4) \frac{r^2}{32}
\]

Ans. (2)

Sol.
\[
A = \frac{1}{2} \times r \times r \times \sqrt{2} = \frac{r^2}{2}
\]

\[
\left( \frac{r}{16} \right)^2 = \frac{r^2}{256}
\]

67. If \( x + y + z = 0 \) & \( x \neq 0, y \neq 0, z \neq 0 \), then the value of \( \frac{x^2}{yz} + \frac{y^2}{xz} + \frac{z^2}{xy} \) is?

\[
(1) 0 \hspace{1cm} (2) 1 \hspace{1cm} (3) 2 \hspace{1cm} (4) 3
\]

Ans. (4)

Sol.
\[
x + y + z = 0, \hspace{1cm} \frac{x^3 + y^3 + z^3}{xyz} = 3
\]
68. If \( x^2 + y^2 + z^2 = r^2 \) where, \( x = r \cos a \cos b \), \( y = r \cos a \sin b \) then \( z \) has one of the following values:

(1) \( r \cos a \)  
(2) \( r \tan a \cos b \)  
(3) \( r \tan a \tan b \)  
(4) \( r \sin a \)

**Ans.** (4)

**Sol.**
\[
x^2 + y^2 + z^2 = r^2
\]
\[
r^2 \cos^2 a \cos^2 b + r^2 \cos^2 a \sin^2 b + z^2 = r^2
\]
\[
r^2 \cos^2 a + z^2 = r^2 - r^2 \cos^2 a
\]
\[
z = r \sin a
\]

69. If \( \alpha \) & \( \beta \) are the roots of the equation \( 3x^2 - 5x + 3 = 0 \) then the quadratic equation whose roots are \( \alpha^2 \beta \) and \( \alpha \beta^2 \) is

(1) \( 3x^2 - 5x + 3 = 0 \)  
(2) \( 3x^2 - 8x + 5 = 0 \)  
(3) \( 3x^2 - 8x + 3 = 0 \)  
(4) \( 3x^2 - 5x - 3 = 0 \)

**Ans.** (1)

**Sol.**
\[
\alpha + \beta = \frac{5}{3}
\]
\[
\alpha \beta = 1
\]
\[
x^2 - x(\alpha^2 \beta + \alpha \beta^2) + \alpha^3 \beta^3 = 0
\]
\[
x^2 - x(\alpha \beta)(\alpha + \beta) + \alpha^3 \beta^3 = 0
\]
\[
x^2 - x \left( \frac{5}{3} \right) + 1 = 0
\]
\[
3x^2 - 5x + 3 = 0
\]

70. The sum of length, breadth and height of cuboid is 19 m, its diagonal is \( 5 \sqrt{5} \) m long. Its surface area is

(1) 286 m\(^2\)  
(2) 236 m\(^2\)  
(3) 226 m\(^2\)  
(4) 256 m\(^2\)

**Ans.** (2)

**Sol.**
\[
l + b + h = 19
\]
\[
l^2 + b^2 + h^2 = 125
\]
\[
T.S.A = 2(lb + bh + lh)
\]
\[
(l + b + h)^2 = l^2 + b^2 + h^2 + 2(lb + bh + lh)
\]
\[
361 = 125 + 2(lb + bh + lh)
\]
\[
T.S.A = 236
\]

71. A conical vessel of radius 6 m and height 8 m is completely filled with water. A sphere is lowered into the water and its size is such that when it touches the side, it is just completely immersed. What fraction of water over flowed?

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

**Ans.** (3)

**Sol.**

\[
\triangle ABC \sim \triangle BDO
\]
\[
\therefore \frac{R}{6} = \frac{4}{8}, \quad R = 3
\]

\[
\text{Volume of sphere} = \frac{4}{3} \pi R^3
\]
\[
\text{Volume of cone} = \frac{1}{3} \pi (6)^2 \times 8
\]
\[
= \frac{4 \times 3^3}{36 \times 8}
\]
\[
= \frac{27}{36} \times \frac{3}{8}
\]
\[
= \frac{27}{36} \times \frac{3}{8}
\]
72. If a, b, c are the sides of right triangle where c is the hypotenuse, then radius of the circle which touches the sides of
the triangle is

(1) \( \frac{a+b+c}{2} \)
(2) \( \frac{a+c-b}{2} \)
(3) \( \frac{a+b-c}{2} \)
(4) \( \frac{b+c-a}{2} \)

**Ans. (3)**

**Sol.**

\[ b - R + a - R = c \]
\[ \Rightarrow R = \frac{b + a - c}{2} \]

73. \( \triangle ABC \) is right angled at B, AD, CE are the two medians drawn from A and C respectively. If \( AD = \frac{3\sqrt{5}}{2}, CE = 2\sqrt{5} \).

The value of AC will be

(1) 13  (2) 5  (3) 12\( \sqrt{5} \)  (4) 12

**Ans. (2)**

**Sol.**

\[ 4y^2 + x^2 = \frac{45}{4} \]
\[ 4x^2 + y^2 = 20 \]
\[ 5(x^2 + y^2) = \frac{125}{4} \]
\[ x^2 + y^2 = \frac{25}{4} \]
\[ 4x^2 + 4y^2 = AC^2 \Rightarrow AC^2 = 25 \]
\[ AC = 5 \]

74. If two circles are such that the centre of one lies on the circumference of the other then the ratio of common chord of
the two circles to the radius of any one of the circles is:

(1) 2:1  (2) \( \sqrt{3} : 1 \)  (3) \( \sqrt{5} : 1 \)  (4) 4 : 1
Ans. (2)

Sol.

\[ \triangle OAO'B \text{ is rhombus.} \]
\[ \therefore \angle O = \angle O' = y \quad \angle A = \angle B = x \]
\[ \therefore O'A = O'O \]
\[ 2y = R \]
\[ y = \frac{R}{2} \]
\[ x^2 = R^2 - \frac{R^2}{4} = \frac{3R^2}{4} \]
\[ x = \frac{R\sqrt{3}}{2} \quad AB = R\sqrt{3} \]
\[ \text{Ratio} = \frac{R\sqrt{3}}{R} = \sqrt{3} \]

75. Which of the following is most malleable metal?
(1) Na (2) Si (3) Au (4) Pb
Ans. (3)
Sol. Gold (Au) is most malleable.

76. When carbon dioxide is passed through lime water then:
(1) calcium hydroxide is formed. (2) Colour of lime water disappears.
(3) White precipitates of calcium carbonate is formed. (4) White precipitates of calcium oxide
Ans. (3)
Sol. Lime water turns milky due to precipitates of calcium carbonate.

77. Arrange the following elements in the order of their decreasing metallic character:
(1) Cl > Si > Al > Mg > Na (2) Na > Mg > Al > Si > Cl (3) Na > Al > Mg > Cl > Si (4) Al > Na > Si > Ca > Mg
Ans. (2)
Sol. Metallic character decreases along the period.

78. Meena visited a natural gas compressing unit and found that the gas can be liquefied under specific conditions of temperature and pressure while sharing her experience with friends she got confused. Help her to identify the correct set of conditions.
(1) Low temperature, Low pressure (2) High temperature, Low pressure
(3) Low temperature, High pressure (4) High temperature, High pressure
Ans. (3)
Sol. Gases can be liquefied at low temperature and high pressure.
79. The scattering of beam of light is shown by
(1) Mud water (2) Milk (3) Copper sulphate solution (4) NaCl solution

Ans. (2)

Sol. Milk (colloidal solution) shows tyndall effect

80. What is the formula of acetone?
(1) CH₃CH₂COOH (2) CH₃COCH₃ (3) CH₃CH₂CHO (4) CH₃CH₂COCH₃

Ans. (2)

Sol. Acetone CH₃COCH₃

81. Match the correct atomic radius with the element

<table>
<thead>
<tr>
<th>Element</th>
<th>Atomic radius (pm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Be</td>
<td>(i) 75</td>
</tr>
<tr>
<td>(b) C</td>
<td>(ii) 88</td>
</tr>
<tr>
<td>(c) O</td>
<td>(iii) 111</td>
</tr>
<tr>
<td>(d) B</td>
<td>(iv) 77</td>
</tr>
<tr>
<td>(e) N</td>
<td>(v) 74</td>
</tr>
</tbody>
</table>

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

Ans. (2)

Sol. Atomic radius decrease as Be > B > C > N > O

82. 22 carat gold means
(1) 20 parts of pure gold alloyed with 2 parts of Cu or Ag
(2) 22 parts of pure gold alloyed with 2 parts of Cu or Zn
(3) 21 parts of pure gold alloyed with 1 parts of Cu or Ag
(4) 22 parts of pure gold alloyed with 2 parts of Cu or Ag

Ans. (4)

Sol. Factual

83. Anodising is a process of forming a oxide layer of
(1) Zinc (2) Aluminum (3) Copper (4) Tin

Ans. (2)

Sol. Factual

84. Which of the following element does not have allotrope?
(1) P (2) B (3) Bi (4) S

Ans. (2)

Sol. Factual

85. Which of following combination about acids is incorrect?
(1) Ethanoic acid vinegar (2) Citric acid orange (3) Carbonic acid Soft Drinks (4) Lactic acid Tea

Ans. (4)

Sol. Factual

86. Which is chemically most active non metal?
(1) Br₂ (2) N₂ (3) O₂ (4) F₂

Ans. (4)

Sol. Fluorine is most reactive
87. A ball is released from the top of a tower of height \( h \) meter. It takes \( T \) seconds to reach the ground. What is the position of the ball at \( T/3 \) second?

\[
(1) \quad \frac{8h}{9} \text{ m from the ground} \quad (2) \quad \frac{7h}{9} \text{ m from the ground} \quad (3) \quad \frac{h}{9} \text{ m from the ground} \quad (4) \quad \frac{17h}{18} \text{ m from the ground}
\]

**Ans. (1)**

**Sol.**

\[ u = 0 \]

Time taken to cover \( h = T \)

\[
S_0 = ut + \frac{1}{2}gt^2
\]

\[
S_1 = \frac{1}{2}g(T)^2
\]

\[
S_2 = \frac{1}{2}g\left(\frac{T}{3}\right)^2
\]

\[
S_2 = \frac{1}{2}g\frac{T^2}{9}
\]

\[
S_1 = \frac{1}{9}
\]

Postion of ball at \( T/3 \) second

Ball is \( \frac{8h}{9} \) from ground.

88. Two bodies have masses \( 2m \) and \( m \). Their Kinetic energies are in the ratio 8:1. Their linear momentum are in the ratio of

\[
(1) \quad 1:1 \quad (2) \quad 2:1 \quad (3) \quad 4:1 \quad (4) \quad 8:1
\]

**Ans. (3)**

**Sol.**

\[
m_1 = 2m \quad \frac{KE_1}{KE_2} = \frac{8}{1}
\]

\[
m_2 = m
\]

\[
KE = \frac{p^2}{2m}
\]

\[
\frac{P_1}{P_2} = \frac{4}{1}
\]

89. Water is pouring down from a waterfall at the rate of 75 kg/s on the blades of a turbine. If the height of the fall is 100m, then power delivered to the turbine is nearly

\[
(1) \quad 95 \text{ kw} \quad (2) \quad 75 \text{ kw} \quad (3) \quad 100 \text{ kw} \quad (4) \quad 0 \text{ kw}
\]

**Ans. (2)**

**Sol.**

Height = 100 m

Rate of water flow = 75 kg/s

\[
\text{Power delivered} = \frac{W}{t} = 75\text{KW}
\]

90. A force - time graph for a linear motion is shown. The linear momentum changed between 0 and 8 second is

\[
(1) \quad -2\pi \text{ Ns} \quad (2) \quad \text{Zero} \quad (3) \quad 4\pi \text{ Ns} \quad (4) \quad 6\pi \text{ Ns}
\]

**Ans. (2)**
91. The length of a given cylindrical wire is increased by 100\%. Due to consequent decrease in diameter, the change in the resistance of the wire will be
(1) 200\% \quad (2) 100\% \quad (3) 50\% \quad (4) 300\%

Ans. (4)

\[ R = \rho \frac{\ell}{A} \]
\[ R' = \rho \frac{\ell'}{A} = \rho \frac{2\ell \times 2}{A} \]
\[ \frac{R'}{R} \times 100 = 300\% \]

92. In an experiment to find the focal length of a concave mirror, a graph is drawn between magnitude of u and v. The graph looks like

Ans. (3)

\[ \frac{1}{v} + \frac{1}{u} + \frac{1}{f} \]

93. Two circular coils of diameter 10 cm and 20 cm have same number of turns. The ratio of magnetic field inductions produced at the centres of coils when connected in series is
(1) 1:2 \quad (2) 3:2 \quad (3) 2:1 \quad (4) 2:3

Ans. (3)

\[ B = \frac{n \mu_0 I}{2\pi} \]
\[ \frac{B_1}{B_2} = \frac{n \mu_0 I}{2\pi[5]} = 2 : 1 \]
\[ n \frac{\mu_0 I}{2\pi[10]} \]
94. Green light of wavelength 5460 \( \text{A} \) is incident on an air-glass interface. If the refractive index of glass is 1.5, the wavelength of light in glass would be (given velocity of light in air \( c = 3 \times 10^8 \text{ m/s} \))

(1) 3640 \( \text{A} \)  
(2) 5460 \( \text{A} \)  
(3) 4861 \( \text{A} \)  
(4) None of the above

\text{Ans. (1)}

\text{Sol.}
\[
\frac{\mu_a}{\mu_g} = \frac{\lambda_a}{\lambda_g}
\]
\[
1.5 = \frac{460}{\lambda_g}
\]
\[
\lambda_g = 3640 \text{A}
\]

95. What is the value of \( R \) in the circuit given below if the current passing through the battery is 0.25A.

![Circuit Diagram](image)

(1) 42\( \Omega \)  
(2) 62\( \Omega \)  
(3) 84\( \Omega \)  
(4) None of these

\text{Ans. (1)}

\text{Sol.}
\[
\frac{1}{R} = \frac{1}{12} + \frac{1}{20} + \frac{1}{60}
\]
\[
R = 6\Omega
\]
\[
\text{Total resistance} = R + 6
\]
\[
V = IR
\]
\[
12 = 0.25 (6 + R)
\]
\[
R = 42\Omega
\]

96. Figure shows the displacement- time graph of a particle moving along X - axis.

(1) The particle is continuously going in positive x-direction.  
(2) The particle is at rest.  
(3) The velocity increases upto time ‘\( t_0 \)’ and then becomes constant.  
(4) The particle moves at a constant velocity upto time ‘\( t_0 \)’ and then stops.

\text{Ans. (4)}

\text{Sol.} Straight line represents constant velocity.

97. A block of mass \( m \) is at rest under the action of force \( F \) against a wall as shown in figure.

![Force Diagram](image)

Which of the following statement is incorrect?

(1) \( f = mg \) (where \( f \) is the frictional force)  
(2) \( F = N \) (where \( N \) is the normal force)  
(3) \( F \) will not produce torque  
(4) \( N \) will not produce torque
Ans. (4)
Sol. N will not produce torque.

98. A hot and cold body are kept in vacuum separated from each other. Which of the following causes decrease in temperature of the hot body?
(1) Radiation (2) Convection
(3) Conduction (4) Temperature remains unchanged

Ans. (1)
Sol. No direct contact between the bodies. There is no medium between the two bodies.

99. A man is standing at the middle point between two cliffs. On clapping his hands, a series of echoes are heard at the interval of 1 Sec. If the speed of sound is 350 m/s, the distance between the two cliffs is
(1) 175m (2) 350m (3) 525m (4) 700m

Ans. (2)
Sol. 
\[2x = v \times t\]
\[2x = 350 \times 1\]
Two times, \(2x = 350\)
\[x = 175\ m\]

100. A rubber ball filled with water is having a small hole. This is used as the bob of a simple pendulum. Then, the period of such a pendulum
(1) Decreases (2) first increases then decreases
(3) First decreases then increases (4) Increases

Ans. (2)
Sol. First increasing then decreases because first length increase and then decrease due to change in position of centre of mass.