



**NATIONAL TALENT SEARCH EXAMINATION  
(NTSE-2020) STAGE -1**

**STATE : ODISHA**

**PAPER : SAT**

**Date: 03/11/2019**

**SET : C**

**Max. Marks: 100**

**SOLUTIONS**

**Time allowed: 120 mins**

1. On which date, atom bomb was dropped on Hiroshima ?  
(A) August 6, 1945 (B) August 20, 1945 (C) August 25, 1945 (D) August 30, 1945  
**Ans. (A)**  
**Sol.** On August 6, 1945, Atom bomb was dropped on Hiroshima.
2. Which one was the first movement organised by Mahatma Gandhi in India ?  
(A) Champaran Movement (B) Kheda Movement  
(C) Civil Disobedience Movement (D) Quit India Movement  
**Ans. (A)**  
**Sol.** Champaran Movement was the first movement organised by Mahatma Gandhi in India in 1917.
3. At which place, the first conference of the Non-Aligned Nations was held ?  
(A) Belgrade (B) Cairo (C) Lusaka (D) Havana  
**Ans. (A)**  
**Sol.** At Belgrade, the first conference of the Non-Aligned Nations.
4. Who was the author of the "Mein Kampf" ?  
(A) Napoleon (B) Hitler (C) Mussolini (D) Lenin  
**Ans. (B)**  
**Sol.** Adolf Hitler was the Author of the 'Mein Kampf'.
5. Which Round Table Conference was attended by Mahatma Gandhi ?  
(A) First Round Table Conference (B) Second Round Table Conference  
(C) Third Round Table Conference (D) None of these  
**Ans. (B)**  
**Sol.** In Second Round Table conference was attended by Mahatma Gandhi in London.
6. Which place of Odisha is known as 'Raktatirtha'?  
(A) Iram (B) Dhamnagar (C) Nimapada (D) Puri  
**Ans. (A)**  
**Sol.** In Iron of Odisha is known as 'Raktatirtha'.
7. Who is the writer of 'Odia Bhagabata' ?  
(A) Kalidasa (B) Jagannath Dasa (C) Upendra Bhanja (D) Bhima Bhoi  
**Ans. (B)**  
**Sol.** Odiya Bhagabata' written by Jagannath Dasa.
8. What was the immediate cause of the First World War ?  
(A) Treaty of Paris (B) Treaty of Berlin (C) Policy of England (D) Murder of Francis Ferdinand  
**Ans. (D)**  
**Sol.** The first world was caused by Murder of Francis Ferdinand.
9. When did Mayurbhanj merge with Odisha ?  
(A) January 1, 1949 (B) March 1, 1949 (C) April 1, 1949 (D) June 1, 1949  
**Ans. (A)**  
**Sol.** In January 1, 1949, Mayurbhanj Merge with Odisha.

10. Which village of Puri district is famous for Patta Painting ?  
 (A) Raghurajapur (B) Kadua (C) Lataharan (D) Nimapada  
**Ans. (A)**  
**Sol.** Raghurajapur village of Puri District is famous for Patta Painting.
11. Under whose leadership, 'Khudai Khidmatgar' was formed ?  
 (A) Chittaranjan Das (B) Gopabandhu Das (C) Bal Gangadhar Tilak (D) Khan Abdul Gaffar Khan  
**Ans. (D)**  
**Sol.** Khan Abdul Gaffar Khan was the leader who formed 'Khudai Khidmatgar'.
12. Who used the term 'Cold war' for the first time?  
 (A) Ho Chi Minh (B) Mustafa Kemal (C) Bernard Baruch (D) Lenin  
**Ans. (C)**  
**Sol.** The first time the term 'Cold war' used by Bernard Baruch.
13. Which of the following hill ranges in India is different from the other three in terms of its origin as well as structure?  
 (A) The garo (B) The khasi (C) The mizo (D) The North Cachar  
**Ans. (C)**  
**Sol.** The MIZO hill range in India is different from the other three (The Garo, The Khasi and the North Cachar) in terms of its origin as well as structure.
14. Which of the following sets of river valley projects in India is correctly arranged in North-South order?  
 (A) Koyna; Tungabhadra; Mettur; Periyar (B) Koyna; Tungabhadra; Periyar; Mettur  
 (C) Periyar; Mettur; Tungabhadra; Koyna (D) Tungabhadra; Koyan; Mettur; Periyar  
**Ans. (A)**  
**Sol.** The rivervalley projects from North-South order are Koyana, Tungabhadra, Mettur and Periyar.
15. Which of the following soils is formed due to high temperature, high rainfall as well as high humidity?  
 (A) Black soil (B) Lateritic soil (C) Peaty and Marshy soil (D) Red soil  
**Ans. (B)**  
**Sol.** Laterite soil is formed due to high temperature, rainfall and high humidity.
16. Which of the following pairs of places and the mineral extracted therein is incorrectly matched?  
 (A) Kosamba-Mineral oil (B) Kshetri-Copper (C) Mosabani-Manganese (D) Neyveli-Coal  
**Ans. (C)**  
**Sol.** Mosabani-Manganese this pairs of place and the mineral are incorrectly matched.
17. Which of the following industries in India is ideally suited to the co-operative sector ?  
 (A) Cotton textile (B) Fertiliser (C) Petro-chemicals (D) Sugar  
**Ans. (D)**  
**Sol.** Sugar Industries in India is ideally suited to the co-operative sector.
18. What will be the temperature of a place (altitude : 2500 metres) if the sea level temperature in the same area is 27°C?  
 (A) 11°C (B) 16°C (C) 27°C (D) 38°C  
**Ans. (A)**  
**Sol.** 11°C will be the temperature of a place altitude. 2500 mt. If the sea level temperature in the same area is 27°C
19. Which among the following places does not receive precipitation during winter ?  
 (A) Chennai (B) Mangalore (C) Shimla (D) Srinagar  
**Ans. (B)**  
**Sol.** Mangalore does not receive precipitation during winter.
20. The latitudinal as well as longitudinal extent of the mainland India is approximately :  
 (A) 28° (B) 29° (C) 30° (D) 31°  
**Ans. (C)**  
**Sol.** The Latitudinal as well longitudinal extent of mainland of India is approximately 30°.
21. Which of the following oilseeds is cultivated in Northern India in the Kharif season but in Southern India in the Rabi season ?  
 (A) Groundnut (B) Mustard (C) Sesamum (D) Sunflower  
**Ans. (C)**  
**Sol.** Sesamum Oil seeds is cultivated in Northern India in the Kharif season but in the Southern India in the Rabi Season.

- 22.** Why no delta has been formed in the mouth of river Narmada ?  
 (A) The river flows through a rift valley. (B) The river mouth is affected by strong ocean currents and tides.  
 (C) The sediment load carried by the river is low. (D) The stream is fast flowing due to a steep gradient.
- Ans. (D)**  
**Sol.** The stream is fast flowing due to a steep gradient. So, No delta has been formed in the mouth of River Narmada.
- 23.** The following local terms are used in the desert areas of Rajasthan in connection with 'rain water harvesting'. Identify the odd one out from among them.  
 (A) Johad (B) Khadin (C) Palar pani (D) Tanaka
- Ans. (D)**  
**Sol.** Johad, Khadin, Palar Pani those are found in Rajasthan in connection with Rain water Hasvesting. But Tanaka is in Gujarat that is why, Tanaka is different one.
- 24.** Which of the following group of trees is noticed in the Monsoon forests of India ?  
 (A) Acacia, Kikar, Silk cotton (B) Birch, Juniper, Silver fir  
 (C) Ebony, Mahogany, Rubber (D) Khair, Mahua, Kendu
- Ans. (D)**  
**Sol.** Khair, Mahua, Kendu these group of trees is noticed in the Monsoon forests of India.
- 25.** In which year World Trade Organisation was formed ?  
 (A) 1995 (B) 1998 (C) 1992 (D) 1996
- Ans. (A)**  
**Sol.** In 1995, the world trade Organisation was formed.
- 26.** Which one of the following does not promote national integration ?  
 (A) Secularism (B) Social Justice (C) Regional Disparity (D) Economic Development
- Ans. (C)**  
**Sol.** Regional Disparity does not promote National Integration.
- 27.** In which year Parliament enacted Right to Information Act ?  
 (A) 2005 (B) 1996 (C) 2002 (D) 2000
- Ans. (A)**  
**Sol.** In 2005, Parliament enacted Right to Information Act.
- 28.** Which one of the following is not a permanent member of the UN Security Council ?  
 (A) China (B) USA (C) India (D) Soviet Russia
- Ans. (C)**  
**Sol.** India is not permanent member of UN security council. (USA, USSR, China, UK & France are the permanent members)
- 29.** How many fundamental Duties are there in the Indian Constitution ?  
 (A) 06 (B) 10 (C) 08 (D) 12
- Ans. (GRACE)**  
**Sol.** 11 Fundamental duties are in the Indian constitution.
- 30.** The responsibility of preparing the Electoral Roll in India lies with which of the following?  
 (A) Parliament (B) Prime Minister's office  
 (C) Election Commission of India (D) Supreme Court
- Ans. (C)**  
**Sol.** Election commission of India prepares the Electoral in India.
- 31.** Which day is observed as the UN Day ?  
 (A) 24<sup>th</sup> November (B) 24<sup>th</sup> October (C) 10<sup>th</sup> December (D) 26<sup>th</sup> January
- Ans. (B)**  
**Sol.** 24<sup>th</sup> October is observed as the UN day because UN was established in 1945, 24<sup>th</sup> Oct.
- 32.** Which of the following is not a Fundamental Right under Indian Constitution Now ?  
 (A) Right to Equality (B) Right to Property (C) Right to Freedom (D) Right against exploitation
- Ans. (B)**  
**Sol.** Right property is not a Fundamental Right because it was abolished in 1978 44<sup>th</sup> Amendment from Fundamental Right.

33. Which of the following sources of energy is environment friendly ?  
(A) Coal (B) Electricity (C) Wind Energy (D) Natural Gas

Ans. (C)

Sol. Wind energy is environmental friendly because there is no pollution & Shortage also.

34. National Population Policy, 2000 targeted to achieve a stable population in India by the year:  
(A) 2020 (B) 2025 (C) 2030 (D) 2045

Ans. (D)

Sol. National population policy 2000 targeted to achieve a stable population in India by year 2045.

35. Which kind of power accounts for the largest share of power generation in India ?  
(A) Hydro-electricity (B) Thermal (C) Nuclear (D) Solar

Ans. (B)

Sol. Longest share of power generation in India is thermal power.

36. A rise in the rate of economic growth due to a rising share of working age people in a population is called :  
(A) Demographic Pyramid (B) Demographic Transition (C) Demographic Dividend (D) Dependency Ratio

Ans. (C)

Sol. A rise in the rate of economic growth due to a rising share of working age people in a population is called Demographic dividend.

37. Which one of the following programmes was initiated with the main object of bridging the gap between irrigation potential created and potential utilised ?

- (A) Watershed Development (B) Command Area Development  
(C) Comprehensive Crop Insurance Scheme (D) Wasteland Development Programme

Ans. (B)

Sol. Command area development. programmes was initiated with the main object of bridging the gap between irrigation potential created and potential utilised.

38. The procurement prices are those :

- (A) at which government buys foodgrains for buffer stocks.  
(B) at which fair price shops sell foodgrains to the customers.  
(C) prices that provide minimum guarantee to the farmers.  
(D) prices at which people buy food from market.

Ans. (A)

Sol. The procurement prices are those at which govt. buys foodgrains for buffer stocks.

39. What should be the optimum area under forests in a country to maintain ecological balance ?  
(A) 22% (B) 23% (C) 26% (D) 33%

Ans. (D)

Sol. 33% forests cover area is to maintain the ecological balanced.

40. Cropping pattern refers to :

- (A) Areas under a particular crop at a given point of time.  
(B) Ratio of area under one crop to another.  
(C) Relative distribution of cropped area under different crops at a given period of time.  
(D) Ratio of net sown area to total cropped area.

Ans. (C)

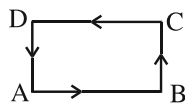
Sol. Cropping pattern refers to relative distribution at cropped area under different crops at a given period of time.

41. A closed loop lying in the xy plane carries a current and kept in a uniform magnetic field. The force acting on the loop is zero. Then magnetic field is in :

- (A) x direction (B) y direction (C) z direction (D) any direction

Ans. (D)

Sol. Because current in opposite arms is in opposite direction, Force on AB will always be opposite of force on CD & similarly force on BC will always be opposite to DA. Hence net force is always zero.



42. The reading of centigrade thermometer coincides with that of Fahrenheit thermometer in a liquid. The temperature of the liquid is :

- (A)  $-40^{\circ}\text{C}$                       (B)  $0^{\circ}\text{C}$                                       (C)  $100^{\circ}\text{C}$                                       (D)  $300^{\circ}\text{C}$

Ans. (A)

Sol.  $C = (F - 32) \frac{5}{9}$

For  $-40$ , the value of C & F coincides.

43. In which mirror virtual image is magnified ?

- (A) Plane mirror                      (B) Concave mirror                      (C) Convex mirror                      (D) All the above

Ans. (B)

Sol. For object placed between focus & pole the image is virtual, erect & magnified.

44. An electric bulb is designed to draw power  $P_0$  at voltage  $V_0$ . At voltage  $V$ , if it draws power  $P$ , then :

- (A)  $P = \frac{V_0}{V} P_0$                       (B)  $P = \frac{V}{V_0} P_0$                       (C)  $P = \left(\frac{V}{V_0}\right)^2 P_0$                       (D)  $P = \left(\frac{V_0}{V}\right)^2 P_0$

Ans. (C)

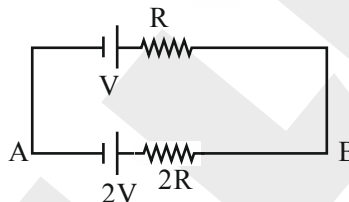
Sol. Resistance of bulb is constant

$$P = \frac{V^2}{R} \text{ or } R = \frac{V^2}{P}$$

$$\Rightarrow \frac{V_0^2}{P_0} = \frac{V^2}{P}$$

$$\text{So, } P = \frac{V^2}{V_0^2} P_0$$

45. In the circuit shown, potential difference  $V_A - V_B$  between A and B is :



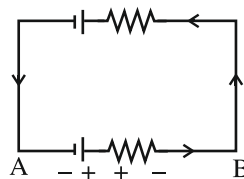
- (A)  $+\frac{4}{3}$  volt                      (B)  $-\frac{4}{3}$  volt                                      (C)  $+\frac{2}{3}$  volt                                      (D)  $-\frac{2}{3}$  volt

Ans. (B)

Sol. Current in loop =  $\frac{2V - V}{2R + R} = \frac{V}{3R}$

Potential different across  $2\Omega$  resistor =  $2R \times \frac{V}{3R}$

$$= \frac{2V}{3}$$



$$\text{So, } V_{AB} = -2V + \frac{2V}{3} = -\frac{4V}{3}$$

46. A block of wood floats in a bucket of water in a lift. Will the block sink if the lift accelerates upwards ?  
 (A) Yes (B) No  
 (C) Depends upon the magnitude of acceleration (D) None of the above

Ans. (B)

Sol. When the lift accelerates upwards, both liquid & block experience pseudo force in downwards direction. This pseudo force causes block to weight more but also increases the pressure in liquid. These effects cancel each other.

47. Which of the following are true ?  
 (a) A convex lens always form a real image for a real object.  
 (b) An air bubble inside water acts like a convex lens.  
 (c) The real image formed by a lens is always inverted.  
 (d) Focal length of a plane mirror is infinite.

(A) (a) , (c) (B) (c), (d) (C) (b), (c) (D) (a), (d)

Ans. (B)

Sol. A real image is always inverted.

The radius of curvature of plane mirror is  $\infty$ .

The air bubble inside water behaves as concave (diverging) lens because, the refractive index of surroundings is more than refraction index of lens, even through shape resembles convex lens.

48. Choose the correct statement :  
 (a) Speed of sound waves in air depends on its temperature.  
 (b) Speed of light is independent of temperature.  
 (c) Speed of sound wave is more in solid than in air.  
 (d) Speed of light is more in air than in solid.

(A) (a),(b) (B) (a),(b),(c) (C) (a), (d) (D) (a), (b), (c), (d)

Ans. (D)

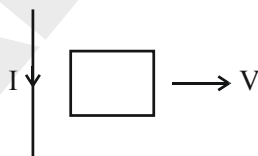
Sol. All statements are true.

49. 5 litres of kerosene oil weigh more in :  
 (A) summer season (B) winter season (C) spring season (D) none

Ans. (B)

Sol. Density increases with decrease in temperature so kerosene is more dense in winter. Thus same volume weighs more.

50. A square metal loop is moving away from a current carrying straight conductor as shown in the figure. What is the direction of induced current across the loop ?

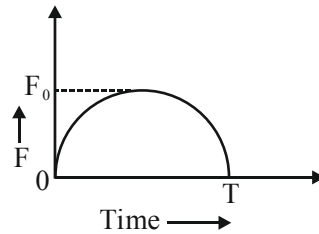


- (A) Clockwise (B) Anticlockwise  
 (C) No induced current (D) May be clockwise or anticlockwise

Ans. (B)

Sol. According to Lenz's Law the loop opposes the change of magnetic flux. Thus the loop should induce current such that it is attracted towards the wire.

51. A particle having mass  $m$  initially at rest is acted upon by a variable force  $F$  for time interval  $T$ . The  $F - T$  graph is semicircular as shown in the figure. The velocity of the particle is  $u$  after time  $T$ . Then:



- (A)  $u = \frac{\pi F_0^2}{2m}$       (B)  $u = \frac{\pi T^2}{8m}$       (C)  $u = \frac{\pi F_0 T}{4m}$       (D)  $u = \frac{F_0 T}{2m}$

**Ans. (C)**

**Sol.** Area of  $f - t$  graph = impulse = change in momentum.

$$\text{Area} = \frac{\pi F_0}{2} \cdot \frac{T}{2}$$

$$\Delta P = P_f - P_i \quad P_i = 0$$

$$P_f = \frac{\pi F_0 T}{4m}$$

52. If the length of the filament of a heater is reduced by 10%, the power of heater will :

- (A) increase by about 9%    (B) increase by about 11%    (C) increase by about 19%    (D) decrease by about 10%

**Ans. (B)**

**Sol.**  $P = \frac{V^2}{R}$

$$P' = \frac{V^2}{R'}$$

$$R = 0.9 \ell \frac{\rho}{A}$$

$$R' = 0.9 R$$

$$P' = \frac{V^2}{0.9 R}$$

$$P' = 1.1 \frac{V^2}{R}$$

$$= 1.1 P$$

Hence power consumption increases by 11%.

53. A ball is dropped from the top of a building at  $t = 0$ . At a later time  $t = t_0$  a second ball is thrown downward with initial speed  $u$ . The time at which two balls meet is given by :

(A)  $\frac{(u - gt_0)}{u} \cdot t_0$       (B)  $\left(\frac{u - \frac{gt_0}{2}}{u - gt_0}\right) t_0$       (C)  $\frac{t_0}{2}$       (D)  $\left(\frac{u + gt_0}{u}\right) t_0$

Ans. (B)

Sol.  $\frac{1}{2}gt^2 = u(t - t_0) + \frac{1}{2}g(t - t_0)^2$

$$\frac{1}{2}gt^2 = u(t - t_0) + \frac{1}{2}g(t^2 + t_0^2 - 2tt_0)$$

$$0 = ut - ut_0 + \frac{1}{2}gt_0^2 - gtt_0$$

$$\left(u - \frac{1}{2}gt_0\right)t_0 = ut - gtt_0$$

$$t = \frac{\left(u - \frac{1}{2}gt_0\right)t_0}{(u - gt_0)}$$

54. Which among the following has highest melting point ?

CaO, NaCl, CaCl<sub>2</sub>, MgCl<sub>2</sub>

(A) CaCl<sub>2</sub>      (B) MgCl<sub>2</sub>      (C) CaO      (D) NaCl

Ans. (C)

Sol. CaO has the highest melting point among the following due to higher ionic character.

55. Electronic configuration of ions of two elements are  $X^{3-}(2, 8, 8)$  and  $Y(2, 8, 8)$ . Which of the following may be the formula of their compound ?

(A) XY ; XY<sub>3</sub>      (B) XY<sub>3</sub>; X<sub>2</sub>Y      (C) XY<sub>3</sub>; XY<sub>5</sub>      (D) X<sub>3</sub>Y; XY<sub>3</sub>

Ans. (Grace)

56. Which type of charge resides over the surface area of micelle formed by soap molecules ?

(A) +ve      (B) -ve      (C) No charge      (D) Both +ve and -ve

Ans. (B)

Sol. Soap molecules consist of negatively charged hydrophilic part. So it will form negatively charged micelle.

57. 0.4 g NaOH in one litre solution has same molarity as what amount of NaCl dissolved in 500 mL of solution ?

(Na = 23, Cl = 35.5)

(A) 2.925 g      (B) 29.25 g      (C) 0.2925 g      (D) 0.5850 g

Ans. (C)

Sol. Molarity =  $\frac{\text{mass of solute}}{\text{molecular mass of solute} \times \text{volume of solution}(\ell)}$

$$\text{Molarity of NaOH} = \frac{0.4}{40 \times 1} = 0.01$$

$$\text{Molarity of NaCl} = 0.01$$

$$= \frac{\text{mass of NaCl} \times 1000}{58.5 \times 500}$$

$$\therefore \text{mass of NaCl} = 0.2925 \text{ g}$$



58. Which chemicals are used in manufacture of  $\text{Na}_2\text{CO}_3$  by Solvay's process ?  
(A)  $\text{NaOH}, \text{CO}_2$  (B)  $\text{NaCl}, \text{CO}_2, \text{H}_2\text{O}$  (C)  $\text{NaCl}, \text{CO}_2, \text{NH}_3, \text{H}_2\text{O}$  (D) None of these is correct

Ans. (C)

Sol. Solvay process is used to prepare  $\text{Na}_2\text{CO}_3$ . In this method a solution of sodium chloride, saturated with ammonia is allowed to react with carbon dioxide and water.

59. Which of the following gases of group 18 is not found in atmosphere ?

(A) Helium (B) Argon (C) Radon (D) Krypton

Ans. (A)

Sol. Helium gas of group 18 is not found in atmosphere due to the small mass of atom, helium cannot be retained by the earth's gravitational field.

60. Corrosion and rancidity are due to \_\_\_\_\_ and \_\_\_\_\_ respectively.

(A) oxidation ; oxidation (B) oxidation ; reduction (C) reduction ; oxidation (D) reduction ; reduction

Ans. (A)

Sol. Corrosion and rancidity are due to oxidation and oxidation respectively. As corrosion is oxidation of metals and rancidity is oxidation of oils and fats.

61.  $\text{C}_4\text{H}_8\text{O}_2$  and  $\text{C}_4\text{H}_8\text{O}$  are the molecular formula of the organic compounds of which class ?

(A) Aldehyde and Ketone (B) Carboxylic acid and Ester  
(C) Ester and Aldehyde (D) Esters and Ethers

Ans. (C)

Sol.  $\text{C}_4\text{H}_8\text{O}_2$  can be a carboxylic acid or an ester.  $\text{C}_4\text{H}_8\text{O}$  can be an aldehyde or ketone.

62. In which of the following number of oxygen atoms are maximum ?

(A) 0.25 mol  $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$  (B) 0.20 mol  $\text{H}_2\text{SO}_4$   
(C) One mol  $\text{HNO}_3$  (D) 0.5 mol  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$

Ans. (D)

Sol. No. of moles of  $\text{O}_2$  in 0.25 mole of  $\text{FeSO}_4 \cdot 7\text{H}_2\text{O} = 0.25 \times 11 = 2.75$  moles.

No. of moles of  $\text{O}_2$  in 0.2 mole of

$\text{H}_2\text{SO}_4 = 0.2 \times 4 = 0.8$  mole

No. of moles of  $\text{O}_2$  in 1 mole of

$\text{HNO}_3 = 1 \times 3 = 3$  moles

No. of moles of Oxygen in 0.5 moles of

$\text{CuSO}_4 \cdot 5\text{H}_2\text{O} = 0.5 \times 9 = 4.5$  moles

Therefore 0.5 moles of  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$  has the maximum atoms of oxygen.

63. A green substance "X", when heated strongly produces a brown solid and gas "Y". The gas is passed into caustic soda and then the solution is treated with  $\text{BaCl}_2$  to get a white solid "Z". Identify 'X', 'Y', 'Z' and choose the correct answer of their formula :

(A)  $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}, \text{SO}_3, \text{BaSO}_4$  (B)  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}, \text{SO}_2, \text{Cu}(\text{OH})_2$   
(C)  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}, \text{SO}_3, \text{BaSO}_4$  (D)  $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}, \text{SO}_3, \text{Fe}(\text{OH})_3$

Ans. (A)

Sol.  $\text{FeSO}_4 + \text{H}_2\text{O} \rightarrow \text{Fe}_2\text{O}_3 + \text{SO}_3 + \text{H}_2\text{O}$

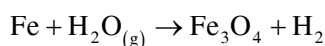
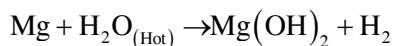
$\text{NaOH} + \text{SO}_3 \rightarrow \text{Na}_2\text{SO}_4 + \text{H}_2\text{O}$

$\text{Na}_2\text{SO}_4 + \text{BaCl}_2 \rightarrow \text{BaSO}_4 + \text{NaCl}$

Therefore X =  $\text{FeSO}_4$ , y =  $\text{SO}_3$ , Z =  $\text{BaSO}_4$

64. The metals which react with cold water, boiled water and steam to produce  $H_2$  respectively are:  
(A) Na, Ca, Al (B) Na, Mg, Fe (C) Na, Mg, Ca (D) Na, Ca, Fe

Ans. (B)



65. Which of the following is correct ?

- (A) Isotopes have different neutrons (B) Isotones have different mass number  
(C) Isobars have different neutrons (D) All of these

Ans. (D)

Sol. All the given statements are correct.

66. Formula of Sodium Zincate is :

- (A)  $Na_2ZnO_3$  (B)  $Na_2ZnO_2$  (C)  $Na_3ZnO_2$  (D)  $NaZnO_3$

Ans. (B)

Sol. Formula of Sodium Zincate is  $Na_2ZnO_2$ .

67. Which of the following is not a micronutrient used by plants ?

- (A) Manganese (B) Chlorine (C) Sodium (D) Magnesium

Ans. (D)

Sol. Magnesium - It is used as a macronutrient not a micronutrient.

68. Who coined the terms like Phenotype and Genotype for the first time ?

- (A) Gregor Mendel (B) W. Johannsen (C) Carl Correns (D) De Vries

Ans. (B)

Sol. W. Johannsen coined the term phenotype & genotype for the 1st time.

69. In which subphase of meiosis-1, paired chromosomes look like rings ?

- (A) Zygotene (B) Pachytene (C) Diplotene (D) Diakinesis

Ans. (C)

Sol. In subphase diplotene of prophase I (meiosis I), chromosomes appear like ring.  
(Diagram - from mail)

70. The type of Hepatitis transmitted by sexual contact is :

- (A) Hepatitis-A (B) Hepatitis-B (C) Hepatitis-C (D) Hepatitis-D

Ans. (B)

Sol. Hepatitis - B is transmitted by sexual contact.

71. The maximum number of trophic levels that can exist in a pond ecosystem :

- (A) 3 (B) 4 (C) 5 (D) 7

Ans. (B)

Sol. The maximum number of trophic levels that can exist in a pond ecosystem is 4.

72. The nutrient present in milk in least amount is:

- (A) Iron (B) Calcium (C) Potassium (D) Magnesium

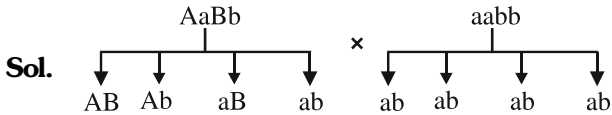
Ans. (A)

Sol. Iron is present in least amount in milk.

73. What phenotypic ratio will appear following a cross between AaBb and aabb?

- (A) 3 : 1                      (B) 1 : 2 : 1                      (C) 1:1:1:1                      (D) 9:3:3:1

Ans. (C)



	AB	Ab	aB	ab
ab	AaBb	Aabb	aaBb	aabb
ab	AaBb	Aabb	aaBb	aabb
ab	AaBb	Aabb	aaBb	aabb
ab	AaBb	Aabb	aaBb	aabb

∴ Phenotype = 1 : 1 : 1 : 1

AaBb : Aabb : aaBb : aabb.

74. The total number of ova produced from 50 secondary oocytes are :

- (A) 50                      (B) 100                      (C) 200                      (D) 250

Ans. (A)

Sol. 1 Secondary Oocyte give rise to 1 Ovum & 1 polar body. So 50 secondary Oocyte will produce 50 Ova.

75. Tendril of pumpkin and spine of Bougainvillea are which type of organ ?

- (A) Homologous organ    (B) Analogous organ    (C) Vestigial organ    (D) Connecting link

Ans. (A)

Sol. Tendrils of pumpkin & Spine of Bougainvillea are modified axillary branches. So, both have same position and structure but different function. So, these two are homologous organs.

76. The hormone associated with reabsorption of Sodium and secretion of Potassium in Kidney is :

- (A) Adrenalin                      (B) Aldosterone                      (C) Prolactin                      (D) Thyroxine

Ans. (B)

Sol. Aldosterone, adrenal gland's cortex region, which regulates the reabsorption of sodium and secretion of potassium in kidney.

77. Riccia belongs to which group of plants ?

- (A) Thallophyta                      (B) Bryophyta                      (C) Pteridophyta                      (D) Gymnosperm

Ans. (B)

Sol. Riccia belongs to Bryophyta group of plant.

78. In which chemical form the stored glucose in plants is transported to different parts through phloem ?

- (A) Glucose                      (B) Fructose                      (C) Sucrose                      (D) Starch

Ans. (C)

Sol. In form of sucrose, plants transport stored glucose through phloem.

79. Which of the followings is a critically endangered species in India ?

- (A) Indian Cheetah                      (B) Golden Langur of Assam    (C) One horned Rhino                      (D) Great Indian Bustard

Ans. (D)

Sol. Great Indian Bustard is a critically endangered species in India.

80. The chemical nature of thromboplastin is :

- (A) Glycoprotein                      (B) Phosphoprotein                      (C) Lipoprotein                      (D) Insoluble protein

Ans. (C)

Sol. Thromboplastin is composed of Phospholipid and proteins. So it is composed of lipoprotein.

81.  $\sqrt[4]{\sqrt[3]{2^2}}$  equals :

(A)  $2^{\frac{13}{12}}$

(B)  $2^{\frac{1}{9}}$

(C)  $2^{\frac{1}{6}}$

(D)  $2^{\frac{1}{24}}$

Ans. (C)

Sol.  $\sqrt[4]{\sqrt[3]{2^2}} = \left( (2^2)^{\frac{1}{3}} \right)^{\frac{1}{4}} = 2^{2 \times \frac{1}{3} \times \frac{1}{4}} = 2^{\frac{1}{6}}$

82.  $\frac{\sin \theta}{1 - \cot \theta} + \frac{\cos \theta}{1 - \tan \theta} = ?$

(A)  $\cos \theta - \sin \theta$

(B)  $\tan \theta + 1$

(C)  $\cos \theta + \sin \theta$

(D)  $\cot \theta + 1$

Ans. (C)

Sol.  $\frac{\sin \theta}{1 - \frac{\cos \theta}{\sin \theta}} + \frac{\cos \theta}{1 - \frac{\sin \theta}{\cos \theta}}$

$$\frac{\sin^2 \theta}{\sin \theta - \cos \theta} + \frac{\cos^2 \theta}{\cos \theta - \sin \theta}$$

$$\frac{\sin^2 \theta - \cos^2 \theta}{\sin \theta - \cos \theta} = \sin \theta + \cos \theta$$

83. One diagonal of a rhombus is 24 cm and its side is 13 cm. The area of rhombus is :

(A)  $115 \text{ cm}^2$

(B)  $120 \text{ cm}^2$

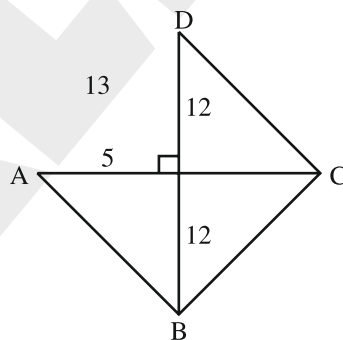
(C)  $125 \text{ cm}^2$

(D)  $90 \text{ cm}^2$

Ans. (B)

Sol. Other diagonal will be 10cm

$$\therefore \text{Area} = \frac{1}{2} d_1 d_2$$



$$= \frac{1}{2} \times 10 \times 24$$

$$= 120 \text{ cm}^2$$

- 84.** Product of  $(1011)_2$  and  $(101)_2$  is :  
 (A)  $(110111)_2$  (B)  $(11011)_2$  (C)  $(100111)_2$  (D)  $(110110)_2$

**Ans. (A)**

**Sol.**  $(1011)_2 \times (101)_2$

$$(1 \times 2^3 + 0 \times 2^2 + 1 \times 2^1 + 1 \times 2^0)(1 \times 2^2 + 0 \times 2^1 + 1 \times 2^0)$$

$$(8 + 0 + 2 + 1)(4 + 0 + 1)$$

$$\Rightarrow 11 \times 5 = 55$$

$$(110111)_2$$

- 85.** If the mean and mode of a data are 30 and 36 respectively, then its median is what ?

- (A) 40 (B) 32 (C) 55.7 (D) 31.69

**Ans. (B)**

**Sol.** Mode = 3 Median - 2 Mean

$$\Rightarrow 36 = 3(\text{Median}) - 2(30)$$

$$\Rightarrow 3(\text{Median}) = 96$$

$$\Rightarrow \text{Median} = \frac{96}{3} = 32$$

So, option (B).

- 86.** If  $\log_{10} a + \log_{10} b = \log_{10} (a + b)$  then :

(A)  $a = \frac{b^2}{1-b}$

(B)  $a = \frac{b}{1-b}$

(C)  $a = \frac{b}{b-1}$

(D)  $a = \frac{b}{1+b}$

**Ans. (C)**

**Sol.**  $\log_{10} a + \log_{10} b = \log_{10} (a + b)$

$$\Rightarrow \log_{10} (a \cdot b) = \log_{10} (a + b)$$

$$\Rightarrow ab = a + b$$

$$a(b-1) = b \Rightarrow a = \frac{b}{b-1}$$

So, option (C).

- 87.** In what ratio does the line  $2x + y - 4 = 0$  divides the line segment joining  $(2, -2)$  and  $(3, 7)$  ?

- (A) 9:2 internally (B) 9:2 externally (C) 2:9 externally (D) 2:9 internally

**Ans. (D)**

**Sol.** Let  $\lambda : 1$  be ratio

$$P = \left\{ \frac{3\lambda + 2}{\lambda + 1}, \frac{7\lambda - 2}{\lambda + 1} \right\}$$

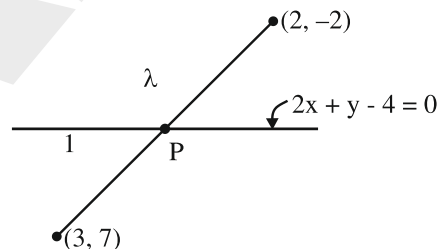
$$\therefore 2 \left( \frac{3\lambda + 2}{\lambda + 1} \right) + \frac{7\lambda - 2}{\lambda + 1} - 4 = 0$$

$$\Rightarrow 6\lambda + 4 + 7\lambda - 2 - 4\lambda - 4 = 0$$

$$\Rightarrow 9\lambda = 2 \quad \Rightarrow \lambda = 2/9$$

$\therefore 2 : 9$  internally

So, option (D).



- 88.** The sum of first 16 terms of an AP whose first and fourth terms are 5 and 20 respectively, is:  
 (A) 600 (B) 765 (C) 680 (D) 690

**Ans. (C)**

**Sol.**  $a = 5$

$$a + 3d = 20$$

$$\therefore d = 5$$

$$\therefore S_{16} = \frac{16}{2} [2(5) + 15(5)]$$

$$= 8 \times (85)$$

$$= 680$$

So, option (C).

- 89.** What must be subtracted from 21, 38, 55, 106 so that the remainders are proportional ?

- (A) 8 (B) 6  
 (C) 4 (D) 2

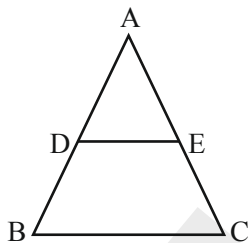
**Ans. (C)**

**Sol.**  $\frac{21-x}{38-x} = \frac{55-x}{106-x}$

Solving, we get  $x = 4$

So, option (C).

- 90.** In the given figure  $BC \parallel DE$ ,  $AE = 4$  cm,  $DE = 6$  cm and  $BC = 9$  cm. The length of EC is:



- (A) 6 cm (B) 2 cm (C) 4 cm (D) 3 cm

**Ans. (B)**

**Sol.**  $\frac{AE}{AC} = \frac{DE}{BC}$

$$\Rightarrow \frac{4}{AC} = \frac{6}{9}$$

$$\Rightarrow AC = \frac{36}{6} = 6$$

$$\therefore EC = 6 - 4 = 2 \text{ cm}$$

So, option (B).

91. What is the length of the diagonal of a cuboid having 30 cm long, 24 cm broad and 18 cm high ?

- (A) 28 cm                      (B)  $15\sqrt{2}$  cm                      (C)  $30\sqrt{2}$  cm                      (D) 60 cm

Ans. (C)

Sol. Length of diagonal of cuboid

$$\begin{aligned} &= \sqrt{30^2 + 24^2 + 18^2} \\ &= \sqrt{576 + 900 + 324} \\ &= \sqrt{1800} \\ &= 30\sqrt{2} \text{ cm} \end{aligned}$$

92. If  $x + y = 3$  and  $xy = 2$  then the value of  $x^3 - y^3$  is :

- (A) 6                      (B) 7                      (C) 8                      (D) 5

Ans. (B)

Sol.  $x + y = 3$

$$xy = 2$$

$$\Rightarrow x^2 + y^2 + 2xy = 9$$

$$x^2 + y^2 + 4 = 9$$

$$x^2 + y^2 = 5$$

$$(x - y)^2 = x^2 + y^2 - 2xy$$

$$= 5 - 4$$

$$= 1$$

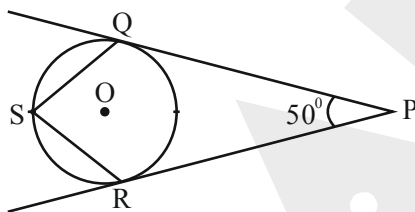
$$x - y = 1$$

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

$$= 1(5 + 2)$$

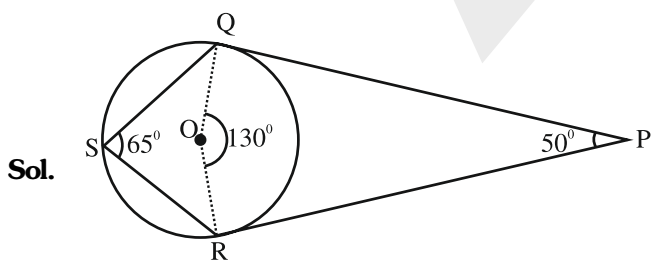
$$= 7$$

93. In the given figure, O is the centre of the circle, PQ and PR are the tangents to the circle. The measure of  $\angle QSR$  is:



- (A)  $65^\circ$                       (B)  $70^\circ$                       (C)  $75^\circ$                       (D)  $60^\circ$

Ans. (A)



94. If  $\tan A = \frac{4}{3}$  and A is acute, then  $\sin A = ?$

(A)  $\frac{4}{5}$

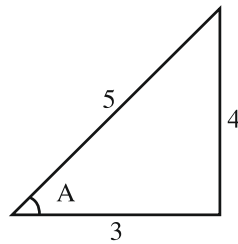
(B)  $\frac{5}{6}$

(C)  $\frac{3}{5}$

(D)  $\frac{1}{3}$

Ans. (A)

Sol.  $\tan A = \frac{4}{3}$



$$\sin A = \frac{4}{5}$$

95. If sum of the roots is 4 and sum of their squares is 9, the equation is :

(A)  $2x^2 - 8x - 7 = 0$

(B)  $2x^2 + 8x - 7 = 0$

(C)  $2x^2 - 8x + 7 = 0$

(D)  $2x^2 + 8x + 7 = 0$

Ans. (C)

Sol.  $\alpha + \beta = 4$

$$\alpha^2 + \beta^2 = 9$$

$$(\alpha + \beta)^2 = 9 + 2\alpha\beta$$

$$16 = 9 + 2\alpha\beta$$

$$\frac{7}{2} = \alpha\beta$$

$$x^2 - (4)x + \frac{7}{2} = 0$$

$$2x^2 - 8x + 7 = 0$$

96. The radii of two cylinders are in the ratio 2:3 and their heights are in the ratio 5 : 3. The ratio of their volumes is:

(A) 27 : 20

(B) 20 : 27

(C) 14 : 19

(D) 19 : 14

Ans. (B)

Sol.  $\frac{r_1}{r_2} = \frac{2}{3}$

$$\frac{h_1}{h_2} = \frac{5}{3}$$

$$\frac{v_1}{v_2} = \frac{\pi r_1^2 h_1}{\pi r_2^2 h_2} \Rightarrow \frac{4}{9} \times \frac{5}{3}$$

$$\Rightarrow \frac{20}{27}$$



97. If  $3^x - 3^{x-1} = 18$ , then value of  $x^x$  is :

(A) 30

(B) 27

(C) 18

(D) 15

Ans. (B)

Sol.  $3^x - \frac{3^x}{3} = 18$

$$3^x = t$$

$$t - \frac{t}{3} = 18$$

$$\frac{2t}{3} = 18$$

$$t = 27$$

$$3^x = 27 \Rightarrow x = 3$$

$$x^x = 3^3 = 27$$

98. If  $f(x) = \log\left(\frac{1+x}{1-x}\right)$  then  $f\left(\frac{2x}{1+x^2}\right)$  is equal to:

(A)  $f(x)$

(B)  $f(-x)$

(C)  $f(2x)$

(D)  $2f(x)$

Ans. (D)

Sol.  $f(x) = \log\left(\frac{1+x}{1-x}\right)$

$$f\left(\frac{2x}{1+x^2}\right) = \log\left(\frac{1 + \frac{2x}{1+x^2}}{1 - \frac{2x}{1+x^2}}\right)$$

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

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

$$= 2\log\left(\frac{1+x}{1-x}\right)$$

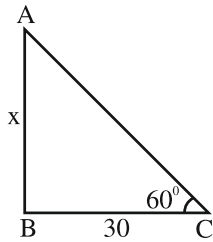
$$= 2F(x)$$

99. From a point, at a distance of 30 m from the foot of an electric pole the angle of elevation of the top of the pole was found to be  $60^\circ$ . Then the height of the pole in 'm' is :

- (A) 30                      (B)  $\frac{30}{\sqrt{3}}$                       (C) 15                      (D)  $30\sqrt{3}$

**Ans. (D)**

**Sol.** Let length of pole be x m.



$\therefore$  In  $\triangle ABC$

$$\tan 60^\circ = \frac{x}{30}$$

$$\sqrt{3} = \frac{x}{30}$$

$$x = 30\sqrt{3}$$

100. The ratio of the length of a side of an equilateral triangle and its height is :

- (A)  $1:\sqrt{3}$                       (B)  $\sqrt{3}:2$                       (C)  $2:\sqrt{3}$                       (D)  $\sqrt{3}:1$

**Ans. (C)**

**Sol.** Let the length of equilateral triangle be a cm.

$$\text{then height} = \frac{\sqrt{3}}{2} a$$

$\therefore$  Side : height

$$a : \frac{\sqrt{3}}{2} a$$

$$2 : \sqrt{3}$$