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

STATE : ASSAM PAPER : SAT

Date: 03/11/2019

Max. Marks: 100 **SOLUTIONS** Time allowed: 120 mins

1. The branch of Geography in which the study of human activities associated with production, distribution, consumption and exchange of resources is done in spatial and temporal contexts is known as :-
(a) Agricultural Geography (b) Economic Geography (c) Industrial Geography (d) Transport Geography

Ans. *(b)*

Sol. Economic geography has been defined by the geographers as the study of human's economic activities under varying sets of conditions which is associated with production location, distribution, consumption exchange of resources and spatial organisation of econimic activities across the world.

2. Transport is an example of :-
(a) Primary Occupation (b) Secondary Occupation (c) Tertiary Occupation (d) Quaternary Occupation

Ans. *(c)*

Sol. Tertiary sector is also called as the service sector. It provides services to the primary and secondary sectors . These services include banking communication, transport, storage facility for goods.

3. Who is considered as the Father of modern economic geography ?
(a) C.F. Jones (b) G.G. Darkenwald (c) George Chisholm (d) Zimmermann

Ans. *(c)*

Sol. Dr George Chisholm was a scottish geographer. He authored the first english textbook on economic geography.

4. Which of the following is a man made resource ?
(a) Rivers (b) Irrigation canal (c) Mineral oil (d) Forests

Ans. *(b)*

Sol. An irrigation canal is constructed to convey water from the source of supply to one or more farms.

5. IUCN was formed in the year :
(a) 1947 (b) 1948 (c) 1949 (d) 1950

Ans. *(b)*

Sol. The international union for conservation of nature is an international organisation working in the field of nature conservation and sustainable use of natural resources. It is involved in data gathering and analysis, research, field projects, advocacy and education. It was founded on october 5, 1948.

6. Where is the headquarter of North-East Frontier railway located ?
(a) Karimganj (b) Bongaigaon (c) Dhubri (d) Guwahati

Ans. *(d)*

Sol. The north-east frontier railway is one of the 18 railway zones in India. Headquartered in maligaon, Guwahati in the state of Assam, it is responsible for rail operations in the entire north-east and parts of West Bengal and Bihar.

7. How many spheres are generally recognised by Earth Sciences ?
(a) 3 (b) 4 (c) 5 (d) 6

Ans. *(b)*

Sol. Everything in earth's system can be placed into one of four major sub-systems, land, water living things or air. These four sub-systems are called "spheres". Specially they are "lithosphere." (land), "hydrosphere" (water, "biosphere" (living things) and "atmosphere" (air).

8. What percentage of the Earth's Land surface is Desert ?

(a) 25% (b) 30% (c) 35% (d) 40%

Ans. *(b)*

Sol. Almost one-third of Earth's surface is a Desert- that is, area that gets less than 10 inches of rain its year. These areas have what is called a moisture defisat.

9. The lakes, rivers, seas and oceans together constitute the Earth's :

(a) Lithosphere (b) Hydrosphere (c) Atmosphere (d) Biosphere

Ans. *(b)*

Sol. A hydrosphere is the total amount of water on a planet. The hydrosphere includes water that is on the surface of the planet, underground and in the air. A planets hydrosphere can be liquid, vapor or ice. On earth liquid water exists on the surface in form of oceans, lakes and rivers.

10. Which ocean occupies the entire South Pole ?

(a) Pacific Ocean (b) Atlantic Ocean (c) Indian Ocean (d) Southern Ocean

Ans. *(d)*

Sol. The southern ocean, also known as the Antarctic ocean or the Austral ocean, comprises the southern most waters of the world ocean. Generally taken to be south of 60°S latitude and encircling Antarctica.

11. How many countries are there in the world ?

(a) 196 (b) 197 (c) 198 (d) 199

Ans. *(b)*

Sol. There are 193 countries in the list of united nations and two permanent observer states in palestine and the vatican city. Two more countries are Taiwan and Kosovo but they are not given UN member status so total number of countries happends to be 197.

12. How many districts are there in the state of Assam ?

(a) 31 (b) 32 (c) 33 (d) 34

Ans. *(c)*

Sol. Assam, a northeastern state of India, is divided into 33 administrative geographical units careed districts.

13. Which is the longest National Highway in Assam ?

(a) NH 31 (b) NH 31 B (c) NH 36 (d) NH 37

Ans. *(d)*

Sol. National highway 37 is a longest national highway in Assam. This highway starts from sutarakandi near Karimganj in Assam and terminates at Bhali in Manipur. Total length of this highway is 365 KM.

14. How many stages are there through which money has evolved ?

(a) 3 (b) 4 (c) 5 (d) 6

Ans. *(c)*

Sol. There are five stages of evolution of money. Commodity money (goods), Metallic money (coins), Paper money (Bank notes), Credit money (cheques and DDs), and Plastic money (Credit and Debit cards).

15. The historic Jonbeel Mela is organised in :-

(a) Golaghat (b) Sibsagar (c) Morigaon (d) Kamrup (R)

Ans. *(c)*

Sol. Jonbeel mela is a three-day annual indigenous tiwa community fair held at the weekend of magh bihu at historic place known as dayang Belguri at Jonbeel. It is 3 KM from Jagiroad in Morigaon district of Assam and 32 KM from Guwahati. The national highway connecting the mela is NH37.

16. The money that is recognised by the law of the land, as valid for payment of debt is known as :

(a) Commodity money (b) Token money (c) Dear money (d) Legal tender money

Ans. *(d)*

Sol. The legal tender is the money that is recognised by the law of land as valid for payment of debt. It must be accepted for discarge of debt.

17. In India, the first bank, Bank of Hindustan was established in the year :
(a) 1760 (b) 1770 (c) 1780 (d) 1790

Ans. *(b)*

Sol. Among the first banks were the bank of Hindustan, which was eastablished in 1770 and liquidated in 1829-32.

18. The Reserve Bank of India was established in :-
(a) 1925 (b) 1935 (c) 1945 (d) 1955

Ans. *(b)*

Sol. Reserve Bank of India (RBI) is India's central bank. Which was established in 1935 under the reserve bank of India act 1934. It controls the issuance and Supply of the Indian rupee. RBI is the regulator of the entire banking in India.

19. Who is the chairman of NITI Aayog ?
(a) Union Home Minister (b) Any Union Minister of Cabinet Rank
(c) Lt. Governor of Delhi (d) Prime Minister

Ans. *(d)*

Sol. NITI aayog was formed in 2015. It is a policy thing tank of the government of India eastablished with the aim of to achieve sustainable development goals with cooperative federalism. It is headed by prime minister of India.

20. In India, the government's financial year runs from :
(a) 1st January to 31 December (b) 1st March to 28th February
(c) 1st July to 30th June (d) 1st April to 31st March

Ans. *(d)*

Sol. India enacted the income tax act in 1961. The act came into force from april 1, 1962 and that is why our financial year begins on april 1 every year and ends on 31st march.

21. Which of the following is not a key dimension of human development in the Human Development Index (HDI) :
(a) A long and healthy life (b) Being Knowledgeable
(c) A decent standard of living (d) Political participation

Ans. *(d)*

Sol. The human development index is a statistic composite index of life expectancy, education and per capital income indicators, which are used to rank countries into three tier of human development.

22. The first bank that was eastablished in Assam was :
(a) Central Bank (b) SIDBI (c) IDBI (d) Guwahati Bank

Ans. *(d)*

Sol. In 1926, the Guwahati bank ltd. was eastablished as a shareholders bank by a few elite persons of Assam with a view to providing loan facilities to indigenous people of Assam.

23. The 42nd amendment of the Constitution, by which, the words "Socialist", "Secular" and "Unity and integrity of the Nation" were incorporated in the preamble, was enacted in :
(a) 1975 (b) 1976 (c) 1977 (d) 1978

Ans. *(b)*

Sol. The 42nd amendment to constitution of India officially known as the constitution act, 1976 was enacted during the emergency by the Indian national congress government headed by Indra Gandhi.

24. How many principal organs are there in the United Nations ?
(a) 4 (b) 5 (c) 6 (d) 7

Ans. *(c)*

Sol. The united nations has six principal organs. The general assembly, the security council, the economic and social council the trusteeship council, the international court of justice and the secretariat.

25. How many member States are there in the United Nations ?
(a) 192 (b) 193 (c) 194 (d) 195

Ans. *(b)*

Sol. The united nations member states are the 193 sovereign states that are members of the united nations (UN) and have equal representation in the UN general assembly.

26. 'The Protection of Human Rights' Bill received the assent of the President of India in :

(a) 1992 (b) 1993 (c) 1994 (d) 1995

Ans. *(b)*

Sol. The national Human rights commission of India is a statutory public body constituted on 12th October, 1993 under the protection of human rights ordinance of 28 September 1993. It was given a statutory basis by the protection of human rights act, 1993.

27. When was the United Nations established ?

(a) 1944 (b) 1945 (c) 1946 (d) 1947

Ans. *(b)*

Sol. The united nations (UN) is an inter-governmental organisation responsible for maintaining international peace and security, developing friendly relations among nations. It was founded in 1945 in San Francisco california, United states.

28. Who was the Chairman of the drafting Committee of Indian Constitution ?

(a) Dr. B.R. Ambedkar (b) Jawaharlal Nehru (c) Rajendra Prasad (d) M. Madhab Rao

Ans. *(a)*

Sol. Dr. Babasaheb Ambedkar chairman of the drafting committee presented the final draft of the India constitution to Dr. Rajendra Prasad on 25 November 1949.

29. The UN Charter, consists of a preamble and 19 chapters, which are divided into :

(a) 110 articles (b) 111 articles (c) 112 articles (d) 113 articles

Ans. *(b)*

Sol. On June, 1945 in San Francisco, the United Nations was established. The UN charter consists of a preamble and 19 chapters, which are divided into 111 articles.

30. Which city was made the capital of the province, 'Eastern Bengal and Assam' ?

(a) Jorhat (b) Karimganj (c) Silchar (d) Dhaka

Ans. *(d)*

Sol. Eastern Bengal and Assam was an administrative subdivision of the British raj between 1905 and 1912. Headquartered in the city of Dacca, it covered territories in what are now Bangladesh, North-east India and Northern west Bengal.

31. When was the Rowlatt Act passed by the Imperial Legislative Council ?

(a) 1917 (b) 1918 (c) 1919 (d) 1920

Ans. *(c)*

Sol. Rowlatt act was passed in February 1919. It was passed by the by the imperial legislative council the legislature of British India. The act allowed certain political cases to be tried without Juries and permitted internment of suspects without trial.

32. The 'Chauri Chaura' incident occured in :

(a) Uttar Pradesh (b) Bengal (c) Bombay (d) Madras

Ans. *(a)*

Sol. The Chauri Chaura incident occured at chauri chaura in the Gorkhpur district of the united province (Modern Uttar Pradesh) in British India on 5 february 1922, when a large group of protesters, participating in the non-cooperation movement, clashed with police, who opened fire.

33. The mantra 'Do or Die' was given by Mahatma Gandhi to launch the :

(a) Swadeshi movement (b) Non Cooperation movement

(c) Civil Disobedience movement (d) Quit India movement

Ans. *(d)*

Sol. On the night of 8th August 1942 addressing the congress delegates Mahatma Gandhi gave the slogan "Do and Die". It means we shall either free India or die in the attempt.

34. Which Assamese submitted a memorandum to Moffat Mills in 1853 and ponted out that the Land revenue assessments were taking its toll on the Assamese people ?

(a) Kandarpeswar Singha (b) Lakshmi Nath Bezbarua

(c) Maniram Dewan (d) Anandaram Dhekial Phukan

Ans. *(d)*

Sol. In 1853 when moffat mills came to Assam to review the condition, Anandaram Dekhial phukan presented him with a report written in lucid english describing the potential and admrinistrative situation of facced by the Assamese language and solutions to the pooreconomric condition of the Assamese people.

35. Where did the first organised peasants movement of Assam take place ?

(a) Rangia (b) Lachima (c) Patharughat (d) Phulaguri

Ans. *(d)*

Sol. The peasant uprising in the phulaguri area of Assam in october 1861 AD was the first ever peasant movement in the context of Indian freedom movement. The phulaguri Dhawa movement shook the British administration in Assam for the first time. To control it they killed 39 peasants and hanged many of the leaders. The first peasant movement of Assam inspired many more movements by the peasants against British administration.

36. The 'Jnan Pradayini Sabha' was established by Anandaram Dhekial Phukan and Gunaviram Barua in :

(a) 1855 (b) 1856 (c) 1857 (d) 1858

Ans. *(c)*

Sol. In 1857-59 Anandaram Dhekiyal Phukan and Gunaviram Barua established the "Gyan pradayini Sabha" mainly for the spread of advanced knowledge among the people.

37. Who wrote the famous Assame Dictionary "Hemkosh Abhidhan"?

(a) Hemchandra Goswami (b) Hemchandra Barua (c) Lakshminath Bezbarua (d) Chandra Kumar Agarwal

Ans. *(b)*

Sol. "Hemkosh Abhidhan" is the first etymological dictionary of the Assamese language based on Sanskrit spellings, compiled by Hemchandra Barua.

38. Who was the first president of Assam Pradesh Congress Committee ?

(a) Nabin Chandra Agarwala (b) Kuladhar Chaliha

(c) Bishnuram Medhi (d) Siddhinath Sarma

Ans. *(b)*

Sol. Kuladhar Chaliha was a freedom fighter and prominent leader of Assam from Indian national congress. He was first president of Assam pradesh congress committee when it was formed.

39. Which martyr was hanged during the quit India Movement for his involvement in train derailment at Borpathar, Assam ?

(a) Kanaklata (b) Sankar Chandra Barua (c) Kushak Konwar (d) Mahendranath Hazarika

Ans. *(c)*

Sol. Kushal konwar was an Indian Assamese freedom fighter from Assam and he happended to be the only Martyr in India who was hanged during last phase of Quit India Movement of 1942-43.

40. Who was the founder of Indian National Congress ?

(a) Mahatma Gandhi (b) Allan Octavian Hume (c) Jawaharlal Nehru (d) Subhash Chandra Bose

Ans. *(b)*

Sol. Allan octavian hume, was a member of the Imperial civil service, a political reformer, ornithologist and botanist who worked in India. He was one of the founders of the Indian national congress.

41. Which of the following rational number has terminating decimal expansion ?

(a) $\frac{64}{455}$ (b) $\frac{13}{3125}$ (c) $\frac{29}{343}$ (d) $\frac{77}{210}$

Ans. *(b)*

Sol. (a) $\frac{64}{455} = \frac{8^2}{5 \cdot 18 \cdot 7}$

(b) $\frac{13}{3125} = \frac{13}{5^5.2^\circ} \rightarrow$ Terminating decimal [since denominator is in the form $2^m \times 5^n$]

(c) $\frac{29}{343} = \frac{29}{7^3}$

(d) $\frac{77}{210} = \frac{7.11}{7.3.2.5} = \frac{7}{3.2.5}$

42. $3.\overline{27}$ is :

(a) an integer (b) a rational number (c) a natural number (d) an irrational number

Ans. *(b)*

Sol. $3.\overline{27} \rightarrow$ rational number [$\because$ its has a non terminating and recurring decimal representation]

43. If α and β are the zeros of the polynomial $f(x) = x^2 + px + q$, then a polynomial having $\frac{1}{\alpha}$ and $\frac{1}{\beta}$ as its zeros is

(a) $x^2 + qx + p$ (b) $x^2 - px + q$ (c) $qx^2 + px + 1$ (d) $px^2 + qx + 1$

Ans. *(c)*

Sol. $f(x) = x^2 + px + q$ $\quad \alpha + \beta = -p; \alpha\beta = q$

$\alpha' = \frac{1}{\alpha}, \beta' = \frac{1}{\beta}$

$\alpha' + \beta' = \frac{1}{\alpha} + \frac{1}{\beta} = \frac{\alpha+\beta}{\alpha\beta} = \frac{-p}{q}$

$\alpha'\beta' = \frac{1}{\alpha\beta} = \frac{1}{q}$

$P(x) = x^2 - (\alpha' + \beta')x + \alpha'\beta'$

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

$= k\left(\frac{qx^2 + px + 1}{q}\right)$

$= qx^2 + px + 1$ if $k = q$

44. If zeros of the polynomial $f(x) = x^3 - 3px^2 + qx - r$ are in A.P. then :

(a) $2p^3 = pq - r$ (b) $2p^3 = pq + r$ (c) $p^3 = pq - r$ (d) $p^2 = pq + r$

Ans. *(a)*

Sol. $f(x) = x^3 - 3px^2 + qx - r$

$\alpha + \beta + \gamma = 3p$ ...(i)

$\alpha\beta + \beta\gamma + \gamma\alpha = q$ ...(ii)

$\alpha\beta\gamma = r.$ ...(iii)

$\because \alpha, \beta, \gamma$ are in AP

$\therefore 2\beta = \alpha + \gamma$ ...(iv)

from (i) and (iv) $2\beta + \beta = 3p$

$\Rightarrow \beta = p$ ...(v)

from (v) and (iii) $\Rightarrow \alpha\gamma = \frac{r}{p}$ ...(vi)

from (ii) and (vi) $\Rightarrow \beta(\alpha + \gamma) + \frac{r}{p} = q$

$\Rightarrow p.2p + \frac{r}{p} = q$ [from (iv), (v)]

$\Rightarrow 2p^3 + r = pq$

$\Rightarrow 2p^3 = pq - r$

45. The value of K for which the system of equations $x + 2y - 3 = 0$ and $5x + ky + 7 = 0$ has no solution, is :

(a) 10 (b) 6 (c) 3 (d) 1

Ans. *(a)*

Sol. $x + 2y - 3 = 0$ ...(i)

$5x + ky + y = 0$

$\Rightarrow x + \frac{ky}{5} + \frac{7}{5} = 0$ ...(ii)

For no solution

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

$\Rightarrow I = \frac{2}{\frac{k}{5}}$

$\Rightarrow \frac{k}{5} = 2$

$\Rightarrow k = 10$

46. The value of $\sqrt{6+\sqrt{6+\sqrt{6+....}}}$ is

(a) 4 (b) 3 (c) –2 (d) 3.5

Ans. *(b)*

Sol. Let y = $\sqrt{6+\sqrt{6+\sqrt{6}}}$

$\Rightarrow y^2 = 6 + \sqrt{6+\sqrt{6+\sqrt{6}}}$

$\Rightarrow y^2 = 6 + y$

$\Rightarrow y^2 - y - 6 = 0$

$\Rightarrow y^2 - 3y + 2y - 6 = 0$

$\Rightarrow y(y - 3) + 2(y - 3) = 0$

$\Rightarrow (y - 3)(y + 2) = 0$

$\Rightarrow y = 3$

47. If x = 1 is a common root of the equations $ax^2 + ax + 3 = 0$ and $x^2 + x + b = 0$ then ab = ?

(a) –3 (b) 3.5 (c) 6 (d) 3

Ans. *(d)*

Sol. $ax^2 + ax + 3 = 0$ ...(i)

$x^2 + x + b = 0$ ...(ii)

Putting x = 1 in (i)

$\Rightarrow a + a + 3 = 0$

$\Rightarrow 2a = -3$

$\Rightarrow a = -3/2$ ...(iii)

Putting x = 1 in (ii)

$1 + 1 + b = 0$

$\Rightarrow b = -2$ ...(iv)

(iii), (iv) $\Rightarrow$ ab = 3

48. If $\frac{1}{x+2}, \frac{1}{x+3}, \frac{1}{x+5}$ are in A.P. then x = ?

(a) 5 (b) 3 (c) 1 (d) 2

Ans. *(c)*

Sol. $\frac{1}{x+2}, \frac{1}{x+3}, \frac{1}{x+5}$ are in AP

$\therefore \frac{2}{x+3} = \frac{1}{x+2} + \frac{1}{x+5}$

$\Rightarrow 2(x^2 + 7x + 10) = (x + 3)(2x + 7)$

$\Rightarrow 2x^2 + 14x + 10 = 2x^2 + 7x + 6x + 21$

$\Rightarrow x = 1$

49. If the sum of 1st n terms of an A.P. is $3n^2 + n$ then its common difference is :

(a) 6 (b) 4 (c) 14 (d) 10

Ans. *(a)*

Sol. $S_n = 3n^2 + n$

$\Rightarrow S_1 = 3.1 + 1$

$\Rightarrow a_1 = 4$ ...(i)

$S_2 = 3.2^2 + 2$

$\Rightarrow a_1 + a_2 = 14$

$\Rightarrow 4 + a_2 = 14$

$\Rightarrow a_2 = 10$ ...(ii)

$\Rightarrow d = a_2 - a_1$

$\Rightarrow d = 10 - 4$

$\Rightarrow d = 6$

50. Sides of two similar triangles are in the ratio 4 : 9. Areas of these triangles are in the ratio :

(a) 2 : 3 (b) 4 : 9 (c) 81 : 16 (d) 16 : 81

Ans. *(d)*

Sol. Ratio of sides = 4:9

$\therefore$ Ratio of Areas = $4^2 : 9^2$

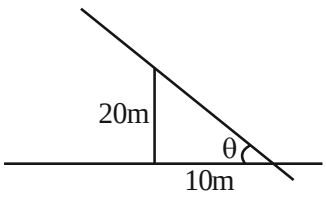
=16 : 81

51. A vertical stick 20 m long casts a shadow 10 m long on the ground. At the same time, a tower casts a shadow 50 m long on he ground. The height of the tower is :

(a) 100 m (b) 120 m (c) 25 m (d) 200 m

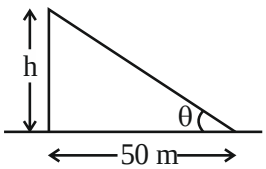
Ans. *(a)*

Sol. *Case-I*



$\tan\theta = \frac{20}{10} = \frac{2}{1}$ ...(i)

Case-II



$\tan\theta = \frac{h}{50}$

$\Rightarrow 2 = \frac{h}{50}$

$\Rightarrow 100 = h$

52. If the centroid of the triangle formed by the points (a, b), (b, c) and (c, a) is at the origin then $a^2 + b^2 + c^2$ = ?

(a) abc (b) 0 (c) a + b + c (d) 3abc

Ans. *(d)*

Sol. Coordinates of centroid $\left(\frac{a+b+c}{3}, \frac{b+c+a}{3}\right) = (0,0)$

$\Rightarrow a + b + c = 0$

$a^3 + b^3 + c^3$

$= a^3 + b^3 + c^3 - 3abc + 3abc$

$= (a + b + c)(a^2 + b^2 + c^2 - ab - bc - ca) + 3abc$

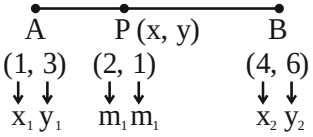
$= 3abc$

53. The co-ordinates of the point P dividing the line segment joining the points A(1, 3) and B(4, 6) in the ratio 2 : 1 are :

(a) (2, 4) (b) (3, 5) (c) (4, 2) (d) (5, 3)

Ans. *(b)*

Sol.



$x = \frac{m_1x_2 + m_2x_1}{m_1 + m_2}$

$= \frac{2.4 + 1.1}{2 + 1}$

$= \frac{9}{3}$

$= 3$

$y = \frac{m_2y_1 + m_1y_2}{m_1 + m_2}$

$= \frac{1.3 + 2.6}{3}$

$= \frac{15}{3}$

$= 5$

$\therefore$ Required coordinates $\rightarrow$ (3, 5)

54. If $\sin\theta + \sin^2\theta = 1$ then $\cos^{12}\theta + 3\cos^{10}\theta + 3\cos^8\theta + \cos^6\theta + 2\cos^4\theta + 2\cos^2\theta - 2 = ?$

(a) 1 (b) 2 (c) 3 (d) 0

Ans. *(a)*

Sol. $\sin\theta + \sin^2\theta = 1$

$\Rightarrow \sin\theta = 1 - \sin^2\theta$

$\Rightarrow \sin\theta = \cos^2\theta$ ...(i)

$\cos^{12}\theta + 3\cos^{10}\theta + 3\cos^8\theta + \cos^6\theta + 2\sin^2\theta + 2\cos^2\theta - 2$

$= \sin^6\theta + 3\sin^5\theta + 3\sin^4\theta + \sin^3\theta + 2\sin^2\theta + 2\sin\theta - 2$

$= \sin^6\theta + \sin^5\theta + 2\sin^5\theta + 3\sin^4\theta + \sin^3\theta + 2\sin^2\theta + 2\sin\theta - 2$

$= \sin^4\theta(\sin^2\theta + \sin\theta) + 2\sin^5\theta + 2\sin^4\theta + \sin^4\theta + \sin^3\theta + 2(\sin^2\theta + \sin\theta) - 2$

$= \sin^4\theta \cdot 1 + 2\sin^3\theta(\sin^2\theta + \sin\theta) + \sin^2\theta(\sin^2\theta + \sin\theta) + 2.1 - 2$

$= \sin^4\theta + 2\sin^3\theta \cdot 1 + \sin^2\theta \cdot 1$

$= \sin^4\theta + \sin^3\theta + \sin^3\theta + \sin^2\theta$

$= \sin^2\theta(\sin^2\theta + \sin\theta) + \sin\theta(\sin^2\theta + \sin\theta)$

$= \sin^2\theta + \sin\theta$

$= \sin^2\theta + \cos^2\theta$

$= 1$

55. The value of $\sin^2 29° + \sin^2 61°$ is :-

(a) $2\sin^2 29°$ (b) $2\sin^2 61°$ (c) 0 (d) 1

Ans. *(d)*

Sol. $\sin^2 29° + \sin^2 61°$

$= \sin^2 29° + \sin^2(90° - 61°)$

$= \sin^2 29° + \cos^2 29°$

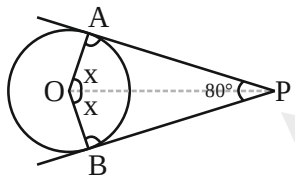
$= 1$

56. If tangents PA and PB from a point P to a circle with centre O are inclined to each other at an angle of 80° then $\angle POA$ is equal to :-

(a) 50° (b) 60° (c) 70° (d) 80°

Ans. *(a)*

Sol.



$\Delta OAP \cong \Delta OBP$ [RHS similarity criterion]

$\therefore \angle APO = \angle BPO$ [CPCT]

$\Rightarrow \angle APO = \angle BPO = \frac{80}{2} = 40°$

In ΔPOA

$\angle POA + \angle OAP + \angle APO = 180°$

$\Rightarrow \angle POA + 90° + 40° = 180°$

$\Rightarrow \angle POA = 180° - 130° = 50°$

57. The length of the diameter of a circle whose area and circumference are numerically equal, is :

(a) $\frac{\pi}{2}$ (b) 2π (c) 2 (d) 4

Ans. *(d)*

Sol. Area = Circumference

$\Rightarrow \pi r^2 = 2\pi r$

$\Rightarrow \frac{r^2}{r} = 2$

$\Rightarrow r = 2$

$\Rightarrow 2r = 4$

$\Rightarrow$ diameter = 4 units

58. The mean of first n natural number is 15. Then n = ?

(a) 15 (b) 30 (c) 14 (d) 29

Ans. *(d)*

Sol. $\frac{1+2+3+...+n}{n} = 15$

$\Rightarrow \frac{n(n+1)}{2} = 15n$

$\Rightarrow n^2 + n = 30\,n$

$\Rightarrow n^2 - 29n = 0$

$\Rightarrow n(n - 29) = 0$

$\Rightarrow n = 29$

59. The median of first 10 prime number is :-

(a) 11 (b) 12 (c) 13 (d) 14

Ans. *(b)*

Sol. 1st 10 prime numbers : 2, 3, 5, 7, 11, 13, 17, 19, 23, 29

Median = $\frac{11+13}{2}$ = 12

60. Which of the following cannot be the probability of an event ?

(a) $\frac{2}{3}$ (b) –1.5 (c) 0.8 (d) 0.5

Ans. *(b)*

Sol. (a) $0 \le \frac{2}{3} \le 1$

(b) $-1.5 < 0$

(c) $0 \le 0.8 \le 1$

(d) $0 \le 0.5 \le 1$

–1.5 cannot be the probability of an unit as it cannot be less than 0.

61. In autotrophic oganism energy requirement is fulfilled by :

(a) Photosynthesis (b) Respiration (c) Digestion (d) Transpiration

Ans. *(b)*

Sol. In all autotrophic organism energy requirement is fullfilled by 'Respiration'.

62. Which of the following maintains the opening and closing of stomatal pore ?

(a) Guard cell (b) Chlorophyll (c) Oxygen (d) Rate of photosynthesis

Ans. *(a)*

Sol. Guard cell maintains the opening and closing of stomatal pore by changing the turgor pressure.

63. Which of the following method is used for vegetative propagation of sugarcane ?
(a) Grafting (b) Artificial Reproduction (c) Budding (d) Tissue culture

Ans. *(b)*

Sol. 'Artificial Reproduction' is used for vegetative propagation of sugarcane. (cutting)

64. Example of unisexual flower is :
(a) Hibiscus (b) Mustard (c) Papaya (d) Rose

Ans. *(c)*

Sol. Papaya plant has a male plant & a female plant separately each producing the male gamete & female gamete respectively. Hibiscus, Mustard & Rose are bisexual plants, having both male & female reproductive organ in the same flower.

65. The process by which the plant embryo develops into seeding under appropiate condition is known as :
(a) Germination (b) Reproduction (c) Fertilization (d) Plantation

Ans. *(a)*

Sol. Germination is the process in which the plant embryo develops into seedling under appropriate condition.

66. In energy pyramid of terrestrial ecosystem, which of the following is present at the bottom of the pyramid ?
(a) Primary consumer (b) Producer (c) Top carnivores (d) Secondary consumer

Ans. *(b)*

Sol. Producers occupy the bottom of the pyramid as the food chain always begin from producers and energy is transferred to next trophic level (consumers).

67. Kulh in Himachal Pradesh is associated to :-
(a) Water management (b) Air Pollution Control (c) Wild life protection (d) River Dams

Ans. *(a)*

Sol. 'Kulh' in Himachal Pradesh is associated to 'water management.'

68. The technique that is used to grow ornamental plants from one parent is known as :-
(a) Tissue culture (b) Vegetative propagation (c) Hybrid (d) Budding

Ans. *(a)*

Sol. Tissue culture is used to grow ornamental plants from one parent. It is a type of vegetative propagation.

69. In muscle cells the break down of pyruvate in absence of oxygen produces :
(a) Ethanol + CO_2 + Energy (b) Lactic acid + Energy
(c) CO_2 + Water + Energy (d) CO_2

Ans. *(b)*

Sol. In muscle cells the breakdown of pyruvate in absence of oxygen produces 'Lactic acid + energy', while in yeast cell breakdown of pyruvate in absence of oxygen produces ethanol + CO_2 + energy.

70. Pulmonary vein carries oxygen from :
(a) Left auricle to left ventricle (b) Right ventricle to lung
(c) From lungs to left auricle (d) Brain to left auricle

Ans. *(c)*

Sol. Pulmonary vein carries oxygen from lungs to left auricle.

71. The structure of kidney that collects the filtrate is known as :
(a) Bowman's capsule (b) Capillaries (c) Nephron (d) Urinary bladder

Ans. *(a)*

Sol. Nephron is the structural and functional unit of kidney. filtration takes place through glomerulus & filtrate is collected in 'Bowman's Capsule'.

72. All the involuntary actions of human body is controlled by :
(a) Fore brain (b) Hind brain (c) Heart (d) Tissue

Ans. *(b)*

Sol. All the involuntary actions (Sneezing, coughing) of human body is controlled by 'Hind brain'.

73. The less secretion of growth hormone from pituitary gland results :

(a) Dwarfism (b) Gigantism (c) Acromegaly (d) Anaemia

Ans. *(a)*

Sol. The less secretion of growth hormone from pituitary gland causes, less growth of bones and muscles resulting in dwarfism.

74. The life span of human egg is :

(a) 24 hours (b) 48 hours (c) 76 hours (d) 90 hours

Ans. *(a)*

Sol. The life span of human egg is 12 to 24 hours.

75. The genotypic ratio of Mendel's monohybrid cross is :-

(a) 3 : 1 (b) 1 : 2 : 1 (c) 9 : 3 : 3 : 1 (d) 2 : 1

Ans. *(b)*

Sol. The genotypic ratio of mendel's monohybrid cross is '1 : 2 : 1'.

76. The study that deals with the relationship distance of organisms on the basis of their DNA structure is known as :

(a) Molecular phylogeny (b) Fossil study (c) Embryology (d) Histology

Ans. *(a)*

Sol. 'Molecular phylogeny' is the study that deals with the relationship distance of organisms on the basis of their 'DNA Structure'.

77. If a plane mirror is rotated by an angle 15° then the reflected light will be rotated by :

(a) 15° (b) 30° (c) 45° (d) 7.5°

Ans. *(b)*

Sol. If a plane mirror is rotated by an angle θ then reflected ray will be rotated by an angle of 2θ.

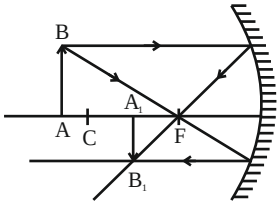
78. If an object is placed away from the centre of curvature of a concave mirror, then the image would be :-

(a) Magnefied, real inverted (b) Diminished, real, erect

(c) Diminished, virtual, erect (d) Diminished, real, inverted

Ans. *(d)*

Sol.



If an object is placed away from the centre of curvature of a concave mirror, then the image would be real, inverted and diminished (between C and F).

79. At total internal reflection the angle between the reflected ray and the incident ray is :

(a) Two times the angle of incidence (b) Equal to the angle of incidence

(c) Zero (0°) (d) 90°

Ans. *(a)*

Sol. In total internal reflection :-

Angle between the reflected ray and the incident ray = $\angle i + \angle r$

= $\angle i + \angle i$ ($\because \angle i = \angle r$)

= $2 \times \angle i$

80. If an object is placed at the focus of a biconvex lens then the image will be formed :

(a) At focus on the otherside of the lens (b) At the centre of curvature

(c) At infinity (d) In between focus and centre of curvature

Ans. *(c)*

Sol. If an object is placed at the focus of a biconvex lens then the image will be formed at infinity.

81. The correct sequence in the increasing order of fequency is :

(a) Violet, yellow, orange (b) Red, orange, violet (c) Blue, yellow, violet (d) Blue, red, orange

Ans. *(b)*

Sol. Increasing order of frequency is :-

$$\xrightarrow[\text{Frequency}]{\text{R O Y G B I V}}$$

$f_{red} < f_{orange} < f_{violet}$

82. A person can see distant object clearly but find it difficult to read a book. The person is suffering from :

(a) Astigmatism (b) Myopia (c) Hypermetropia (d) Presbyopia

Ans. *(c)*

Sol. The person is suffering from hypermetropia can see distant object clearly but find it difficult to see nearly object clearly.

83. If a conductor is folded 8 times then the resistance will be :

(a) 8 times (b) 4 times (c) $\frac{1}{8}$ times (d) $\frac{1}{64}$ times

Ans. *(d)*

Sol. Let the length of a conductor = *l*

and the Area of a cross-section = A

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

Now it is folded 8 times then new length of the conductor (ℓ') = $\frac{\ell}{8}$

and new area of the cross-section (A') = 8A

$\therefore$ New resistance R' = $\rho\frac{\ell'}{A'}$

$= \rho \times \frac{\ell}{8\times 8A} = \frac{1}{64}\times\rho\frac{\ell}{A}$

$R' = \frac{1}{64}\times R$

i.e. New resistance will be $\frac{1}{64}$ times of the original resistance.

84. If R is the resistance, I is the current flowing and V is the polential difference accross a conductor at constant temperature, then Ohm's law is :

(a) I = VR (b) R = VI (c) V = IR (d) $V = I^2R$

Ans. *(c)*

Sol. According to ohm's law :-

V = IR

85. How much energy in Kilowatt hour is consumed in operating two 200 watt bulb for 10 hour per day in a month (30 days) ?

(a) 60 KWH (b) 6 KWH (c) 30 KWH (d) 200 KWH

Ans. *(NA)*

Sol. Energy consumed in (kWh) in a month (i.e. 30 days)

= No of appliance × Rating of appliance (in kWh) × Total no of hours it is used × no. of days

$= 2 \times \frac{200}{1000} \times 10 \times 30$

= 120 kWh

86. Particles released from Uranium atom in the increasing order of their velocity.

(a) Alpha, gamma, beta (b) Alpha, beta, gamma (c) Gamma, beta, alpha (d) Beta, gamma, alpha

Ans. *(b)*

Sol. Increasing order of velocity of the particles released from uranium atom :-

$V_{\alpha\text{-particle}} < V_{\beta\text{-particle}} < V_{\gamma\text{-rays}}$

87. We can write on a black board because of the force called :

(a) Viscous force (b) Frictional force (c) Gravitational force (d) Nuclear force

Ans. *(b)*

Sol. Friction force helps to write on a black board.

88. The energy released by sun is due to :

(a) Fission reaction (b) Fusion reaction

(c) Both fission and fusion reaction (d) Chemical reaction

Ans. *(b)*

Sol. The energy released by sun is due to nuclear fusion reaction. In sun hydrogen nuclei combine to form helium atom by nuclear fusion.

89. Which of the following are exothermic processes ?

(i) Reaction of water with lime (ii) Dilution of an acid

(iii) Evaporation of water (iv) Sublimation of Camphor

(a) (i) and (ii) (b) (ii) and (iii) (c) (i) and (iv) (d) (iii) and (iv)

Ans. *(a)*

Sol. Chemical reactions in which heat is evolved are called exothermic reactions.

e.g. Reaction of water with lime and dilution of an acid.

90. Which of the following gases can be used for storage of fresh sample of an oil for a long time ?

(a) CO_2 or O_2 (b) N_2 or O_2 (c) CO_2 or He (d) He or N_2

Ans. *(d)*

Sol. To prevent rancidity inert gases like He or N_2 are used for storage of fresh sample of an oil for a long time.

91. An aqueous solution turns red litmus solution blue. Excess addition of which of the following will reverse the change ?

(a) Baking Powder (b) Lime

(c) Ammonium hydroxide solution (d) Hydrochloric Acid

Ans. *(d)*

Sol. An aqueous solution of a base turns red litmus solution blue, excess addition of an acid like HCl will reverse the change.

92. Silver articles become black on exposure to air for lolonger time which may be due to the formation of :

(a) AgCN (b) Ag_2O (c) Ag_2S (d) Ag_2S and AgCN

Ans. *(c)*

Sol. $2Ag + H_2S \rightarrow \underset{\text{(Black Colour)}}{Ag_2s} + H_2$

Due to formation silver sulphide (Ag_2S) which is black colour, silver articles become black on exposure to air for longer time.

93. Which of the following four metals would be displaced from the solution of its salts by other three metals ?

(a) Mg (b) Cu (c) Zn (d) Fe

Ans. *(b)*

Sol. Less reactive metal can displaced by more reactive metal, so Cu will be displaced from the solution of its salt by other three metal i.e. Mg, Zn and Fe because Cu is least reactive among the four.

94. Which of the following is not required to find the pH of a solution ?

(a) pH Paper (b) Litmus Paper (c) Universal indicator (d) Standard pH chart

Ans. *(b)*

Sol. pH paper, universal indicator and standard pH chart are used to find the pH of a solution where as litmus paper is used to find the nature of solution i.e. acid or base.

95. Soaps are

(a) Calcium Salt of acids

(b) Magnesium salts of acids

(c) Sodium and potassium salts of long chain fatty acids

(d) Salts of bases

Ans. *(c)*

Sol. Soaps are sodium and potassium salts of long chain fatty acids.

96. The general formula of esters where R represents the alkyl group is

(a) POH (b) RCOR (c) RCOOH (d) RCOOR

Ans. *(d)*

Sol. General formula of esters is RCOOR, where R, represents alkyl group.

97. Which of the following does not belong to the same homologus series ?

(a) CH_4 (b) C_2H_6 (c) C_3H_8 (d) C_3H_6

Ans. *(d)*

Sol. General formula of alkane = $C_nH_{2_{n+2}}$ and

General formula of alkene = C_nH_{2n}

option (a), (b) and (c) belongs to alkane homologous series where as (d) belongs to alkene homologous series. So, (d) belongs to different homologous series.

98. Which of the following elements would lose an electron easily ?

(a) Mg (b) Na (c) Rb (d) Ca

Ans. *(c)*

Sol. Rb is most metallic, so its can lose an electron easily.

99. Upto which element the law of octaves was found to be applicable ?

(a) O (b) Ca (c) Co (d) K

Ans. *(b)*

Sol. The law of octave was found to be applicable upto Ca.

100. Where would you locate the element with electronic configuration 2, 8 in the modern periodic table ?

(a) Group 8 (b) Group 2 (c) Group 15 (d) Group 18

Ans. *(d)*

Sol. Electronic configuration 2, 8

i.e. Neon, belongs to group 18.