

DATE : 05/11/2017

WEST BENGAL



Aakash

Medical | IIT-JEE | Foundations

(Divisions of Aakash Educational Services Pvt. Ltd.)

Regd. Office : Aakash Tower, 8, Pusa Road, New Delhi-110005

Ph.: 011-47623456 Fax : 011-47623472

Time : 3 Hour.

Answers & Solutions for NTSE (Stage-I) 2017-18

Max. Marks : 200

INSTRUCTIONS TO CANDIDATES

1. Use blue/black ball point pen only. There is no negative marking.
2. This test booklet contains 200 questions of one mark each. All the questions are compulsory.
3. Section-I : MAT : 1 - 50 questions
Section-II : Language : 1 - 50 questions
Section-III : SAT : 1 - 100 questions
4. Answer each question by darkening the one correct alternative among the four choices on the OMR Sheet with blue/black ball point pen.
5. Students are not allowed to scratch/alter/change out an answer once marked on OMR Sheet, by using white fluid/eraser/blade/tearing/wearing or in any other form.
6. Separate sheet has been provided for rough work in this test booklet.
7. Please handover the OMR sheet to the invigilator before leaving the Examination Hall.
8. Darken completely the ovals of your answers on OMR Sheet in the time limit allotted for that particular paper.
9. Your OMR Sheet will be evaluated through electronic scanning process. Incomplete and incorrect entries may render your OMR sheet invalid.
10. Use of electronic gadgets, calculator, mobile etc., is strictly prohibited.

SECTION-I : MENTAL ABILITY TEST (MAT)

(Questions 1–10)

DIRECTION : Read the questions carefully and give answers by filling the circle of the letter denoting your selected answer on the O.M.R. Answer-Sheet.

1. If the polynomial $f(x) = 2x^3 + mx^2 + nx - 14$ has

$(x-1)$ and $(x+2)$ as its factors, find the value of $\frac{m}{n}$.

(a) 27

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

(c) 3

(d) $\frac{1}{27}$

Answer (c)

Sol. $f(1) = 0 \Rightarrow m + n = 12$

$f(-2) = 0 \Rightarrow 2m - n = 15$

$\Rightarrow m = 9; n = 3 \therefore \frac{m}{n} = 3$

2. In how many years the ratio of the principal and its interest at 4% per annum will be 5 : 2 ?

(a) 10

(b) 15

(c) 20

(d) None of these

Answer (1)

Sol. $\frac{P}{I} = \frac{100}{tr} = \frac{5}{2}$ ($r = 4$)

$\Rightarrow t = 10$ yrs

3. If $\frac{a^3 + 3ab^2}{3a^2b + b^3} = \frac{x^3 + 3xy^2}{3x^2y + y^3}$, then

(a) $bx = ay$

(b) $by = ax$

(c) $b^2y = a^2x$

(d) $b^2x = a^2y$

Answer (a)

Sol. Applying componendo and dividendo

$$\frac{(a+b)^3}{(a-b)^3} = \frac{(x+y)^3}{(x-y)^3} \Rightarrow \frac{a+b}{a-b} = \frac{x+y}{x-y} \Rightarrow \frac{a}{b} = \frac{x}{y}$$

$\Rightarrow ay = bx$

4. The mean of x_1 and x_2 is M_1 and that of $x_1, x_2, x_3,$

x_4 is M_2 then the mean of $ax_1, ax_2, \frac{x_3}{a}, \frac{x_4}{a}$ is

(a) $\frac{M_1 + M_2}{2}$

(b) $\frac{aM_1 + \frac{M_2}{a}}{2}$

(c) $\frac{1}{2a} [(a^2 - 1)M_1 + 2M_2]$

(d) $\frac{1}{2a} [2(a^2 - 1)M_1 + M_2]$

Answer (c)

Sol. $x_1 + x_2 = 2M_1; x_1 + x_2 + x_3 + x_4 = 4M_2$

$$\Rightarrow x_3 + x_4 = 4M_2 - 2M_1$$

$$\therefore \frac{1}{4} \left[ax_1 + ax_2 + \frac{1}{a}x_3 + \frac{1}{a}x_4 \right]$$

$$= \frac{1}{4} \left[2aM_1 + \frac{1}{a}(4M_2 - 2M_1) \right]$$

$$= \frac{1}{2a} [(a^2 - 1)M_1 + 2M_2]$$

5. If $f(x+1) = 3x - 9$, then what will be the value of $f(x^2 - 1)$?

(a) $3x^2 - 9$

(b) $3x^2 - 15$

(c) $x^2 - 10$

(d) $3x^2 - 10$

Answer (b)

Sol. Replace $x \rightarrow x - 1 \Rightarrow f(x) = 3x - 12$

$$\therefore f(x^2 - 1) = 3(x^2 - 1) - 12 = 3x^2 - 15$$

6. The area of the whole surface of a certain cube is equal to the area of the curved surface of a certain sphere. The ratio of their volumes is

(a) $\pi : 6$

(b) $\sqrt{\pi} : \sqrt{6}$

(c) $\sqrt{6} : \sqrt{\pi}$

(d) $6 : \pi$

Answer (b)

Sol. $\therefore 6a^2 = 4\pi r^2 \Rightarrow \frac{a}{r} = \sqrt{\frac{2\pi}{3}}$

$$\therefore a^3 \div \frac{4}{3}\pi r^3 = \frac{3}{4\pi} \left(\frac{a}{r} \right)^3 = \sqrt{\pi} : \sqrt{6}$$

7. If $x \neq y$ and x, y are real numbers; and $A = x^2 + y^2 - xy - x - y + 1$, then

(a) $A > 0$

(b) $A = 0$

(c) $A < 0$

(d) $0 < A < 1$

Answer (a)

Sol. $A = \frac{1}{2} (2x^2 + 2y^2 - 2xy - 2x - 2y + 2)$

$$= \frac{1}{2} [(x-y)^2 + (x-1)^2 + (y-1)^2] > 0$$

8. If $\sin\alpha$ and $\cos\alpha$ are the roots of the equation $kx^2 + mx + n = 0$, then

- (a) $\ell^2 + m^2 + 2n = 0$ (b) $\ell^2 - m^2 + 2n = 0$
(c) $\ell^2 - m^2 - 2n = 0$ (d) $\ell^2 + m^2 - 2n = 0$

Answer (b)

Sol. $\sin\alpha + \cos\alpha = -\frac{m}{\ell}$; (1)

$\sin\alpha \cos\alpha = \frac{n}{\ell}$ (2)

Squaring (1)

$\sin^2\alpha + \cos^2\alpha + 2\sin\alpha \cos\alpha = \frac{m^2}{\ell^2}$

$\Rightarrow 1 + \frac{2n}{\ell} = \frac{m^2}{\ell^2} \Rightarrow \ell^2 - m^2 + 2\ell n = 0$

9. PQ is the diameter of a semicircle with radius 4 cm and $\angle PRQ$ is the angle on the semicircle. If

QR = $2\sqrt{7}$ cm, then length of PR is

- (a) 8 cm (b) 6 cm
(c) 5 cm (d) $2\sqrt{11}$ cm

Answer (2)

Sol. $\angle PRQ = 90^\circ \Rightarrow PR = \sqrt{PQ^2 - RQ^2}$
 $= \sqrt{64 - 28} = 6$

10. What must be added to $x^4 + 6x^3 + 19x^2 + 30x$ to make it a perfect square ?

- (a) 49 (b) 25
(c) 10 (d) 36

Answer (b)

Sol. $(x^2)^2 + (3x)^2 + (5)^2 + 2.x^2.3x + 2.x^2.5 + 2.3x.5 - 25$
 $= (x^2 + 3x + 5)^2 - 25$

(Questions 11–20)

DIRECTION : In each question 11 to 29 below, there is a number series with one term missing shown by '?'. The term is given as one of the alternatives among four members given below it. Find the term and indicate your answer by filling the circle of the corresponding letter of alternatives in the O.M.R. Answer-Sheet

11. $21\frac{1}{3}, 16, 12, 9, ?$

- (a) 7 (b) 6
(c) 6.75 (d) 5

Answer (c)

Sol. Given numbers are in G.P. $\Rightarrow r = \frac{3}{4} \therefore$ Required

number = $9 \times \frac{3}{4} = 6.75$

12. 21, 34, 55, 89, 144 ?

- (a) 169 (b) 213
(c) 223 (d) 233

Answer (d)

Sol. $\because t_1 + t_2 = t_3, t_2 + t_3 = t_4 \Rightarrow t_3 + t_4 = t_5 \Rightarrow 89 + 144 = 233$

13. 225, 100, 36, 9, 1, ?

- (a) -7 (b) -6
(c) 0 (d) -1

Answer (c)

Sol. differences are $5^3, 4^3, 3^3, 1^3 \Rightarrow$ next difference = $1^3 \Rightarrow$ next number = 0

14. 2, 15, 41, 80, ?

- (a) 111 (b) 120
(c) 121 (d) 132

Answer (d)

Sol. differences are 13, 26, 39

$\Rightarrow 4^{\text{th}}$ difference = 52,

\therefore required number = $80 + 52 = 132$

15. 462, 420, 380, ?, 306

- (a) 322 (b) 332
(c) 342 (d) 352

Answer (c)

Sol. $380 - 38 = 342$

16. 4, 18, ?, 100, 180, 294

- (a) 32 (b) 36
(c) 48 (d) 40

Answer (c)

Sol. $2^2.1, 3^2.2, \boxed{4^2.3}, 5^2.4, 6^2.5, 7^2.6$

required number = 48

17. (11, 13), ?, (23, 29), (31, 37), (41, 47)

- (a) (13, 17) (b) (19, 21)
(c) (17, 19) (d) (13, 18)

Answer (c)

Sol. pair of prime numbers (17, 19)

18. $\frac{1}{\sqrt{3}}, \frac{2}{3}, ?, \frac{4}{9}, \frac{5}{9\sqrt{3}}$

(a) $\frac{3}{3\sqrt{3}}$ (b) $\frac{3}{\sqrt{3}}$

(c) $\frac{1}{2\sqrt{3}}$ (d) $\frac{1}{3}$

Answer (a)

Sol. Arithmetic - Geometric series $\Rightarrow \frac{3}{3\sqrt{3}}$

19. 121, 126, 141, 166, 201, ?

(a) 206 (b) 212

(c) 230 (d) 246

Answer (d)

Sol. differences are : 5, 15, 25, 35

\Rightarrow next difference = 45

\therefore required number = 246

20. 0, 6, 24, 60, ?, 210

(a) 117 (b) 119

(c) 120 (d) 126

Answer (c)

Sol. $0 = 0.1.2$

$6 = 1.2.3$

$24 = 2.3.4$

$60 = 3.4.5$

next number $4.5.6 = 120$

(Questions 21 — 30)

DIRECTION: In each of the questions 21 to 30, there are four items, three of which are alike by some means or other while one is out of the class. Find out the odd item and indicate your answer by filling the circle of the corresponding letter on the O.M.R. Answer-Sheet.

21. (a) Jagadish Chandra Bose

(b) Debendra Mohan Bose

(c) Satyendra Nath Basu

(d) Prafulla Chandra Roy

Answer (c or d)

Sol. (c) Only one awarded Padma Vibhusan

or,

(d) Chemist, rest are physicist

22. (a) Raman Research Institute

(b) Indian Institute of Science

(c) Indian Institute of Chemical Biology

(d) International Centre for Theoretical Science

Answer (c)

Sol. Situated in Kolkata, rest are in Bangaluru

23. (a) Blade

(b) Axe

(c) Scissors

(d) Needle

Answer (d)

24. (a) India Today

(b) The Hindu

(c) The Hindustan Times (d) Times of India

Answer (a)

Sol. Magazine, rest are Newspapers

25. (a) Terrence Tao

(b) Maryam Mirzakhari

(c) Rene Thom

(d) Michael Atiyah

Answer (a or b)

Sol. (a) Only one alive

or,

(b) Only female

26. (a) Patna

(b) Kolkata

(c) Baranasi

(d) Cuttack

Answer (c)

27. (a) Metre

(b) Litre

(c) Nautical mile

(d) Light year

Answer (b)

28. (a) May Day

(b) Republic Day

(c) Gandhi Jayanti Day

(d) Rabindra Jayanti Day

Answer (a)

Sol. (a) Originated in Russia, rest are originated from India

29. (a) The Mahabharat

(b) The Geeta

(c) The Koran

(d) The Bible

Answer (a)

30. (a) Atal Behari Bajpae

(b) Dr. Manmohan Singh

(c) Dr. A. P. J. Abdul Kalam

(d) Morarji Desai

Answer (c)

(Questions 31–40)

DIRECTION : In each question below there are two words separated by ':' in the upper row. Below that there are some words on each side of the symbol ':'. Find the relation between two upper words and select one word from the right side of ':' below which have the same relation as above. Fill the circle of the letter denoting your selected answer on the O.M.R. Answer-Sheet

31. Prashanta Chandra
Mahalanobis : Indian Statistical
Institute
- Dr. Mahendralal
Sarkar : ?
- (a) Calcutta University
(b) Rajabazar Science College
(c) Indian Association for the Cultivation of Science
(d) Indian Institute of Science

Answer (c)

32. Calendar : Dates
Dictionary : ?
- (a) Sentences (b) Language
(c) Words (d) Books

Answer (c)

33. 1729 : Ramanujan
6174 : ?
- (a) Sir Asutosh Mukhopadhyay
(b) Mahan Maharaj
(c) S. Chandrasekhar
(d) D. R. Kaprekar

Answer (d)

34. 15th August : India
? : Pakistan
- (a) 21st February (b) 16th December
(c) 16th August (d) 14th August

Answer (d)

35. Cocunut : Shell
Letter : ?
- (a) Letter-box (b) Envelope
(c) Stamp (d) Mail

Answer (b)

36. Rabishankar : Sitar
Amjad Ali Khan : ?
- (a) Sitar (b) Sarod
(c) Flute (d) Guiter

Answer (b)

37. Prof. Amarthya Sen : Economics
Prof. Ashoke Sen : ?
- (a) Economics (b) Physics
(c) Chemistry (d) Biology

Answer (b)

38. The Ganges : India
The Nile : ?
- (a) Pakistan (b) China
(c) Egypt (d) Nairobi

Answer (c)

39. Virat Kohli : Cricket
Pankaj Advani : ?
- (a) Basket ball (b) Billiard
(c) Snooker (d) Chess

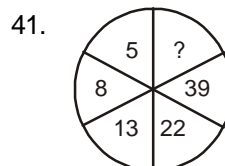
Answer (b)

40. Apparel : Cloth
Footwear : ?
- (a) Material (b) Leather
(c) Cobbler (d) Shoes

Answer (d)

(Questions 41–50)

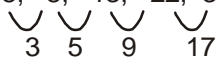
DIRECTION : In questions 41–50, numbers are placed in figures on the basis of some rules. One place in the figure is indicated by the interrogation sign (?). Find out the correct alternative to replace the question mark and indicate your answer by filling the circle of the corresponding letter of alternatives in the O.M.R. Answer-Sheet



- (a) 66 (b) 72
(c) 71 (d) 78

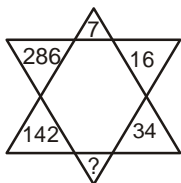
Answer (b)

Sol. 5, 8, 13, 22, 39, —



$$3 \times 2 - 1, 5 \times 2 - 1, 9 \times 2 - 1, 17 \times 2 - 1 + 39 = 72$$

42.



- (a) 38 (b) 66
(c) 68 (d) 70

Answer (d)

Sol. Sum of all digits is 7

43.

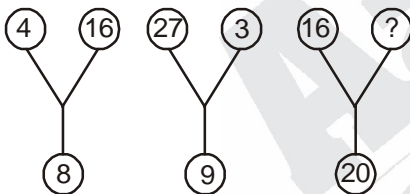
4C	2B	3A
28A	?	45B
7C	8A	15B

- (a) 16C (b) 12C
(c) 13C (d) 7C

Answer (a)

Sol. $2 \times 8 = 16, 16C$

44.



- (a) 60 (b) 50
(c) 25 (d) 40

Answer (c)

Sol. $16 \times \frac{5}{4} = 20, 20 \times \frac{5}{4} = 25$

45.

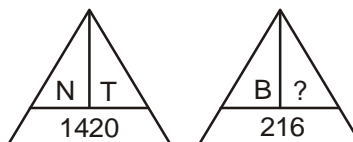


- (a) 35 (b) 40
(c) 49 (d) 53

Answer (b)

Sol. $23 + 5 = 28, 45 + 5 = 50, 35 + 5 = 40$

46.



- (a) P (b) H
(c) M (d) L

Answer (a)

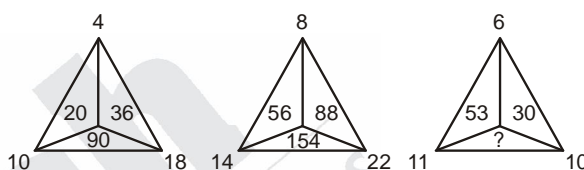
Sol. Position of N \rightarrow 14

Position of T \rightarrow 20

\therefore Position of B \rightarrow 2

Position of P \rightarrow 16

47.



- (a) 110 (b) 1
(c) 55 (d) 441

Answer (c)

Sol. $\frac{11 \times 10}{2} = 55$ and in third diagram instead of 53, it should be 33

48.



- (a) 100 (b) 10
(c) 200 (d) 9

Answer (b)

Sol. $5 \times 3 = 15, 8 \times 3 = 24$

$14 \times 2 = 28, 16 \times 2 = 32$

$25 \times 2 = 50, 10 \times 2 = 20$

49.

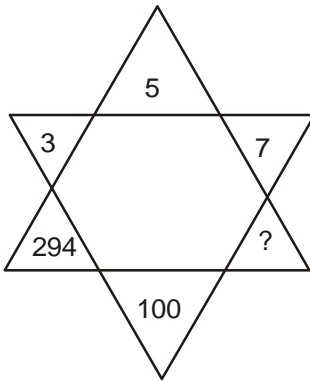
3	5	7	9	15	13
8	26	48	82	?	170

- (a) 121 (b) 224
(c) 120 (d) 225

Answer (b)

Sol. $3^2 - 1, 5^2 + 1, 7^2 - 1, 9^2 + 1, 15^2 - 1, 13^2 + 1$

50.



(a) 18

(b) 9

(c) 10

(d) 20

Answer (a)**Sol.** $5^2 (5 - 1) = 100$, $7^2 \times (7 - 1) = 294$ $\therefore 3^2 (3 - 1) = 18$ 


Aakash
 Medical | IIT-JEE | Foundations
 (Divisions of Aakash Educational Services Pvt. Ltd.)

SECTION-II : LANGUAGE TEST

Q.1-5. Read the following passage and answer the questions given below :

Nestling between the Greater Himalayas and the Zaskar Range, the Zaskar Valley is Ladakh's remotest and loveliest valley. The Zaskar Valley is a part of Ladakh region in the state of Jammu and Kashmir. Spread over an area of about 5000 square kilometers and at an elevation of 4010 metres, it is situated in Kargil district. Zaskar's western arm (fed by the Stod river) is studded with small settlements and agricultural expanses, as opposed to its eastern flank (watered by the Lungnak), which is an isolated, forbidding gorge. Prone to heavy snowfall, the Zaskar Valley is sealed off by snow-locked passes for almost eight months of the year. The passes open only around June and close by mid-October, beckoning intrepid trekkers and rafters to its challenging mountain trails and treacherous waters, for here nature gives no quarter but will reward those who dare. Padum, the biggest village and headquarters of Zaskar, along with Lamayuru, is the base for adventure activities here. It comes as no surprise that the journey, by jeep, raft or even on foot, both to and through this dramatic terrain, ends up being the destination. High passes, fraught with danger and a terrible beauty, are the gateways to this fabulous hidden valley.

Choose the correct answer from the options given below :

- The Zaskar Valley is
 - part of lesser Himalayas
 - very remote
 - popular tourist destination
 - devoid of any settlement

Answer (b)

- 'Prone to snowfall' means
 - the valley always experiences heavy snowfall
 - the valley never experiences heavy snowfall
 - the valley always experiences moderate snowfall
 - the valley experiences heavy rainfall

Answer (a)

- The Zaskar Valley remains cut off for eight months because
 - adventure sports are held during this time
 - the roads are repaired during this time
 - the mountain passes are blocked by snow
 - the rivers become dry during this time

Answer (c)

- The western arm of Zaskar Valley is habitable as
 - it is well connected by roads with the eastern side
 - it is in the plainland and so very fertile
 - the capital is located here
 - it has agricultural land fed by Stod river

Answer (d)

- Which of the following statements is true ?
 - The Zaskar Valley is a lush green valley
 - The Zaskar Valley has a hot dry weather
 - The Zaskar Valley is visited by foreigners only
 - The Zaskar Valley has rugged and wild beauty

Answer (d)

Q. 6-10. Read the following passage and answer the questions given below :

From the shores of their Scandinavian homeland, between the Baltic and North Sea's. Viking fortune seekers took to the world stage in the mid-eighth century, exploring much of Europe over the next three hundred years. With sleek sailing ships and expert knowledge of rivers and seas, they journeyed to 37 countries, from Afghanistan to Canada. En route they chanced upon more than 50 cultures and traded avidly for luxuries. They donned Eurasian caftans, dressed in silk from China and pocketed heaps of Islamic silver coins. They built thriving cities at Yort and Kiev, colonized large swaths of Great Britain, Iceland, and France, and established outposts in Greenland and North America. No other European seafarers of the day ventured so fearlessly and so far from their homeland as the Vikings. Earlier Scandinavia was wracked by turmoil. Along with three dozen petty kingdoms vying for power and territory, a vast cloud of dust, formed by comets or meteorites smashing into Earth and the eruption of one large volcano, darkened the sun lowering summer temperatures in the Northern Hemisphere. The extended cold and darkness brought death and ruin to Scandinavia setting the stage for the Vikings to set much of Europe on fire with their brand of violence.

Choose the correct answer from the options given below :

- The Vikings started exploring Europe in the middle of

(a) ninth century	(b) eighteenth century
(c) eighth century	(d) nineteenth century

Answer (c)

7. The Vikings could journey to 37 countries by dint of their
- sleek ships and expert knowledge of rivers and seas
 - brave heart and knowledge of rivers and seas
 - knowledge and expertise regarding rivers and seas
 - sleek ships and bravery during turmoil

Answer (a)

8. The Vikings established outpost at North America and
- Afghanistan
 - Canada
 - Greenland
 - France

Answer (c)

9. The turmoil in Scandinavian was caused by
- political strife among kingdoms
 - foreigners invading the kingdoms
 - sudden volcanic eruptions
 - political strife and natural calamities

Answer (d)

10. The Vikings established flourishing cities at
- Great Britain and France
 - York and Kiev
 - Iceland and Kiev
 - Canada and China

Answer (b)

Q. 11-15 Read the passage and answer the questions given below :

Conservation of plant biodiversity for sustainable growth development has been the major concern of all the countries after the Convention of Biological Diversity held in 1992, which provided sovereign rights of the states over their national resources. Being the major staple crop for more than half of the world population, conservation and protection of vast generic of rice has got the top priority in India and also other rice growing countries. Majority of these generic resources were conserved by the local communities throughout the length and breadth of the country and the Government of India rightly recognised them as custodians of these generic resources. The issue of protecting of plant varieties came into focus after the birth of World Trade Organisation (WTO) in 1995. Accordingly, the Protection of Plant Varieties and Farmer's Act was enacted in 2001 by the Government of

India, while recognising the services rendered by Indian farmers and exhaustive privileges and provisions were included in the Act as Farmer's Rights which no other country in the world recognised. Rice with its rich generic repositories and wide adaptability is the only crop that can offer solutions to the daunting goal of curbing hunger. Any threat to the biodiversity in rice is a direct threat to the survival of mankind.

Choose the correct answer from the options given below :

11. The Convention of Biological Diversity recognised
- the absolute claim of the countries on their national resources
 - the nominal rights of the states over their national resources
 - the reservation of rights of more than one country on their national resources
 - the sharing of national resources of participating countries

Answer (a)

12. India was the first country to acknowledge
- the importance of the Convention of Biological Diversity
 - the need for growing more rice for the masses
 - the contributions made by the farmers and their rights
 - the inhuman treatment meted out to rice growing nations

Answer (c)

13. Conservation and protection of different varieties of rice is essential as
- the scientific laboratories find new areas of research which it can give
 - it is the only means of keeping hunger of mass at bay and survival of mankind
 - it can generate more employment of people all over the world
 - a resolution to this effect has been adopted by the World Trade Organisation

Answer (b)

14. The word similar in meaning to 'exhaustive' will be
- exorbitant
 - comprehensive
 - amazing
 - jubilant

Answer (b)

15. 'Sustainable growth' is associated with
- production of more national resources
 - production of more farmland
 - production of more parameters
 - production of more staple crop

Answer (d)

Q. 16 - 17. The following five sentences come from a paragraph. The first and the last sentences are given. Choose the order in which the three sentences (P,Q,R) should appear to complete the paragraph

16. S1. The loss of helium on earth would affect society greatly

S2 _____

S3 _____

S4 _____

S5 There it is blended with nitrogen to mitigate the dangers of inhaling ordinary air under high pressure

P - The element actually has many vital applications in society

Q - Probably the most well-known commercial usage is in airships and blimps

R - But helium is also instrumental in deep-sea diving

Choose from the options given below :

- | | |
|---------|---------|
| (a) PQR | (b) QPR |
| (c) RQP | (d) PRQ |

Answer (a)

17. S1. The word 'megacity' means a city with a population of more than ten million people

S2 _____

S3 _____

S4 _____

S5 Its population has risen to over twenty-four million

P - Tokyo, Japan, is now world's largest megacity

Q - In 1950, New York was the world's only megacity

R - Now there are about thirty megacities, and the number will continue to grow

Choose from the options given below :

- | | |
|---------|---------|
| (a) PQR | (b) RQP |
| (c) QPR | (d) QRP |

Answer (d)

Q. 18-19. The questions have the second sentence missing. Choose the appropriate sentence from the options given below :

P - Humans eat, sleep and play, but also speak, plot, rationalise and debate finer points of morality

Q - _____

R - The power of neocortex comes from its ability to think beyond the present, concrete moment

- These same sensations also cause mammals to develop various types of social relations and kinship networks
- Our unique abilities are the result of an expansive third brain-the neocortex-which engages with logic, reason and ideas
- The neocortex is also responsible for the process by which we decide on and commit to particular courses of action
- The ability to sacrifice our drive for immediate satisfaction in order to benefit later is a product of the neocortex

Answer (b)

19. **P** - It seems, art (that is, graphic art-pictures- and spatial art-sculpture) is divided into two broad categories

Q - _____

R - The second is 'modern' art, also known as abstract or non-representational

- Entirely new forms of art have emerged during the twentieth century
- The two broad categories of art are fine art and the rest
- This category includes those artworks that are created primarily for aesthetic reasons
- The first is 'classic' art, by which is meant representational painting, drawing and sculpture

Answer (d)

Q. 20-29. Choose the word that best fills the blank from the options given :

20. Leather is very much in fashion this season as is the _____ denim

- | | |
|-----------------|----------------|
| (a) auspicious | (b) ubiquitous |
| (c) conspicuous | (d) enormous |

Answer (b)

21. _____ studies show that some forms of alternative medicines are extremely effective.

- | | |
|----------------|------------------|
| (a) imperial | (b) enthusiastic |
| (c) incidental | (d) experimental |

Answer (d)

22. The _____ use of chlorofluorocarbons has depleted the ozone layer to a great extent.

- (a) extended (b) exclusive
(c) exorbitant (d) extensive

Answer (d)

23. The furniture in the old house is to be _____ on the following week.

- (a) audited (b) absorbed
(c) auctioned (d) altered

Answer (c)

24. The little girl _____ her pretty umbrella to flaunt it to her friends.

- (a) undulated (b) undermined
(c) undetected (d) unfurled

Answer (d)

25. Petroleum and natural gas are taken out from deep within the crust through wells by _____.

- (a) digging (b) drawing
(c) dredging (d) drilling

Answer (d)

26. A few dried neem leaves _____ down as a gentle wind began to blow.

- (a) fluttered (b) fluctuated
(c) frustrated (d) flouted

Answer (a)

27. One should not spend an _____ amount of time on one's appearance.

- (a) overwhelming (b) innocuous
(c) inordinate (d) importune

Answer (c)

28. Armed with this terrible weapon he was all but _____ for a time.

- (a) invincible (b) intolerable
(c) indefectible (d) incorrigible

Answer (a)

29. As a nation our _____ of junk food is horrifying.

- (a) acceptance (b) consumption
(c) amount (d) food value

Answer (b)

Q 30-35. Select the meaning of the given phrases/ idioms:

30. Call it a day

- (a) name a particular day
(b) stop working on smething
(c) slow down pace
(d) starting over

Answer (b)

31. Uphill task

- (a) enjoyable task (b) childish task
(c) difficult task (d) tedious task

Answer (c)

32. Red tapism

- (a) official delay (b) gross mistake
(c) daring deed (d) stop work

Answer (a)

33. Null and void

- (a) ineffective (b) insecure
(c) inaudible (d) intentional

Answer (a)

34. On queer street

- (a) in light mood (b) in a strange place
(c) in a wrong place (d) in difficult situation

Answer (d)

35. Once in a blue moon

- (a) happend long ago (b) irregular happening
(c) frequent happening (d) very rare happening

Answer (d)

Q. 36-40. In the following passage there are some numbered blanks. Fill in the blanks by selecting the most appropriate word from the options given below:

_____36_____satellites are man-made objects that orbit the earth. In order to _____37_____satellites into space we need to _____38_____Earth's gravity. This is _____39_____by sending satellites with powerful rockets. There are different types of satellites, each designed for a _____40_____purpose.

36. (a) Electronic (b) Oriental
(c) Astronomical (d) Artificial

Answer (d)

37. (a) land (b) rotate
(c) launch (d) revolve

Answer (c)

38. (a) attack (b) overcome
(c) chase (d) recall

Answer (b)

39. (a) achieved (b) adjusted
(c) administered (d) admitted

Answer (a)

40. (a) general (b) broad
(c) specific (d) commercial

Answer (c)

Q 41-43. Out of the given alternatives, choose the one which can be substituted for the given words:

41. Incapable of being approached
(a) illegible (b) inaudible
(c) invincible (d) inaccessible

Answer (d)

42. A person who hates women
(a) misogynist (b) misogynist
(c) mythologist (d) philanthropist

Answer (a)

43. Misappropriation of money
(a) robbery (b) embezzlement
(c) miscalculation (d) forgery

Answer (b)

Q 44-45. Select the word which means the opposite of the given word :

44. Compliment
(a) insult (b) fulfill
(c) supplement (d) praise

Answer (a)

45. Humble
(a) queer (b) kind
(c) proud (d) simple

Answer (c)

Q 46-47. Select the word which is nearest in meaning to the given word:

46. Ameliorate
(a) obviate (b) alleviate
(c) improve (d) inculcate

Answer (c)

47. Obnoxious
(a) repugnant (b) invigorating
(c) amiable (d) fastidious

Answer (a)

Q 48 - 50. Choose the appropriate phrasal verbs to complete the sentence:

48. You can _____ me to keep your secret.
(a) count down (b) count out
(c) count in (d) count on

Answer (d)

49. The project _____ for want of funds
(a) came round (b) fell through
(c) brought about (d) turned down

Answer (b)

50. Don't _____ me _____, I'm trying to concentrate.
(a) put off (b) put down
(c) putaside (d) put over

Answer (a)



SECTION-III : SCHOLASTIC APTITUDE TEST (SAT)

Mathematics

1. If $ax^2 + bx + c = a(x - p)^2$, the relation among a, b, and c is

- (a) $abc = 1$ (b) $2b = a + c$
 (c) $b^2 = ac$ (d) $b^2 = 4ac$

Answer (d)

Sol. $b^2 = 4ac$, since, repeated factors

2. The identity $\sqrt{(x+4)^2} = x+4$ is possible, when

- (a) $x \leq -4$ (b) $x \geq -4$
 (c) $x \leq -16$ (d) Not possible

Answer (b)

Sol. $x \geq -4$, since square root of a number is always non-negative.

3. The number of real roots of the quadratic equation $3x^2 + 4 = 0$ is

- (a) 0 (b) 2
 (c) 1 (d) 4

Answer (a)

Sol. $x^2 = -\frac{4}{3}, \Rightarrow x = \pm\sqrt{-\frac{4}{3}}$, which is imaginary

4. The solution of the equation $9^x + 6^x = 2.4^x$

- (a) 0 (b) 1
 (c) ± 2 (d) -1

Answer (a)

Sol. Let $3^x = p, 2^x = q$

$$\therefore 9^x + 6^x = 2.4^x$$

$$\Rightarrow p^2 + pq = 2q^2 \Rightarrow (p - q)(p + 2q) = 0$$

$$\therefore p - q = 0 \quad [p \neq -2q]$$

$$\Rightarrow 3^x - 2^x = 0$$

$$\Rightarrow x = 0$$

5. If $f(x) = 2x^3 - 3x + 4$, the value of $f(x) + f(-x)$ is

- (a) 4 (b) 6
 (c) 0 (d) 8

Answer (d)

Sol. $f(x) + f(-x)$

$$= 2x^3 - 3x + 4 + (-2x^3 + 3x + 4)$$

$$= 8$$

6. If $\frac{x^2}{by+cz} = \frac{y^2}{cz+ax} = \frac{z^2}{ax+by} = 2$, the value of

$$\frac{c}{2c+z} + \frac{b}{2b+y} + \frac{a}{2a+x} \text{ is}$$

- (a) 2 (b) $\frac{1}{2}$
 (c) 4 (d) $\frac{1}{4}$

Answer (b)

Sol. $\frac{c}{2c+z} + \frac{b}{2b+y} + \frac{a}{2a+x}$

$$= \frac{cz}{2cz+z^2} + \frac{by}{2by+y^2} + \frac{ax}{2ax+x^2}$$

$$= \frac{cz}{2cz+2ax+2by} + \frac{by}{2by+2cz+2ax} + \frac{ax}{2ax+2by+2cz}$$

$$= \frac{ax+by+cz}{2(ax+by+cz)} = \frac{1}{2}$$

7. If $\log_4[\log_4\{\log_4(\log_4 x)\}] = 0$, 'x' is equal to

- (a) 256 (b) 4^{16}
 (c) 2^{512} (d) 256^4

Answer (d)

Sol. $\log_4[\log_4\{\log_4(\log_4 x)\}] = 0$

$$\Rightarrow \log_4\{\log_4(\log_4 x)\} = 1$$

$$\Rightarrow \log_4(\log_4 x) = 4$$

$$\Rightarrow \log_4 x = 4^4$$

$$\Rightarrow x = (256)^4$$

8. If $x^2 + y^2 = z^2$, the value of $\frac{1}{\log_{z-y} x} + \frac{1}{\log_{z+y} x}$ is

- (a) x (b) y
 (c) $x + y$ (d) 2

Answer (d)

Sol. $\frac{1}{\log_{z-y} x} + \frac{1}{\log_{z+y} x}$

$$= \log_x(z-y) + \log_x(z+y)$$

$$= \log_x(z^2 - y^2) = \log_x x^2 = 2$$

9. If $(x + 2)$ and $(2x - 1)$ are factors of $(2x^3 + ax^2 + bx + 10)$, the value of $(a^2 + b^2)$ is
 (a) 338 (b) 218
 (c) 74 (d) 198

Answer (a)

Sol. $f(-2) = 0$

$$\Rightarrow 2a - b = 3$$

$$f\left(\frac{1}{2}\right) = 0 \Rightarrow a + 2b = -41$$

$$\therefore a = -7, b = -17$$

$$\text{and } a^2 + b^2 = 338$$

10. If $a + b = 2c$, the value of $\frac{a}{a-c} + \frac{b}{b-c}$ is

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

Answer (c)

Sol. $a + b = 2c$

$$\Rightarrow a - c = c - b$$

$$\therefore \frac{a}{a-c} + \frac{b}{b-c} = \frac{a}{b-c} + \frac{b}{b-c}$$

$$= \frac{b-a}{b-c} = \frac{b-(2c-b)}{b-c}$$

$$= \frac{2(b-c)}{(b-c)} = 2$$

11. The compound interest for two years of the amount Rs. 75000 at the rate of 8% per annum would be
 (a) Rs. 1,248 (b) Rs. 1,260
 (c) Rs. 1,300 (d) Rs. 1,352

Answer (a)

Sol. $CI = 7500 \left(1 + \frac{8}{100}\right)^2 - 7500$

$$= \text{Rs. } 1248$$

12. A businessman fixed the selling price of an article after increasing the cost price by 40%. Then he allowed his customer a discount of 20% and gained Rs. 48. The cost price of the article is
 (a) Rs. 200 (b) Rs. 248
 (c) Rs. 400 (d) Rs. 448

Answer (c)

Sol. Let CP = x

$$SP = \frac{7x}{5}$$

$$\text{Price after discount} = \frac{7x}{5} - 20\% \text{ of } \frac{7x}{5}$$

$$= \frac{28x}{25}. \text{ Gain} = 48$$

$$\Rightarrow \frac{28x}{25} - x = 48 \Rightarrow \frac{3x}{25} = 48$$

$$\Rightarrow x = \text{Rs. } 400$$

13. The curved surface area of a right circular cylinder and that of a sphere are equal. If their radii are equal, the ratio of their volume is

- (a) 3 : 2 (b) 2 : 3
 (c) 3 : 4 (d) 4 : 3

Answer (a)

Sol. $2\pi rh = 4\pi r^2$

$$\Rightarrow h = 2r$$

$$\frac{\text{Vol. of cylinder}}{\text{Vol. of sphere}} = \frac{\pi r^2 h}{\frac{4}{3}\pi r^3} = \frac{\pi r^2 (2r)}{\frac{4}{3}\pi r^3} = \frac{3}{2}$$

14. The sum of the length, breadth and height of a rectangular parallelepiped is 15 cm and its whole surface area is 264 sq. cm. The area of the square whose sides are equal to the length of the diagonal of that parallelepiped is

- (a) 256 sq. cm. (b) 361 sq. cm.
 (c) 225 sq. cm. (d) 324 sq. cm.

Answer (b)

Sol. $\ell + b + h = 25$

$$2(\ell b + bh + \ell h) = 264$$

$$\ell + b + h = 25$$

$$\Rightarrow (\ell + b + h)^2 = 25^2$$

$$\Rightarrow \ell^2 + b^2 + h^2 + 2(\ell b + bh + \ell h) = 625$$

$$\Rightarrow \ell^2 + b^2 + h^2 + 264 = 625$$

$$\Rightarrow \ell^2 + b^2 + h^2 = 361$$

$$\text{Length of diagonal} = \sqrt{\ell^2 + b^2 + h^2}$$

$$\therefore \text{Area} = \left(\sqrt{\ell^2 + b^2 + h^2}\right)^2 = \ell^2 + b^2 + h^2 = 361$$

15. The radii of two circles with center at A and B are 11 cm and 6 cm respectively. If PQ is the common tangent of the circles and AB = 13 cm, length of PQ is

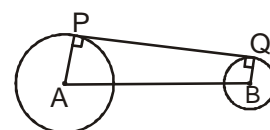
- (a) 13 cm (b) 12 cm
 (c) 17 cm (d) 8.5 cm

Answer (b)

Sol. $AB^2 = PQ^2 + (r_1 - r_2)^2$

$$169 = PQ^2 + 25$$

$$PQ = 12 \text{ cm}$$



16. The chords PQ and RS of a circle are extended to meet at the point O. If PQ = 6 cm, OQ = 8 cm, OS = 7 cm, then RS =

- (a) 12 cm (b) 9 cm
 (c) 10 cm (d) 16 cm

Answer (b)

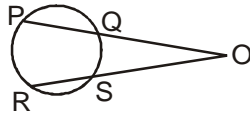
Sol. We know

$$OQ \times OP = OS \times OR$$

$$8 \times 14 = 7 \times OR$$

$$OR = 16 \text{ cm}$$

$$\therefore RS = 9 \text{ cm}$$



17. ABC is a right angled triangle and AD is perpendicular to the hypotenuse BC. If AC = 2 AB, then BC =

- (a) 2 BD (b) BD
 (c) 5 BD (d) 4 BD

Answer (c)

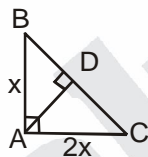
Sol. $\triangle ABC \sim \triangle DBA$

$$\therefore \frac{AB}{BD} = \frac{AC}{AD} \Rightarrow BD = \frac{AD}{2}$$

and $\triangle ABC \sim \triangle DAC$

$$\frac{AB}{AD} = \frac{AC}{DC}, \quad DC = 2AD$$

$$\therefore BC = \frac{5AD}{2} = 5BD$$



18. $(x+2)$, x and $(x-1)$ are the frequencies of the numbers 12, 15 and 20 respectively. If the mean of the distribution is 14.5, the value of x is

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

Answer (b)

Sol.
$$\frac{12(x+2) + 15x + 20(x-1)}{3x+1} = \frac{29}{2}$$

$$\Rightarrow x = 3$$

19. If two angles of a triangle are $87^\circ 24' 54''$ and $32^\circ 31' 6''$, the third angle is

- (a) $\frac{\pi}{6}$ (b) $\frac{\pi}{2}$
 (c) $\frac{\pi}{3}$ (d) $\frac{\pi}{4}$

Answer (c)

Sol. Third angle $x = 180^\circ (87^\circ 24' 54'' + 32^\circ 31' 6'')$

$$= 60^\circ 4'$$

$$= \frac{\pi}{3} \text{ (approx)}$$

20. If $x \sin^3 \alpha + y \cos^3 \alpha = \sin \alpha \cos \alpha$ and $x \sin \alpha - y \cos \alpha = 0$, the value of $x^2 + y^2$ is

- (a) 0 (b) 1
 (c) $\frac{1}{2}$ (d) $\frac{1}{3}$

Answer (b)

Sol. $x \sin \alpha = y \cos \alpha$

$$y \cos \alpha \cdot \sin^2 \alpha + y \cos^3 \alpha = \sin \alpha \cdot \cos \alpha$$

$$y = \sin \alpha$$

$$\therefore x = \cos \alpha$$

$$x^2 + y^2 = 1$$

Physics

21. Two particles of masses m_1 and m_2 are allowed to fall freely from height h_1 and h_2 . They reach the ground at time t_1 and t_2 respectively. Then

- (a) $\frac{t_1}{t_2} = \sqrt{\frac{h_1}{h_2}}$ (b) $\frac{t_1}{t_2} = \sqrt{\frac{h_2}{h_1}}$
 (c) $\frac{t_2}{t_1} = \frac{h_2}{h_1}$ (d) $\frac{t_2}{t_1} = \frac{h_1}{h_2}$

Answer (a)

Sol. $t_1 = \sqrt{\frac{2h_1}{g}} \quad t_2 = \sqrt{\frac{2h_2}{g}} \quad \frac{t_1}{t_2} = \sqrt{\frac{h_1}{h_2}}$

22. Position of a particle moving along x-axis is given by $x = 3t - 4t^2 + t^3$, where x is in metre and t is in second. Find the average velocity of the particle in the time interval from $t = 2$ second to $t = 4$ second.

- (a) 7 m/s (b) 1 m/s
 (c) 13 m/s (d) 5 m/s

Answer (a)

Sol. $x_i (t=2) = 6 - 4 \times 4 + 8 = -2$

$$x_f (t=4) = 12 - 64 + 64 = 12$$

$$\Delta x = x_f - x_i = 14$$

$$v_{\text{avg}} = \frac{\Delta x}{\Delta t} = \frac{14}{2} = 7$$

23. A lightwave of certain frequency moves from air to glass, then its
- wavelength does not change
 - frequency does not change but wavelength changes
 - frequency changes
 - frequency and wavelength both changes

Answer (b)

24. In an atomic reactor, which of the following is used as fuel?
- H^1
 - H^2
 - D_2O
 - U^{235}

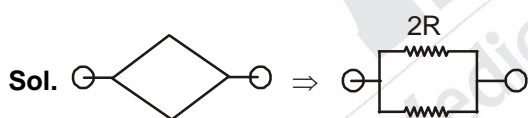
Answer (d)

25. The linear momentum p of a body having mass m is given by
- $p = \sqrt{2mE}$
 - $p = \sqrt{\frac{E}{2m}}$
 - $p = \sqrt{\frac{2m}{E}}$
 - $p = \frac{E^2}{2m}$

Answer (a)

26. What is the equivalent resistance between any two opposite corner points of a quadrilateral, if the sides of the quadrilateral are of equal resistance R ?
- $3R$
 - $2R$
 - R
 - $\frac{2R}{3}$

Answer (c)



27. Two electrodes are maintained at a potential difference of 50V. An electron moving from cathode to anode gains kinetic energy equal to
- 50×10^{-19} erg
 - 50 Joule
 - 80×10^{-19} Joule
 - 80 erg

Answer (c)

Sol. $\Delta k = qv$
 $= 1.6 \times 10^{-19} \times 50$
 $= 80 \times 10^{-19}$

28. What will be the power consumed by a 50Ω wire if it is kept across a potential difference of 200 V?
- 0.8 kW
 - 80 kW
 - 400 kW
 - 0.4 kW

Answer (a)

Sol. $p = \frac{v^2}{R} = \frac{(200)^2}{50}$

29. The Th_{90}^{232} atom undergoes successive α and β decays to the end product Pb_{82}^{208} . The number of α and β particles emitted in the process respectively are
- 4, 6
 - 4, 4
 - 6, 6
 - 6, 4

Answer (d)

232
Sol. $\frac{-208}{24} \Rightarrow 6 \alpha$ particle

- $90 - 6 \times 2 = 78$ $78 + 4 = 82$
30. A particle is executing simple harmonic motion. If its amplitude of vibration increases by 20%, what will be increase of its total mechanical energy?
- 44 %
 - 21 %
 - 20 %
 - 10 %

Answer (a)

Sol. $E \propto A^2$
 $E_1 = KA^2$
 $E_2 = K(1.2A)^2$
 $E_2 = 1.44 KA^2$
 $\frac{E_2 - E_1}{E_1} \times 100 = 44$

31. When a body is orbiting near the surface of the earth, what will be the ratio of its orbital velocity to the escape velocity from earth?
- $1 : \sqrt{2}$
 - $\sqrt{2} : 1$
 - 2:1
 - 1:2

Answer (a)

Sol. $v_0 = \sqrt{\frac{GM}{R}}$ $v_e = \sqrt{\frac{2GM}{R}}$ $v_e = \sqrt{2} v_0$

32. How many times is the root mean square velocity of hydrogen gas molecules compared to the root mean square velocity of oxygen molecules? [Conditions remaining same]
- 16
 - 8
 - 4
 - 2

Answer (c)

Sol. $v_{rms} = \sqrt{\frac{3RT}{M}}$, $v_{H_2} = \sqrt{\frac{3RT}{2}}$

$$v_{O_2} = \sqrt{\frac{3RT}{32}} = \frac{1}{4} \sqrt{\frac{3RT}{2}} \quad v_{O_2} = \frac{1}{4} v_{H_2}$$

33. For the definite colour of light absolute refractive index of water is $4/3$ and absolute refractive index of glass is $3/2$, then what will be the refractive index of glass with respect to water?

- (a) 1.125 (b) 1.33
(c) 1.56 (d) 2

Answer (a)

Sol. $\mu_{rel} = \frac{3 \times 3}{2 \times 4} = \frac{9}{8}$

Chemistry

34. Chlorine atom does not differ from the chloride ion in which of the following context ?

- (a) Electron (b) Volume
(c) Proton (d) Chemical reactivity

Answer (c)

Sol. Cl and Cl^- contain same number of proton

35. Which one of the following statements is applicable regarding the number of bonds and the nature of bonds between two carbon atoms in CaC_2 compound ?

- (a) One Sigma (σ) bond and one Pi(π) bond
(b) One Sigma (σ) bond and two Pi(π) bond
(c) One Sigma (σ) bond and one half Pi(π) bond
(d) One Sigma bond

Answer (b)

Sol. CaC_2 : $Ca^{2+} [C \equiv C]^{2-}$, contains one sigma bond and two π bonds

36. 10^{-3} mole of KOH is added to 10 litres of pure water at $25^\circ C$. The pH will change by (assume no change in volume occurs)

- (a) 3 (b) 4
(c) 7 (d) 11

Answer (a)

Sol. concentration of $[OH^-] = \frac{10^{-3} \text{ mol}}{10 \text{ L}} = 10^{-4} \text{ mol/L}$

$$pOH = -\log[OH^-] = -\log 10^{-4} = 4,$$

$$pH = 14 - 4 = 10$$

$$\text{change in pH} = 10 - 7 = 3$$

37. Formula of a metallic oxide is M_2O_3 . Upon reduction with hydrogen the metallic oxide gives pure metal and water. 0.112 gm metal is produced by 6 mg of hydrogen after complete reduction. Atomic mass of the metal is

- (a) 28 (b) 160
(c) 56 (d) 8

Answer (c)

Sol. $\therefore 6 \times 10^{-3} \text{ g } H_2$ reduces 0.112 metal

$$\therefore 1 \text{ g } \dots\dots \frac{0.112}{6 \times 10^{-3}} = \frac{112 \times 10^{-3}}{6 \times 10^{-3}} = \frac{56}{3} \text{ g}$$

$$\text{Equivalent mass} = \frac{56}{3} \text{ g}$$

Valency of metal = 3,

Atomic mass = equivalent mass \times valency

$$= \frac{56}{3} \times 3 = 56$$

38. Which of the following group below represents a set of isoelectronic species ?

- (a) N^{3-} , F^- , Na^+ (b) Na^+ , Ca^{2+} , Mg^{2+}
(c) Be , Al^{3+} , Cl^- (d) K^+ , Na^+ , Al^{3+}

Answer (a)

Sol. All ions contain 10 electrons. These are isoelectronic (Having same number of electron)

39. Concentrated aqueous solution of sodium hydroxide is used for separation of pairs of radicals

- (a) Al^{3+} and Sn^{2+} (b) Al^{3+} and Fe^{3+}
(c) Al^{3+} and Zn^{2+} (d) Mg^{2+} and Pb^{2+}

Answer (d)

Sol. option (a) : Both Al^{3+} and Sn^{2+} dissolve in conc. aq. solution of NaOH

option (b) : Al^{3+} is soluble in conc. NaOH Fe^{3+} forms a brown precipitate which has an actual composition of $FeO(OH)$. This hydrous oxide is soluble in strong base

option (c) : Both Al^{3+} and Zn^{2+} are soluble in NaOH

option (d) : Mg^{2+} forms $Mg(OH)_2$ precipitate Pb^{2+} dissolves forming Na_2PbO_2

40. 10 ml of an aqueous solution contains 222 mg dissolved $CaCl_2$ (molecular weight = 111). What will be the concentration of chloride ion in the resulting solution when it is diluted to 100 ml ?

- (a) 0.02 Mole/Lit (b) 0.01 Mole/Lit
(c) 0.04 Mole/Lit (d) 2.0 Mole/Lit

Answer (c)

Sol. Number of moles of $\text{CaCl}_2 = \frac{222 \times 10^{-3}}{111} = 2 \times 10^{-3}$

moles



1mole 1mole 2mole

2×10^{-3} 2×10^{-3} 4×10^{-3} moles

∴ concentration of $[\text{Cl}^-] =$

$$\frac{4 \times 10^{-3} \times 1000}{100} = 4 \times 10^{-2} \text{ mole/litre} = 0.04$$

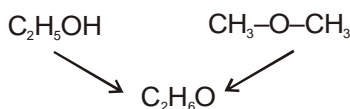
mole/litre

41. Among ethanol, Dimethyl ether, Methanol and propanal the isomers are

- (a) Ethanol, Dimethyl ether, Methanol and Propanal
(b) Ethanol and Methanol
(c) Ethanol and Dimethyl ether
(d) Ethanol and Propanal

Answer (c)

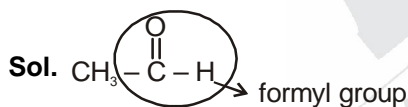
Sol. Ethanol and Dimethyl ether



42. Which molecule of the following compounds contain formyl radical ?

- (a) Acetone (b) Acetaldehyde
(c) Acetic Acid (d) Acetic anhydride

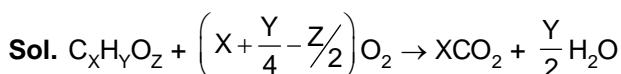
Answer (b)



43. The quantity of oxygen required for complete combustion of 1 mole of an organic compound $\text{C}_x\text{H}_y\text{O}_z$ is

- (a) $\left(x + \frac{y}{2}\right)$ moles (b) $\left(x + \frac{y}{4}\right)$ moles
(c) $\left(x + \frac{y}{4} - \frac{z}{2}\right)$ moles (d) $(x+y+z)$ moles

Answer (C)



$$1 \text{ mol } \text{C}_x\text{H}_y\text{O}_z \equiv \left(x + \frac{y}{4} - \frac{z}{2}\right) \text{ mol}$$

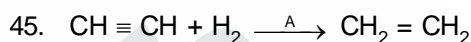
44. Which of the following pairs have identical values of e/m ?

- (a) A proton and a neutron
(b) A deuterium and an α particle
(c) An electron and γ rays
(d) A proton and a deuterium

Answer (b)

Sol. [question is wrong, but the possible answer may be -]

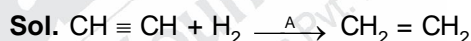
$${}^2_1\text{D}^+ \quad {}^4_2\alpha^{++}, \text{ e/m ratio} = \frac{1}{2} = 1:2 \quad \frac{2}{4} = 1:2$$



'A' in this reaction is

- (a) Ni/250°C
(b) Raney Ni/Normal temperature
(c) Pd/BaSO₄ Quinoline
(d) Pd/Normal temperature

Answer (c)

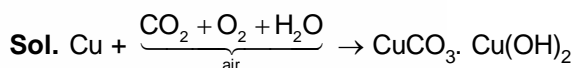


(Pd/BaSO₄ - Lindlar's catalyst)

46. Container made of Copper metal on exposure to air for longtime turns green. The green layer is due to

- (a) CuO (b) CuCO₃, Cu(OH)₂
(c) CuSO₄, 3Cu(OH)₂ (d) All of the above

Answer (b)



[Basic copper carbonate is green]

Biology

47. During ventricular systole

- (a) Atrial systole occur
(b) The atrio-ventricular valves are closed
(c) The pressure inside the ventricles is less than atria
(d) The mitral valve is closed

Answer (b)

Sol. Both AV-valves will close due to high inter-ventricular pressure

48. Match the words in *column I* with those which are most appropriate in *column II*

Column I

- (A) Karyokinesis
- (B) Cytokinesis
- (C) Meiosis
- (D) Cell plate

Column II

- 1. Meiocytes
- 2. Plant cell
- 3. Nuclear division
- 4. Cytoplasmic division

- (a) A = 1, B = 2, C = 3, D = 4
- (b) A = 2, B = 1, C = 4, D = 3
- (c) A = 3, B = 4, C = 1, D = 2
- (d) A = 4, B = 3, C = 2, D = 1

Answer (c)

49. Exine and intine are the parts of

- (a) Stigma
- (b) Seed
- (c) Embryo sac
- (d) Pollen grain

Answer (d)

Sol. Outer wall of pollen grain is exine and inner wall is intine

50. Transpiration will be fastest when the day is

- (a) cool, windy and humid
- (b) hot, humid and windy
- (c) hot, dry and windy
- (d) hot, humid and still wind

Answer (c)

Sol. Rate of transpiration is high when evaporation is favoured i.e. on a hot, windy day when humidity is low

51. A basket of vegetables contains carrot, potato, tomato and radish. Which of them represent the correct homologous structures?

- (a) carrot and radish
- (b) carrot and tomato
- (c) tomato and radish
- (d) potato and tomato

Answer (a)

Sol. Carrot and radish both are modified roots; so same origin → homologous

52. What type of teeth are absent in case of baby?

- (a) Incisor
- (b) Canine
- (c) Pre-molar
- (d) Molar

Answer (c)

Sol. Dental formula in baby: $I \frac{2}{2} C \frac{1}{1} Pm \frac{0}{0} M \frac{2}{2}$

53. When ATP is converted into ADP, it releases

- (a) Hormone
- (b) Secretion
- (c) Enzyme
- (d) Energy

Answer (d)

54. Which stage of *Plasmodium* is present in the salivary gland of female mosquito?

- (a) Sporozoite
- (b) Merozoite
- (c) Gametocyte
- (d) Ookinete

Answer (a)

Sol. Sporozoite is the infective stage for humans

55. In a plant, red fruit (R) is dominant over yellow fruit (r) and tallness (T) is dominant over dwarf (t). If a plant with RRTt is crossed with a plant with rrtt, then

- (a) 75% will be tall with red fruit
- (b) 100% will be tall with red fruit
- (c) 25% will be tall with red fruit
- (d) 50% will be tall with red fruit

Answer (d)

Sol. RRTt × rrtt



	rt	rt
RT	RrTt	RrTt
Rt	Rrtt	Rrtt

Thus 50% plants are tall with red fruit and 50% are dwarf with red fruits.

56. Match the words in *column I* with those which are most appropriate in *column II*.

Column-I

Column-II

- (A) *Hydra*
 - (B) *Amoeba*
 - (C) *Mucor*
 - (D) *Planaria*
- 1. Binary fission
 - 2. Spore
 - 3. Budding
 - 4. Regeneration

- (a) A = 4, B = 1, C = 3, D = 2
- (b) A = 3, B = 1, C = 2, D = 4
- (c) A = 2, B = 3, C = 4, D = 1
- (d) A = 1, B = 4, C = 3, D = 2

Answer (b)

57. A person has damaged central nervous system due to continuous intake of metal contaminated water, the metal is

- (a) Mercury
- (b) Calcium
- (c) Sodium
- (d) Lead

Answer (d)

Sol. Lead affects CNS; Mercury mostly enters as methyl mercury which is unable to cross blood-brain barrier

58. Difference between DNA and RNA by
- Nitrogen base and sugar
 - Nitrogen base and phosphate group
 - Number of carbon atom in sugar
 - Sugar and Phosphate

Answer (a)

Sol. Sugar for DNA is deoxyribose and for RNA it is ribose. DNA has Thymine, but RNA has uracil

59. The middle layer of three layers of meninges
- Dura matter
 - Pia matter
 - Arachnoid membrane
 - Sub-arachnoid space

Answer (c)

60. Which one of the following hormones is not produced from anterior lobe of pituitary gland?

- GH
- ADH
- ACTH
- TSH

Answer (b)

Sol. ADH is released from posterior pituitary

History

61. "Imperialism: The Highest stage of Capitalism" was written by

- Lenin
- Stalin
- Karl Marx
- Rousseau

Answer (a)

62. 24th October, 1929 was marked as "Black Thursday" in U. S. A. because

- Terrorist Attack
- Natural Calamity
- Great Depression
- Change in Political aspect

Answer (c)

63. During the period of Russian Revolution the Russian ruler was

- Czar Alexander-I
- Czar Alexander-II
- Czar Nicholas-I
- Czar Nicholas-II

Answer (d)

64. "Flying Shuttle" was invented by

- James Hargraves
- Edmund Cartwright
- James Watt
- John Kay

Answer (d)

65. "Mein Kampf" was written by

- Hitler
- Mussolini
- Lenin
- Stalin

Answer (a)

66. The country which did not join the League of

Nations:

- America
- France
- Italy
- Japan

Answer (a)

67. Present name of General Assembly's Institution is

- Hindu School
- Scottish Church College
- Loreto House
- St. Xavier's College

Answer (b)

68. The first Chancellor of Calcutta University was

- Lord Canning
- Lord Dalhousie
- James William Colville
- Sir Ashutosh Mukherjee

Answer (a)

69. Sardar Ballavbhai Patel was known as

- Saviour of India
- Modern Man of India
- Iron Man of India
- Mechiavelli of India

Answer (c)

70. 'Communal Awards' (1932) in India was declared by

- Lord Irwin
- Ramsay Macdonald
- Md. Ali Jinnah
- Lord Mountbatten

Answer (b)

71. Pahartali European Club was attacked in 1932 by

- Kalpona Dutta
- Bina Das
- Pritilata Waddedar
- Lila Nag

Answer (c)

72. "All India Trade Union Congress" (AITUC) was formed in

- 1915 AD
- 1920 AD
- 1922 AD
- 1928 AD

Answer (b)

Geography

73. Augite metamorphosed to

- Horn blande
- Pyroclastic
- Brecia
- Pegmatite

Answer (a)

74. 'Busket of Egg topography' is a common feature of

- River deposition
- Wind deposition
- Glacial erosion
- Glacial deposition

Answer (d)

75. Widest waterfall of world is
 (a) Khone waterfall of Laos
 (b) Salto Angel of Veneguella
 (c) Niagra of U.S.A
 (d) Stanley waterfall of Congo

Answer (c)

76. 'Cyclone' or 'Anti-cyclone' is a
 (a) Trade wind (b) Periodical wind
 (c) Sudden wind (d) Local wind

Answer (c)

77. Benguela Current flows along the coast of
 (a) California (b) South-West Africa
 (c) Peru (d) East Greenland

Answer (b)

78. Coromandel coastal plain is located at
 (a) Kerala state (b) Karnataka state
 (c) Tamilnadu state (d) Maharashtra state

Answer (c)

79. Among these regions _____ is under Tropical Monsoon climate.
 (a) Canada (b) India
 (c) Guinea (d) Argentina

Answer (b)

80. UNESCO has registered Sundarban as 'World Heritage Site' in the year
 (a) 1978 (b) 1979
 (c) 1986 (d) 1987

Answer (d)

81. Which state of India ranks first as per hectare production?
 (a) Punjab (b) West Bengal
 (c) Uttar Pradesh (d) Andhra Pradesh

Answer (a)

82. 'White Revolution' is related with
 (a) Milk production
 (b) Paper production
 (c) Egg production
 (d) Non-Conventional energy sources

Answer (a)

83. In India the Metro Rail starts for the first time in
 (a) Delhi (b) Mumbai
 (c) Kolkata (d) Bengaluru

Answer (c)

84. Which of the following satellites are launched from India?

- (a) LANDSAT (b) SPOT
 (c) GOMs (d) IRS

Answer (d)

Political Science

85. "Political Science begins and ends with the State", is stated by
 (a) Gettel (b) Gamer
 (c) Seeley (d) Aristotle

Answer (b)

86. How many members in the Lok Sabha can be nominated by the President of India?
 (a) 2 (b) 3
 (c) 4 (d) 5

Answer (a)

87. Joint Session of the Indian Parliament is presided over by the
 (a) Vice-President (b) Speaker
 (c) Governor (d) President

Answer (b)

88. In Indian Parliamentary system of government the Council of Ministers is responsible to
 (a) President (b) Prime Minister
 (c) Parliament (d) Supreme Court

Answer (c)

89. In modern times Direct Democracy is existed in
 (a) India (b) Britain
 (c) France (d) Switzerland

Answer (d)

90. The World Trade Organisation was established in the year
 (a) 1990 (b) 1991
 (c) 1994 (d) 1995

Answer (d)

91. The number of permanent members of the Security Council of United Nations are
 (a) 5 (b) 7
 (c) 8 (d) 10

Answer (a)

92. The United Nations Organisation was established in
 (a) 1945 (b) 1941
 (c) 1947 (d) 1950

Answer (a)

Economics

93. If national income increases at a higher rate than population the per capita income
- (a) increases
 - (b) decreases
 - (c) remains same
 - (d) may increase or decrease

Answer (a)

94. To control the situation of deflation it is necessary to
- (a) increase the demand for bank loan
 - (b) decrease the demand for bank loan
 - (c) decrease the purchasing power of the people
 - (d) increase national saving

Answer (a)

95. Economic rent is the price paid for the use of
- (a) land only
 - (b) scarce resources
 - (c) machinery only
 - (d) building only

Answer (a)

96. Which of the following is not a factor of production?
- (a) Money
 - (b) Land
 - (c) Labour
 - (d) Capital

Answer (a)

97. The main aim of _____ programme was to provide employment of 100 days per year to one member of rural family
- (a) TRYSEM
 - (b) IRDP
 - (c) NREGS
 - (d) JGSY

Answer (c)

98. The expenditure of government for payment of government employees is expenditure on _____ account
- (a) revenue
 - (b) capital
 - (c) development
 - (d) investment

Answer (a)

99. Which of the following is not a public goods?
- (a) Roads and bridges
 - (b) Administration
 - (c) Food products
 - (d) Defence

Answer (c)

100. If the value of domestic currency falls in terms of foreign currency then
- (a) import payment will increase and export earnings will also increase
 - (b) import payment will fall and export earnings will also fall
 - (c) import payment will increase and export earnings will fall
 - (d) import payment will fall and export earnings will increase

Answer (c)

