NATIONAL TALENT SEARCH EXAMINATION
(NTSE-2019) STAGE -1 [PAPER CODE :]
STATE : UTTARAKHAND PAPER : SAT

Date: 04-11-2018

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

1. 'Kolkhoz' were

(A) Collective Farms (B) War Ships (C) Confiscated land (D) Quarters for workers

Ans. ***(A)***

Sol. 'Kolkhoz' were- Collective Farms

2. The Nuremberg tribunal was set up to

(A) prosecute the Bolsheviks (B) prosecute Tsar Nicholas Il

(C) prosecute Nazi war criminals (D) prosecute the Jews.

Ans. ***(C)***

Sol. The Nuremberg tribunal was set up to prosecute Nazi war criminals

3. "Dawes Plan" was introduced by-

(A) France (B) Italy (C) Russia (D) U.S.A.

Ans. ***(D)***

Sol. "Dawes Plan" was introduced by U.S.A.

4. Who used to live in 'Ghettos'?

(A) The Nazis (B) The Jews (C) The Landlords (D) The Workers

Ans. ***(B)***

Sol. The Jews used to live in 'Ghettos'

5. Who followed the 'Scorched Earth policy' -

(A) The Japanese (B) The French (C) The Dutch (D) The Kalangs

Ans. ***(D)***

Sol. The Kalangs followed the 'Scorched Earth policy' -

6. Who once remarked, " When France sneezes, the rest of Europe catches cold."

(A) Bismark (B) Napoleon (C) Metternlch (D) Hitler

Ans. ***(C)***

Sol. Metternlch once remarked, " When France sneezes, the rest of Europe catches cold."

7. Who led the famous 'Expedition of the Thousand' -

(A) Mazzini (B) Garibaldi (C) Cavour (D) Victor Emmanuel II

Ans. ***(B)***

Sol. Garibaldi led the famous 'Expedition of the Thousand'.

8. Who was instrumental in setting up of 'Awadh Kisan Sabha'

(A) Jawahar Lal Nehru (B) Deen Bandhu Andrews

(C) Govind BaIlabh Pant (D) Rajendra Prasad

Ans. ***(A)***

Sol. Jawahar Lal Nehru was instrumental in setting up of 'Awadh Kisan Sabha'

9. Who painted the famous painting of Bharat Mata -

(A) Dwarka Nath Tagore (B) Ravindra Nath Tagore

(C) Abanindra NathTagore (D) Raja Ravi Verma

Ans. ***(C)***

Sol. Abanindra NathTagore painted the famous painting of Bharat Mata -

10. The Bretton Woods twins are called-

(A) The WTO and The UNESCO (B) The UNO and The UNICEF

(C) The IMF and The World Bank (D) The WHO and The UNICEF

Ans. ***(C)***

Sol. The Bretton Woods twins are called - The IMF and The World Bank

11. Match the Column A with Column B and choose the correct option

Column-A	Column-B
(I) Rousseau	(a) Two Treatises of Government
(II) Montesquieu	(b) Marseillaise
(III) Locke	(c) The Social Contract
(IV) Roget de Lisle	(d) The Spirit of the Laws

	(I)	(II)	(III)	(IV)
(A)	d	c	b	a
(B)	b	a	d	c
(C)	c	d	a	b
(D)	d	a	c	b

Ans. ***(C)***

Sol. (I) Rousseau - (c) The Social Contract

(II) Montesquieu - (d) The Spirit of the Laws

(III) Locke - (a) Two Treatises of Government

(IV) Roget de Lisle - (b) Marseillaise

12. Match the Column A with Column B and choose the correct option-

Column A	Column B
I) Zoilverein	(a) Dynasty
II) Germania	(b) Secret Society
III) Carbonari	(c) Allegory
IV) Bourbon	(d) Customs Union

	(I)	(II)	(III)	(IV)
(A)	c	b	d	a
(B)	b	a	d	c
(C)	c	a	d	b
(D)	d	c	b	a

Ans. ***(D)***

Sol. I) Zoilverein - (d) Customs Union

II) Germania - (c) Allegory

III) Carbonari - (b) Secret Society

IV) Bourbon - (a) Dynasty

13. Who appoints Chief Election Commissioner of India -

(A) The Chief Justice of India (B) The Governor

(C) President (D) The Prime Minister

Ans. ***(C)***

Sol. President appoints Chief Election Commissioner of India.

14. Which Country is not a permanent member of the UN Security Council -

(A) Chine (B) Japan (C) Russia (D) France

Ans. ***(B)***

Sol. Japan Country is not a permanent member of the UN Security Council.

15. Community Government is in -

(A) India (B) Sri Lanka (C) Britain (D) Belgium

Ans. ***(D)***

Sol. Community Government is in - Belgium

16. Match the Column A with Column B and choose the correct option

Column-A	Column-B
I) Seven Party Alliance	(a) Bolivia
Il) Water War	(b) Kenya
lii) The Green Belt Movement	(c) Indonesia
IV) No land, No Vote	(d) Nepal

	(I)	(II)	(III)	(IV)
(A)	c	d	b	a
(B)	b	a	d	c
(C)	c	b	a	d
(D)	d	a	b	c

Ans. ***(D)***

Sol. I) Seven Party Alliance - (d) Nepal

Il) Water War - (a) Bolivia

lii) The Green Belt Movement - (b) Kenya

IV) No land, No Vote - (c) Indonesia

17. Which team was defeated in semifinal by winner of FIFA world cup 2018, France-

(A) Croatia (B) England (C) Belgium (D) Russia

Ans. ***(C)***

Sol. Belgium team was defeated in semifinal by winner of FIFA world cup 2018, France.

18. Match the Column 'A' with Column 'B' and choose the correct option-

Column A	Column B
I) Augusto Pinochet	(a) Poland
Il) Lech Walesa	(b) Ghana
Ill) Aung San Suu Kyi	(c) Chile
IV) KwameNkrumah	(d) Myanmar

	(I)	(II)	(III)	(IV)
(A)	d	c	b	a
(B)	a	b	c	d
(C)	c	a	d	b
(D)	b	a	d	c

Ans. ***(C)***

Sol. I) Augusto Pinochet - (c) Chile

Il) Lech Walesa - (a) Poland ti

Ill) Aung San Suu Kyi - (d) Myanmar

IV) KwameNkrumah - (b) Ghana

19. One basic principle of democracy is that -

(A) People are the source of all political power.

(B) Religious community is the source of all political power.

(C) Nation is the source of political power.

(D) Head of the state is the source of political power.

Ans. (A)

Sol. People are the source of all political power is one basic principle of democracy .

20. In a way, the federal form of government is in contrast to -

(A) Parliamentary form of government (B) Presidential form of government.

(C) Republican form of government. (D) Unitary form of government.

Ans. (D)

Sol. In a way, the federal form of government is in contrast to -Unitary form of government.

21. Neeraj Chopra has won gold medal in which event of Asian games 2018-

(A) Judo (B) Wrestling (C) Javelin Throw (D) Shot put

Ans. (C)

Sol. Neeraj Chopra has won gold medal in Javelin Throw of Asian games 2018.

22. The highest point of the Eastern Ghat is

(A) Anaimudi (B) Doddabetta (C) Mahendragiri (D) Guru Shikhar

Ans. (C)

Sol. Mahendragiri is the highest point of the Eastern Ghat

23. World's largest river Island 'Majuli' is located in-

(A) Brahmputra River (B) Ganga River (C) Yamuna River (D) Satluj River

Ans. (A)

Sol. World's largest river Island 'Majuli' is located in-Brahmputra River

24. 'Asiatic Lion' is found in which state of India

(A) Assam (B) West Bengal (C) Uttarakhand (D) Gujrat

Ans. (D)

Sol. 'Asiatic Lion' is found in Gujrat state of India

25. Which state of India does not have 'Jhoom agriculture' -

(A) Mizoram (B) Nagaland (C) Assam (D) Gujrat

Ans. (D)

Sol. Gujrat state of India does not have 'Jhoom agriculture'.

26. The coast between Mumbai and Goa is known as

(A) Coromandel coast (B) Malabar Coast

(C) Konkan Coast (D) Kannad Coast

Ans. (C)

Sol. The coast between Mumbai and Goa is known as 'Konkan Coast'

27. Match the Column I with Column II and choose the correct option-

Column I	Column II
a) Evergreen Forest	(I) Acacia, Palm
b) Deciduous Forest	(II) Ebony, Mahogany
c) Thorn Forest	(III) Bamboos, Sal
d) Mountain Forest	(IV) Pine, Deodar

	(a)	(b)	(c)	(d)
(A)	I	IV	III	II
(B)	IV	III	II	I
(C)	II	III	I	IV
(D)	I	II	III	IV

Ans. (C)

Sol.

a) Evergreen Forest	(II) Ebony, Mahogany
b) Deciduous Forest	(III) Bamboos, Sal
c) Thorn Forest	(I) Acacia, Palm
d) Mountain Forest	(IV) Pine, Deodar

28. Match the Column I with Column II and choose the correct option

Column I	Column Il
a) Corbett Park	(I) West Bangal
b) Sundarban Park	(II) Uttarakhand
c) Bandhavgarh Park	(III) Assam
d) Manas Tiger Reserve	(IV) Madhya Pradesh

	(a)	(b)	(c)	(d)
(A)	I	II	III	IV
(B)	II	I	IV	III
(C)	IV	III	II	I
(D)	III	II	I	IV

Ans. ***(B)***

Sol.

a) Corbett Park	(II) Uttarakhand
b) Sundarban Park	(I) West Bangal
c) Bandhavgarh Park	(IV) Madhya Pradesh
d) Manas Tiger Reserve	(III) Assam

29. Match the Column I with Column II and choose the correct option

Column I (Mine/Field)	Column Il Minerals
a) Khetri	(I) Coal
b) Jharia	(Il) Copper
c) Kudremukh	(Ill) Mica
d) Koderma	(IV) Iron

	(a)	(b)	(c)	(d)
(A)	I	II	III	IV
(B)	II	I	IV	III
(C)	III	IV	I	II
(D)	IV	III	II	I

Ans. ***(B)***

Sol.

a) Khetri	(Il) Copper
b) Jharia	(I) Coal
c) Kudremukh	(IV) Iron
d) Koderma	(Ill) Mica

30. The Indian standard time is determined by which longitude-

(A) 80° 30' East longitude (B) 0° 7' East longitude

(C) 23° 30' East longitude (D) 82° 30' East longitude

Ans. ***(D)***

Sol. The Indian standard time is determined by 82° 30' East longitude

31. Jet stream flows between the latitudes-

(A) 27° —30° N (B) 20° —23° N (C) 17° —20° S (D) 14° —17°S

Ans. ***(A)***

Sol. Jet stream flows between the latitudes- 27° —30° N

32. Which of the following is not correctly matched

(A)Karakoram -Jammu Kashmir (B) Nanda devi - Uttarakhand

(C) Kanchanjunga - Sikkim (D) Garo, Khasi -Tripura

Ans. ***(D)***

Sol. Garo, Khasi -Tripura

33. Which one of the following is formal sector of credit.

(A) Bank (B) Relatives (C) Trader (D) Money lenders

Ans. ***(A)***

Sol. Bank is formal sector of credit.

34. Which one is accepted as a money in modern economy -

(A) Currency (B) Demand deposits

(C) Currency and demand deposits (D) None of the above

Ans. ***(C)***

Sol. Currency and demand deposits is accepted as a money in modern economy.

35. Making of Sugar from Sugarcane is associated with

(A) Primary Sector (B) Secondary Sector (C) Tertiary Sector (D) All of the above

Ans. ***(B)***

Sol. Making of Sugar from Sugarcane is associated with Secondary Sector

36. Minimum Support Price is declared by the Government of India

(A) Before the sowing season (B) Before the harvesting of crop

(C) After the harvesting of crop (D) Any time

Ans. ***(A)***

Sol. Minimum Support Price is declared by the Government of India before the sowing season

37. Which of the following activity is not related to the primary sector

(A) Forestry (B) Animal Husbandry

(C) Mining and Quarrying (D) Tourism

Ans. ***(D)***

Sol. Tourism activity is not related to the primary sector.

38. Under which Act a three tier quasi-Judicial machinery has been set up for redressal of consumer disputes

(A) RTE (B) COPRA (C) RTI (D) None of the above

Ans. ***(B)***

Sol. Under COPRA Act a three tier quasi-Judicial machinery has been set up for redressal of consumer disputes.

39. Match Column I with Column II and choose the correct option-

Column I	Column II
a) Revised Public Distribution System	I) Indigent senior citizen
b) Antyodaya Anna Yojana	II) Poorest of thePoor
c) Anna Purna Yojana	III) Priority house hold
d) National Food Security Act	IV) Backward Blocks

	(a)	(b)	(c)	(d)
(A)	I	III	II	IV
(B)	I	II	III	IV
(C)	IV	II	I	III
(D)	III	I	II	IV

Ans. ***(C)***

Sol. a) Revised Public Distribution System - IV) Backward Blocks

b) Antyodaya Anna Yojana - II) Poorest of thePoor

c) Anna Purna Yojana-I) Indigent senior citizen

d) National Food Security Act - III) Priority house hold

40. A Payment that a government makes to a producer to supplement the market price of a commodity is

(A) Subsidy (B) Shares (C) Donation (D) None of the above

Ans. ***(A)***

Sol. Subsidy is a Payment that a government makes to a producer to supplement the market price of a commodity.

41. If $\sin\theta - \cos\theta = 0$, then the value of $\sin^4\theta + \cos^4\theta$ will be

(A) 1 (B) $\frac{3}{4}$ (C) $\frac{1}{2}$ (D) $\frac{1}{4}$

Ans. ***(C)***

Sol. $\sin\theta - \cos\theta = 0$

squaring on both sides

$$\left(\sin\theta - \cos\theta\right)^2 = 0^2$$

$$\sin^2\theta + \cos^2\theta - 2\sin\theta\cos\theta = 0$$

$$1 - 2\sin\theta\cos\theta = 0$$

$$1 = 2\sin\theta\cos\theta$$

$$\frac{1}{2} = \sin\theta\cos\theta \quad \text{...(i)}$$

Now we know that

$$\sin^2\theta + \cos^2\theta = 1$$

squaring on both sides

$$\left(\sin^2\theta + \cos^2\theta\right)^2 = 1^2$$

$$\sin^4\theta + \cos^4\theta + 2\sin^2\theta\cos^2\theta = 1$$

$$\therefore \sin^4\theta + \cos^4\theta + 2\times\left(\frac{1}{2}\right)^2 = 1 \quad \text{(using (i))}$$

$$\sin^4\theta + \cos^4\theta + \frac{1}{2} = 1$$

$$\sin^4\theta + \cos^4\theta = 1 - \frac{1}{2}$$

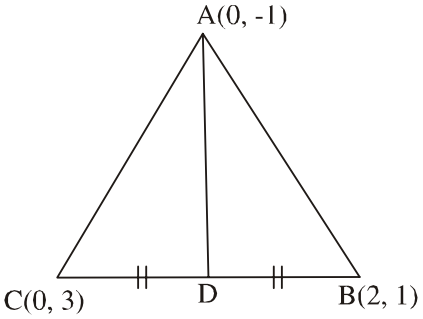
$$\sin^4\theta + \cos^4\theta = \frac{1}{2}$$

42. If A (0, –1), B(2, 1) and C(0, 3) are the vertices of Δ ABC then the length of median drawn from A will be

(A) 10 (B) $\sqrt{10}$ (C) $\sqrt{5}$ (D) None of these

Ans. ***(B)***

Sol.



Let D be the mid-point of BC

$\therefore$ Co-ordinate of D $= \left(\frac{0+2}{2}, \frac{3+1}{2}\right) = (1, 2)$

Now, length of $AD = \sqrt{(1-0)^2 + (2+1)^2} = \sqrt{1+9} = \sqrt{10}$

43. If the roots of the equation $(a - b)x^2 + (b - c)x + (c - a) = 0$, are equal then the value of $b + c$ will be-

(A) 6a (B) –6a (C) 2a (D) –2a

Ans. (C)

Sol. $(a-b)x^2 + (b-c)x + (c-a) = 0$

$\because$ Roots are equal

$\therefore d = 0$

$\therefore (b-c)^2 - 4(a-b)(c-a) = 0$

$\Rightarrow b^2 + c^2 - 2bc - 4(ac - a^2 - bc + ab) = 0$

$\Rightarrow b^2 + c^2 - 2bc - 4ac + 4a^2 + 4bc - 4ab = 0$

$\Rightarrow 4a^2 + b^2 + c^2 - 4ab + 2bc - 4ac = 0$

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

$\therefore b + c - 2a = 0$

$\therefore b + c = 2a$

44. How many numbers lie between 10 to 300 which when divided by 4 leave a remainder 3-

(A) 71 (B) 73 (C)72 (D) 74

Ans. (B)

Sol. Numbers between 10 and 300 leaving remainder 3 when divided by 4 are.

11, 15, 19, ..., 299

which forms an A.P.

$a = 11, d = 4, a_n = 299$

$a_n = a + (n - 1)d$

$299 = 11 + (n - 1)4$

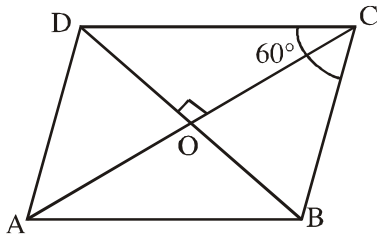
$299 - 11 = 4(n - 1)$

$\frac{288}{4} = (n - 1)$

$72 + 1 = n$

$73 = n$

45. In the given figure ABCD is a rhombus in which $\angle C = 60°$ then AC : BD will be -



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

Ans. ***(A)***

Sol. As we know, diagonals, bisect each other at right angle.

Also diagonals bisect the interior angles of rhombus.

$\therefore \angle DCO = \frac{1}{2}$ of $60° = 30°$

In ΔDOC

$$\tan 30° = \frac{OD}{OC}$$

$$\frac{1}{\sqrt{3}} = \frac{OD}{OC}$$

$$\therefore \frac{\sqrt{3}}{1} = \frac{OC}{OD}$$

$$\therefore \frac{\sqrt{3}}{1} = \frac{2 \times OC}{2 \times OD}$$

$$\frac{\sqrt{3}}{1} = \frac{AC}{BD}$$

$\therefore \sqrt{3}:1 = AC:BD$

46. If $\cos(\alpha+\beta) = 0$, then $\sin(\alpha-\beta)$ is equal to

(A) $\cos\beta$ (B) $\cos 2\beta$ (C) $\sin\alpha$ (D) $\sin 2\alpha$

Ans. ***(B)***

Sol. $\cos(\alpha+\beta) = 0$

$\alpha + \beta = 90°$

$\therefore \alpha = 90° - \beta$

$\sin(\alpha-\beta) = \sin(90° - \beta - \beta) = \sin(90° - 2\beta) = \cos 2\beta$

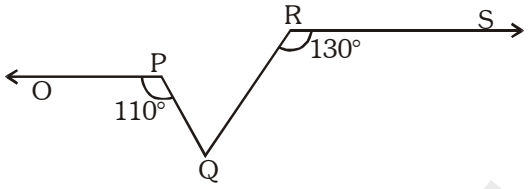
47. In a frequency distribution, the mid value of a class is 10 and its width is 6 then the lower limit of the class will be-

(A) 6 (B) 7 (C) 8 (D) 12

Ans. ***(B)***

Sol. Lower limit $= 10 - 3 = 7$

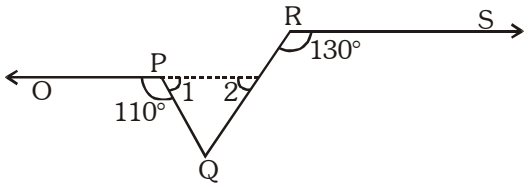
48. In figure if OP || RS, $\angle OPQ = 110°$ and $\angle QRS = 130°$ then $\angle PQR$ is euqal to -



(A) $40°$ (B) $50°$ (C) $60°$ (D) $70°$

Ans. ***(C)***

Sol.



$\angle 1 + 110 = 180°$ (Linear pair)

$\angle 1 = 180° - 110° = 70°$

$\angle PMR = \angle MRS$ (Alternate interior angles)

$\therefore \angle PMR = 130°$

$\angle 2 + \angle PMR = 180°$ (Linear pair)

$\angle 2 = 180° - 130°$

$\angle 2 = 50°$

$\therefore \angle PQR = 180° - (\angle 1 + \angle 2)$

$= 180° - (70° + 50°) = 60°$

49. Value of $(125)^{\frac{1}{3}} . (32)^{\frac{1}{5}}$ will be -

(A) 5 (B) 10 (C) 15 (D) 25

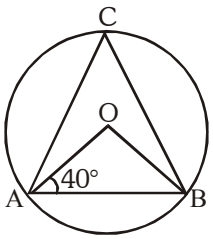
Ans. ***(B)***

Sol. $(125)^{\frac{1}{3}} \times (32)^{\frac{1}{5}}$

$= 5^{3 \times \frac{1}{3}} \times 2^{5 \times \frac{1}{5}}$

$= 5 \times 2 = 10$

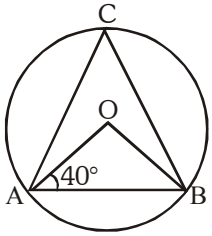
50. If figure if $\angle OAB = 40°$ then $\angle ACB$ is equal to -



(A) $50°$ (B) $40°$ (C) $60°$ (D) $70°$

Ans. ***(A)***

Sol.



OA = OB (radius)

$\therefore \angle OBA = 40°$

$\therefore \angle AOB = 180° - 80° = 100°$

$\therefore \angle ACB = \frac{1}{2} \times \angle AOB = \frac{1}{2} \times 100° = 50°$

51. Polynomial $x^4 + x^3 - 2x^2 + x + 1$ divided by x –1, the remainder will be-

(A) 2 (B) 1 (C) 0 (D) 3

Ans. ***(A)***

Sol. $P(x) = x^4 + x^3 - 2x^2 + x + 1$

By remainder theorem,

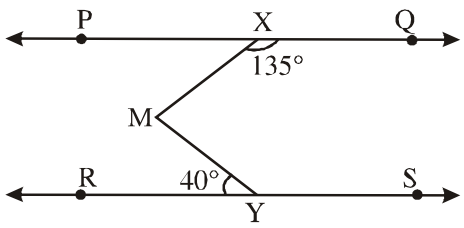
If p(x) is divided by (x – a)

then the remainder is P(a)

$\therefore$ remainder $P(1) = 1^4 + 1^3 - 2 \times 1^2 + 1 + 1$

$$P(1) = 1 + 1 - 2 + 1 + 1 = 2$$

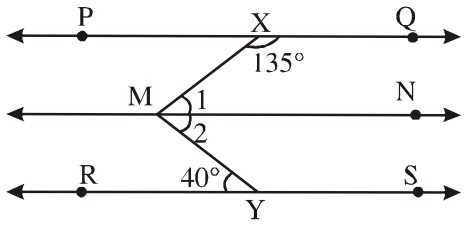
52. In the given figure if PQ||RS, $\angle MXQ = 135°$ and $\angle MYR = 40°$ then value of $\angle XMY$ will be -



(A) $95°$ (B) $45°$ (C) $140°$ (D) $85°$

Ans. ***(D)***

Sol.



Draw MN | | PR

$\therefore MN \parallel PQ \parallel SR$

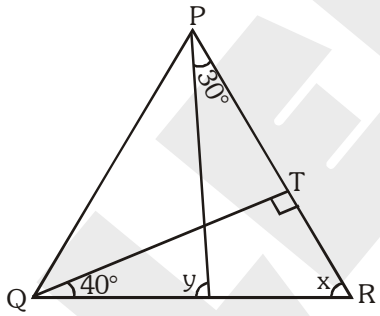
$\angle 1 + 135 = 180°$ (Co-interior angles)

$\angle 1 = 45°$

$\angle 2 = 40°$ (Alternate interior angles)

$\therefore \angle XMY = 85°$

53. In the figure if $QT \perp PR, \angle TQR = 40°$ and $\angle SPR = 30°$. Then the value of x and y will be -



(A) $x = 50°, y = 80°$ (B) $x = 80°, y = 50°$ (C) $x = 30°, y = 60°$ (D) $x = 60°, y = 30°$

Ans. ***(A)***

Sol. In ΔQTR

$x = 180° - (90° + 40°)$ (Angle sum property)

$x = 50°$

$y = 30 + x$ (Exterior angle property)

$y = 30 + 50 = 80°$

54. The dimensions of a cuboid are in the ratio of 1:2:3 and its total surface area is 88 m^2 then the dimensions will be

(A) 1m, 2m and 3m (B) 1m, 4m and 6m (C) 2m, 4m and 6m (D)1m, 4m and 9m

Ans. ***(C)***

Sol. $\ell : b : h = 1 : 2 : 3$

Let $\ell = x, b = 2x, h = 3x$

Total surface area = $88m^2$

$2(\ell b + bh + h\ell) = 88$

$2(x \times 2x + 2x \times 3x + 3x \times x) = 88$

$2(2x^2 + 6x^2 + 3x^2) = 88$

$2 \times 11x^2 = 88$

$x^2 = 4$

$x = 2$

$\therefore \ell = 2m, b = 4m, h = 6m$

55. If $x^2+\frac{1}{x^2}=83$ then the value of $x^3-\frac{1}{x^3}$ will be -

(A) 729 (B) 756 (C) 709 (D) None of these

Ans. ***(B)***

Sol. $x^2+\frac{1}{x^2}=83$

$x^2+\frac{1}{x^2}-2=83-2$

$\left(x-\frac{1}{x}\right)^2=81$

$\left(x-\frac{1}{x}\right)=9$

cubing on both sides

$\left(x-\frac{1}{x}\right)^3=9^3$

$x^3-\frac{1}{x^3}-3\times x\times\frac{1}{x}\left(x-\frac{1}{x}\right)=729$

$x^3-\frac{1}{x^3}-3\times 9=729$

$x^3-\frac{1}{x^3}=729+27$

$x^3-\frac{1}{x^3}=756$

56. The diameter of 120 cm. long roller is 84 cm. If it takes 500 revolutions to level a playground, find the cost of levelling it at the rate of ₹5 per square metre-

(A) ₹1584 (B) ₹7920 (C) ₹3500 (D) None of these

Ans. ***(B)***

Sol. h = 120 cm, 2r = 84 cm

h = 120 cm, r = 42 cm

curved surface Area = $2\pi rh$

$=2\times\frac{22}{7}\times 42\times 120=31680\,cm^2$

Area covered in 500 revolutions

$=500\times 31680\,cm^2$

$=15840000\,cm^2$

$=1584\,m^2$

$\therefore$ cost of levelling $=5\times 1584$

= ₹7920

57. In equation $4^{1+x}+4^{1-x}=10,$ the value of x will be -

(A) $\frac{1}{2},-\frac{1}{2}$ (B) $-\frac{1}{2},-\frac{1}{2}$ (C) $\frac{1}{2},\frac{1}{4}$ (D) None of these

Ans. ***(A)***

Sol. $4^{1+x}+4^{1-x}=10,$

$4\times4^{x}+4\times\frac{1}{4^{x}}=10$

$a=4^{x}$

$4a+\frac{4}{a}=10$

$\frac{4a^2+4}{a}=10$

$4a^2-10a+4=0$

$4a^2-8a-2a+4=0$

$4a(a-2)-2(a-2)=0$

$(4a-2)(a-2)=0$

$a=\frac{1}{2}$ or $a=2$

$\therefore$ $4^{x}=\frac{1}{2}$ or $4^{x}=2$

$2^{2x}=2^{-1}$ or $2^{2x}=2^{1}$

$x=-\frac{1}{2}$ or $2x=1$

$x=\frac{1}{2}$

58. If $x=a\cos\theta$ and $y=b\sin\theta$ then the value of $\left(b^2x^2+a^2y^2\right)$ will be -

(A) x^2+y^2 (B) a^2+b^2 (C) a^2b^2 (D) ab

Ans. ***(C)***

Sol. $x=a\cos\theta$ & $y=b\sin\theta$

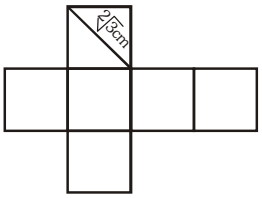
$b^2x^2+a^2y^2$

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

$=a^2b^2\left(\sin^2\theta+\cos^2\theta\right)$

$=a^2b^2$

59. In the following figure each quadrilateral is a square. The value of surface area of following figure will be-



(A) $4\sqrt{3}\ \text{cm}^2$ (B) $24\sqrt{3}\ \text{cm}^2$ (C) $36\ \text{cm}^2$ (D) $8\sqrt{3}\ \text{cm}^2$

Ans. ***(C)***

Sol. $S\sqrt{2} = 2\sqrt{3}$

$$S = \frac{2\sqrt{3}}{\sqrt{2}}$$

$$6S^2 = 6 \times 4 \times \frac{3}{2}$$

$$= 36\ \text{cm}^2$$

60. Which of the following statement is true for the values of central tendency-

(A) 2 median = mode +2 mean (B) mode = mean - median

(C) 3 median = mode + 2 mean (D) none of the above

Ans. ***(C)***

61. Match Column A with Column B and Choose the correct option

Column-A	Column-B
a) Epsom salt	(I) $Na_2SO_4.10H_20$
b) Glauber's Salt	(II) KNO_3
c) White Vitriol	(Ill) $MgSO_4$
d) Nitre	(IV) $ZnSO_4$

	(a)	(b)	(c)	(d)
(A)	III	I	IV	II
(B)	I	III	IV	II
(C)	IV	III	II	I
(D)	I	II	III	IV

Ans. (A)

Sol. Chemical formula of Epsom salt is $MgSO_4$, Glauber's Salt is $Na_2SO_4.\ 10H_2O$, White vitriol is $ZnSO_4$ and Nitre is KNO_3.

62. The nature of calcium phosphate present in tooth enamel is

(A) Basic (B) Amphoteric (C) Acidic (D) Neutral

Ans. (A)

Sol. Nature of calcium salt is basic. When pH of our mouth falls below 5.5 due to eating of sweets, snacks etc, inside mouth acidic nature is created due to which the dissolution of enamel (Calcium phosphate) starts. This shows that calcium phosphate is basic in nature.

63. Match Column A with Column B

Column-A	***Column-B***
a) Butyric Acid	(I) Tomatoes
b) Malic Acid	(II) Rancid Butter
c) Oxalic Acid	(III) Apple
d) Stearic Acid	(IV) Fats

	(a)	(b)	(c)	(d)
(A)	I	II	III	IV
(B)	III	I	IV	II
(C)	II	III	I	IV
(D)	IV	III	II	I

Ans. (C)

Sol. Butyric acid is present in rancid butter, Malic acid is present in apple, Oxalic acid is present in tomatoes and stearic acid is present in fats.

64. If 110 g of a salt is present in 550 g of solution then the concentration of solution will be-

(A) 50% (50 Percent) (B) 40% (40 Percent)

(C) 20% (20 Percent) (D) 10% (10 Percent)

Ans. (C)

Sol. Concentration of salt is evaluated by mass of solute present in mass of solution. So

mass of solute = 110gm

mass of solution = 550 gm

Concentration = 110/550 = 0.2

Percentage of concentration can be obtained by multiply concentration with 100.

So, $0.2 \times 100 = 20\%$

65. Mass of 56 cc of CO (Carbon monooxide) at STP will be

(A) 28g (B) 0.04 g (C) 0.07 g (D) 0.05 g

Ans. (C)

Sol. Given that- Volume of CO = 56cc = 0.056L

Molar mass of CO = 28gm

AT STP-

Volume of 28gm of CO = 22.4L

So, Mass of 0.056 L of CO = $(0.056 \times 28)/22.4 = 0.07$gm.

66. Hydrogen contains three types of atoms ($_1H^1$ Protium, $_1H^2$ deuterium and tritium) these atoms are

(A) Isotopic (B) Isobaric (C) Isotopic & Isobaric (D) none of the above

Ans. (A)

Sol. $_1H^1$(Protium), $_1H^2$ (Duterium), $_1H^3$(Tritium) are three isotopes of Hydorgen.

67. Number of moles present in 9.033×10^{24} atoms of Helium are -

(A) 1 mole (B) 5 mole (C) 10 mole (D) 15 mole

Ans. (D)

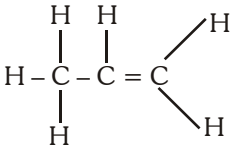
Sol. Given that- No. of atoms of Helium= 9.033×10^{24}

No. of moles (n) = no. of atoms/Avogadro no.

$= 9.033 \times 10^{24}/6.023 \times 10^{23}$

= 15 moles of Helium

68. According to IUPAC system which type of compound is shown by the given structure-



(A) Ketone (B) Alkene (C) Alkyne (D) Aldehyde

Ans. (B)

Sol. Since given compound is unsaturated and contain double bond. Having molecular formula C_3H_6, which follows molecular formula of alkene i.e. C_nH_{2n}.

69. Five elements A, B, C, D and E have atomic numbers 2, 3, 7, 10 and 18 respectively. The elements which belong to the same period of the periodic table are

(A) A,B,C (B)B,C,D (C) A,D,E (D) B,D,E

Ans. (B)

Sol.

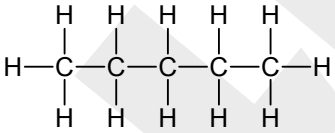
Element	Period number
A -	1
B -	2
C -	2
D -	2
E -	3

Element B,C,D belongs to period 2.

70. The number of covalent bonds present in pentane are-

(A) 5 (B) 12 (C) 17 (D) 16

Ans. (D)

Sol. Structure of pentane 

Covalent bond is present between 2 carbon atom & between carbon and hydrogen

$\therefore$ Total number of covalent bond in structure are 16

71. Which method is used to separate cream from milk?

(A) Crystallization (B) Distillation (C) Centrifugation (D) Vapourisation

Ans. (C)

Sol. Centrifugation method is used to separate cream from milk.

72. Which group of compounds shows correct increasing order of boiling points ?

(A) CH_3COOH, CH_3CH_2OH, CH_4, $CHCl_3$ (B) CH_3CH_2OH, $CHCl_3$, CH_4, CH_3COOH

(C) CH_4, CH_3CH_2OH, $CHCl_3$, CH_3COOH (D) CH_4,$CHCl_3$, CH_3CH_2OH, CH_3COOH

Ans. (D)

Sol.

Compound		Boiling point (approx)
CH_4	$\longrightarrow$	–161.5°C
$CHCl_3$	$\longrightarrow$	61.2°C
CH_3CH_2OH	$\longrightarrow$	78.37°C
CH_3COOH	$\longrightarrow$	118.1°C

73. What is the mass of the oxygen required to react completely with 15g of H_2 gas to form water ?

(A) 140 g (B) 115 g (C) 107.5 g (D) 120 g

Ans. (D)

Sol. $2H_2 + O_2 \longrightarrow 2H_2O$

In above chemical equation, 4g of H_2 gas reacts with 32 g of O_2

Therfore amount of O_2 required to react with 15 g of H_2 is

$$\frac{15\times 32}{4} = 120 \text{ g}$$

$\therefore$ 120 g of O_2 required

74. Percentage purity of a sample of gold is 85%. How many atoms of gold are present in 1 g sample (Atomic mass of Gold =197u)-

(A) 2.6×10^{21} (B) 2.6×10^{23} (C) 3.0×10^{21} (D) 4.5×10^{20}

Ans. (A)

Sol. Since % purity is 85%

Therefore 1 gm of sample of gold have 0.85 g of gold

Atomic mass of gold is 197.

$\therefore$ 197 gm of gold contain 6.023×10^{23} atoms

$\therefore$ 0.85 gm of gold contain $\frac{0.85\times6.023\times10^{23}}{197}$

$= 0.0259 \times 10^{23}$

$= 2.59 \times 10^{21}$

$\approx 2.6 \times 10^{21}$ atoms

75. Tendon is a structure which connects -

(A) One bone to another bone (B) Muscle to bone

(C) Neuron to Muscle (D) Muscle to muscle

Ans. ***(B)***

Sol. Tendons are connective tissue that connect muscle to bone.

76. Platyhelminthes are-

(A) Coelomates (B) PseudocoeIomates (C) Homocoelomates (D) Acoelomates

Ans. ***(D)***

Sol. Platyhelminths are acoelomate triploblasts.

77. Bone tissue becomes hard due to presence of phosphate and carbonates of the following

(A) Calcium and Sodium (B) Calcium and Magnesium

(C) Magnesium and Sodium (D) Magnesium and Potassium

Ans. ***(B)***

Sol. Bone tissue is hardened mostly by deposition of calcium phosphate (hydroxyapatite) and also due to deposition of calcium and magnesium carbonates.

78. What is Zoological name of National Bird of India-

(A) Psittacula Eupatria (B) Passer Domesticus

(C) Pavo Cristatus (D) Corvus Splendens

Ans. ***(C)***

Sol. Indian national bird is peacock. Its zoological name is *Pavo cristatus.*

79. Which of the following is known as the 'energy currency of cells' in Biology

(A) DTP (B) PDP (C) ATP (D) DDT

Ans. ***(C)***

Sol. Energy currency of cell is ATP (Adenosine triphosphate).

80. Which of the following plant hormone inhibits plant growth-

(A) Abscisic acid (B) Ascorbic acid (C) Ethene (D) Cytokinins

Ans. ***(A)***

Sol. Abscisic acid is the growth inhibiting plant hormone.

81. Excretory unit of the human excretory system is

(A) Nephron (B) Nephridia (C) Neuron (D) Ureter

Ans. ***(A)***

Sol. Excretory unit of human excretory system is nephron.

82. Match Column I with Column Il and choose the correct option-

Column I	Column -Il
I) Arteries and veins	(a) Clotting of blood
II) Xylem Vessels	(b) Carrier of Oxygen
III) RBC	(c) Water transport in plants
IV) Platelets	(d) Blood transport in humans

	(I)	(II)	(III)	(IV)
(A)	a	b	c	d
(B)	d	c	b	a
(C)	b	c	d	a
(D)	d	c	a	b

Ans. ***(B)***

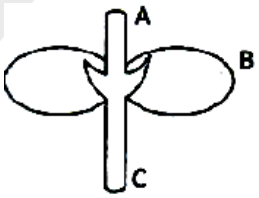
Sol. Both arteries and veins transport blood.

Xylem vessels transport water in plants.

RBC contains haemoglobin, which carries most of the oxygen that is transported through blood.

Platelets help in blood clotting.

83. In the given figure parts marked A, B and C subsequently are-



(A) Cotyledon, Plumule and rad ide (B) Plumule, cotyledon and Radicle

(C) Plumule, Radicle and Cotyledon (D) Radicle, Plumule and Cotyledon

Ans. ***(B)***

Sol. The given image represents a germinating seed. The upward growing part is plumule (young shoot), the swollen part is the food storage organ called cotyledon and the downward growing part is the radicle (young root).

84. Lipid molecule in the cell are synthesized by-

(A) Smooth endoplasmic Reticulum (B) Rough endoplasmic Reticulum

(C) Golgi Apparatus (D) Plastid

Ans. ***(A)***

Sol. Lipid molecules are synthesized in smooth endoplasmic reticulum.

85. The plant cells become turgid due to -

(A) Plasmolysis (B) Exosmosis (C) Endosmosis (D) Electrolysis

Ans. ***(C)***

Sol. Plant cells become turgid due to endosmosis as water is absorbed by the cell in this process.

86. Bile Juice is produced by

(A) Gall bladder (B) Liver (C) Pancreas (D) Stomach

Ans. ***(B)***

Sol. Bile juice is produced by liver while it is stored and concentrated in the gall bladder.

87. The right path of energy flow in a eco system is

(A) Producer $\rightarrow$ Herbivorous $\rightarrow$ carnivorous $\rightarrow$ decomposer

(B) Producer $\rightarrow$ carnivorous $\rightarrow$ herbivorous $\rightarrow$ decomposer

(C) Herbivorous $\rightarrow$ carnivorous $\rightarrow$ producer $\rightarrow$ decomposer

(D) Herbivorous $\rightarrow$ producer $\rightarrow$ carnivorous $\rightarrow$ decomposer

Ans. ***(A)***

Sol. Producers (autotrophs) are eaten by herbivores who in turn are eaten by carnivores. And when these organisms die they are decomposed by decomposers. Hence energy also flows from producers to herbivores to carnivores and finally to decomposers.

88. Mechanical advantage (MA) Load (L) and effort (E) are related as-

(A) MA = L $\times$ E (B) MA $\times$ E = L (C) MA $\times$ LE (D) None of these

Ans. ***(B)***

Sol. MA = Load / Effort

MA $\times$ E = L

89. When light enters from air to glass its wave length-

(A) Decreases (B) Increases (C) Remains the same (D) None of these

Ans. **(A)**

Sol. When light goes from optically rarer medium to denser medium then velocity decreases and frequency remains same hence its wavelength also decreases.

90. The magnetic field Inside a long straight current carrying solenoid-

(A) is zero (B) decreases as we move towards its end

(C) Increases as we move towards its end (D) is same at all points

Ans. **(D)**

Sol. Here, long straight solenoid is considered as infinite length solenoid.

$B_{inside} = \mu_0 ni$

Hence Magnetic field is same at all points.

91. Which of the following is correct -

(A) $\lambda_{blue} > \lambda_{yellow} > \lambda_{green}$ (B) $\lambda_{yellow} > \lambda_{green} > \lambda_{blue}$ (C) $\lambda_{yellow} > \lambda_{blue} > \lambda_{green}$ (D) $\lambda_{green} > \lambda_{blue} > \lambda_{yellow}$

Ans. **(B)**

Sol. **VIBGYOR**

Violet has minimum wavelength and red has maximum wavelength.

92. The magnification produced by a spherical mirror and a spherical lens is +0.8 -

(A) The mirror and lens both are convex.

(B) The mirror and lens both are concave.

(C) The mirror is concave but the lens is convex

(D) The mirror is convex but the lens is concave

Ans. **(D)**

Sol. Magnification is positive so that image is virtual and m < 1. Mirror is convex and but the lens is concave.

93. Two bulbs A and B are rated 100 w, 120V and 10W. 120V respectively. They are connected across a 120 V source in series. Which bulb will consume more power-

(A) A (B) B (C) both equally (D) Nothing can be said

Ans. **(B)**

Sol. In Series grouping of bulbs, bulb of greater rated power dissipates less power, thus glow dimmer. The bulb of smaller rated rated power dissipates more power, thus glow brighter.

94. A coin kept inside water $\left(\mu = \frac{4}{3}\right)$ when viewed from air in a vertical direction, appears to be rasised by 2.0 mm.

The depth of the coin in water is-

(A) 8.00 mm (B) 6.00 mm (C) 8.00 cm (D) 6.00 cm

Ans. **(A)**

Sol. Given : $\mu = \frac{4}{3}, \text{shift} = 2 \text{ mm}$

$$\text{shift} = d\left(1 - \frac{1}{\mu}\right)$$

$$2 = d\left[1 - \frac{1}{\left(\frac{4}{3}\right)}\right] = d\left[1 - \frac{3}{4}\right] = \frac{d}{4}$$

$$d = 8 \text{ mm}$$

depth of the coin in water = 8 mm

95. Select the correct statement in the following and choose the correct option

i) An Ammeter is connected in series in a circuit and a Voltmeter is connected in parallel

ii) An Ammeter has a high resistance

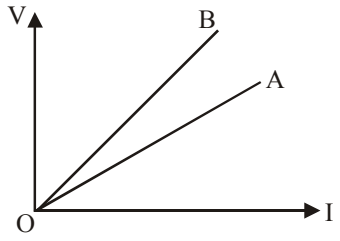
iii) A Voltmeter has a low resistance

(A) i, ii and iii (B) i and ii (C) ii and iii (D) only i

Ans. **(D)**

Sol. Ammeter is connected in series and a voltmeter is connected in parallel. Ammeter has low resistance and voltmeter has high resistance.

96. V-I graph for parallel and series combinations for two identical resistors are as shown in figure. Which graph represents parallel combination-



(A) A (B) B (C) A and B both (D) None of the above

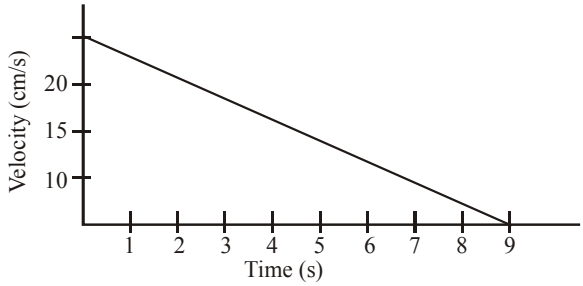
Ans. **(A)**

Sol. Slope of V - I graph gives resistance.

Equilvalent resistance of parallel combination is Less than equilvalent resistance of series combination.

Slope of A < Slope of B

97. The velocity time graph of a ball of mass 20 g moving along a straight line on a long table is given in figure. The force exerted by the table on the ball to bring it to rest is-



(A) -4×10^{-4} N (B) 8×10^{8} N (C) -2×10^{4} N (D) 6×10^{8} N

Ans. **(A)**

Sol. u = 20 cm/s = 0.20 m/s , v = 0 m/s

t = 9 sec , m = 20 × 10 $^{(-3)}$ kg

v = u + at

0 = 0.20 + a(9)

a = – (0.20) / (9) = – 0.0222 m/s^2

F = ma = –20 x 10 $^{(-3)}$ × 0.0222 = –4.44 × 10 $^{(-4)}$ ≈ – 4 × 10 $^{(-4)}$ N

98. How fast should a man weighing 600N run to achieve a kinetic energy of 750 J (g = 10 m/s^2)

(A) 5 m/s (B) 7 m/s (C) 10 m/s (D) 7.5 m/s

Ans. **(A)**

Sol. W = 600 N , g = 10 m/s^2, KE = 750 J

W = mg , m = W/g = 600/10

m = 60 kg

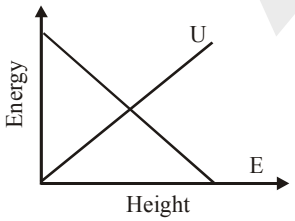
$$KE = \frac{1}{2}mv^2$$

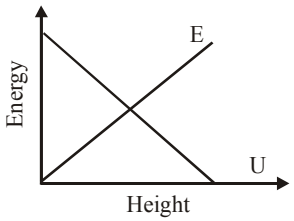
$$\therefore 750 = \frac{1}{2}\times 60 \times v^2$$

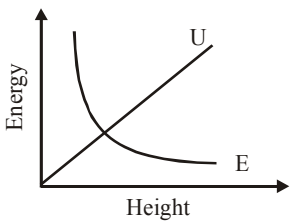
$$\therefore v^2 = \frac{1500}{60} = 25$$

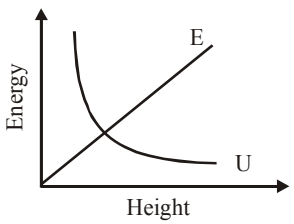
$$v = 5\ m/s$$

99. Which of the following graphs shows correct relation of kinetic energy (E) potential Energy (U) and height (h) from the ground of a particle-

(A)


(B)


(C)


(D)


Ans. **(A)**

Sol. TE = PE + KE = U + E

As height from the ground increases gravitational potential energy increases and kinetic energy decreases linearly with time.

100. A person has a hearing range from 20 Hz to 20 KHz. The typical wavelengths of sound waves in air corresponding to these two frequencies are (speed of sound in air = 344 m/s)

(A)1.72 m, 1.72 mm (B)17.2m, 17.2 mm

(C)17.2m, 1.72mm (D) None of these

Ans. **(B)**

Sol. $f_1 = 20\ \text{Hz}$

$f_2 = 20,000\ \text{Hz}$

$v = 344\ \text{m/s}$

velocity = frequency × wavelength

$v = f_1\lambda_1 = f_2\lambda_2$

$\therefore \quad \lambda_1 = \dfrac{v}{f_1} \qquad \lambda_2 = \dfrac{v}{f_2}$

$= \dfrac{344}{20} \qquad = \dfrac{344}{20,000}$

$\lambda_1 = 17.2\ \text{m} \qquad \lambda_2 = 17.2\ \text{mm}$

wavelength range = 17.2 m to 17.2 mm