SCREENING TEST FOR ADMISSION TO CLASS XI - 2021

STREAM : PHYSICS, CHEMISTRY, MATHEMATICS & COMPUTER

Time : 2½ Hrs

Maximum Marks : 320

| Name of the Student | : |
| Application Number | : |

INSTRUCTIONS

1. Please write the name and application number of the candidate in the column given above.

2. This question booklet contains 80 questions. For each question, five answers are suggested and given against A, B, C, D and E of which only one will be the most appropriate answer. Darken the bubble containing the letter corresponding to the most appropriate answer in the OMR sheet, by using **blue or black ball point pen only.** The bubbles should be darkened fully.

3. **Negative Marking :** Each correct answer will be awarded four marks. One mark willbe deducted for each wrong answer. More than one answer marked against the questions will not be considered.

4. **Return both the answer booklet and the question booklet** to the invigilator at the end of the examination.

5. **Use of calculators and other electronic devices is not permitted.**

6. Rough work can be done only in the paper provided in the question booklet.

7. Immediately after opening this question booklet, the candidate should verify whether the question booklet issued contains all the 80 questions in serial order. If not, request for replacement.

8. **Any malpractice or attempt to commit any kind of malpractice in the examination hall will disqualify the candidate.**

PLEASE DO NOT OPEN THE SEAL UNTIL THE INVIGILATOR ASK FOR YOU TO DO SO

1. Each root of $x^2 - bx + c = 0$ is decreased by 2. The resulting equation is $x^2 - 2x + 1 = 0$, then
   A. b = 6, c = 9
   B. b = 3, c = 5
   C. b = 2, c = -1
   D. b = -4, c = 3
   E. b = -6, c = -7

2. Three bulbs red, green and yellow flash at intervals of 80 seconds, 90 seconds and 110 seconds. All three flash together at 8:00 am. At what will the three bulbs flash altogether again?
   A. 9:00 am
   B. 9:12 am
   C. 10:20 am
   D. 10:00 am
   E. 10:12 am

3. The lengths of the diagonals of a rhombus are 24cm and 32cm. The length of the altitude of the rhombus is :
   A. 12 cm
   B. 12.8 cm
   C. 19 cm
   D. 19.2 cm
   E. 18.2 cm

4. The perimeter of the triangle formed by the points (0,0), (1,0) and (0,1) is
   A. $1 \pm \sqrt{2}$
   B. $\sqrt{2} + 1$
   C. 3
   D. $2 + \sqrt{2}$
   E. 2

5. If $\sqrt{3}\cot^2\theta - 4\cot\theta + \sqrt{3} = 0$, then the value of $\cot^2\theta + \tan^2\theta$ is:
   A. $\dfrac{3}{10}$
   B. $\sqrt{3}$
   C. $\dfrac{1}{\sqrt{3}}$
   D. $\dfrac{10}{3}$
   E. $\dfrac{3\sqrt{3}}{10}$

6. If $3x = \sec\theta$ and $\dfrac{3}{x} = \tan\theta$, then $9\left(x^2 - \dfrac{1}{x^2}\right)$ is equal to
   A. 9
   B. 1
   C. 3
   D. $\dfrac{1}{9}$
   E. $\dfrac{1}{3}$

7. If the angle of elevation of the Sun is $60°$, then find the ratio of the height of a tree with its shadow.
   A. $\sqrt{3} : 1$
   B. $1 : \sqrt{3}$
   C. 3 : 1
   D. $\sqrt{2} : 1$
   E. $1 : \sqrt{2}$

8. If two tangents inclined at an angle $60°$ are drawn to a circle of radius 5cm, then length of each tangent (in cm) is equal to:
   A. $\dfrac{5\sqrt{3}}{2}$
   B. 10
   C. 3
   D. $5\sqrt{3}$
   E. $\dfrac{5\sqrt{3}}{3}$

9. The perimeter of a sector of a circle of radius 5.7cm is 27.2cm. Find the area of the sector.
   A. $45.02\ cm^2$
   B. $46.05\ cm^2$
   C. $54.4\ cm^2$
   D. $49.08 cm^2$
   E. $50.5\ cm^2$

10. A chord of a circle of radius 6 cm subtends an angle of measure $60°$ at the centre. Find the area of the minor segment formed by this chord.

A. $3(2\pi - 3\sqrt{3})\ cm^2$ B. $3(3\pi - \sqrt{3})\ cm^2$ C. $3(3\pi - 2\sqrt{3})\ cm^2$

D. $3(3\pi - 3\sqrt{3})\ cm^2$ E. $3(3\pi - 5\sqrt{3})\ cm^2$

11. If the total surface area of a solid hemisphere is 462cm², find its volume.

A. $\dfrac{308}{3}cm^3$ B. $\dfrac{2156}{3}cm^3$ C. $\dfrac{5216}{3}cm^3$

D. $\dfrac{8624}{3}cm^3$ E. $\dfrac{2516}{3}cm^3$

12. The ratio of the volume of a cube to that of the sphere which will exactly fit inside the cube is:

A. $6: \pi$ B. $4: \pi$ C. $2: \pi$

D. $3: \pi$ E. $8: \pi$

13. The LCM of two numbers is 14 times their HCF. The sum of LCM and HCF is 600. If one number is 280, then find the other number.

A. 560   B. 40   C. 80

D. 180   E. 60

14. The largest number which divides 70 and 125, leaving remainder 5 and 8 respectively is:

A. 65   B. 875   C. 13

D. 1750   E. 95

15. If α and β are zeroes of the polynomial f(x) = $a\,x^2 + bx + c$ then $\dfrac{1}{\alpha^2} + \dfrac{1}{\beta^2}$ =

A. $\dfrac{b^2 - 2ac}{a^2}$ B. $\dfrac{b^2 - 2ac}{c^2}$ C. $\dfrac{b^2 + 2ac}{a^2}$

D. $\dfrac{2b^2 - ac}{a^2}$ E. $\dfrac{2(b^2 - ac)}{a^2}$

16. If the sum of the roots of the quadratic equation $3x^2 + (2k+1)x - (k+5) = 0$ is equal to the product of the roots, then the value of k is :

A. 2   B. 3   C. 4

D. 5   E. 6

17. Which of the following numbers is/are rational

$\sqrt{\pi^2}$, $\sqrt{0.001}$, $\sqrt[4]{0.00016}$, $\sqrt[5]{-1}$

A. $\sqrt[3]{-1}$ B. $\sqrt{\pi^2}$ C. $\sqrt{0.001}$

D. $\sqrt[4]{0.00016}$ E. All of these

18. If $\dfrac{x}{y} = \dfrac{2}{3}$ then the value of $\dfrac{4}{5} + \dfrac{y-x}{y+x}$

A. 1   B. 0   C. 2

D. 5   E. 4

19. The exponential form of $\sqrt{\sqrt{2\sqrt{3}}}$ is

   A. $6^{1/2}$

   B. $6^{1/3}$

   C. $6^{1/4}$

   C. $6^{1/5}$

   E. $6^{1/6}$

20. If $X = \cos 2^\circ \cos 4^\circ \cos 6^\circ$ .... $\cos 100^\circ$ then X is equal to

   A. 1

   B. 0

   C. $\dfrac{1}{2}$

   D. $\dfrac{3}{2}$

   E. $\dfrac{\sqrt{3}}{2}$

21. Determine the least value of 'k' so that the equation $2x^2 - kx + 1 = 0$ has eaual roots

   A. $-2\sqrt{2}$

   B. $2\sqrt{2}$

   C. $-\sqrt{2}$

   D. $\sqrt{2}$

   E. 0

22. The sum of the first 'n' terms of an A.P is $3n^2 + 2n$, find the nth term

   A. 6n - 1

   B. 6n+1

   C. 4n-1

   D. 3n-2

   E. 5n

23. Find the ratio of the sum of the first 'n' even natural numbers and the sum of firs 'n' odd natural numbers:

   A. $\dfrac{n-1}{n}$

   B. $\dfrac{n+1}{n}$

   C. $\dfrac{1-n}{n}$

   D. $\dfrac{2n+1}{n}$

   E. None of these

24. The mean of 11 numbers is 23. If 5 is added to every number, find the new mean.

   A. 18

   B. 16

   C. 6

   D. 28

   E. 23

25. The median when it is given that mode and mean are 8 and 9 respectively is,

   A. 8.57

   B. 8.67

   C. 8.97

   D. 9.24

   E. 8.24

26. The line $3x + y - 9 = 0$ divides the line segment joining the points (1, 3) and (2, 7) internally in the ratio:

   A. 3 : 4

   B. 3 : 2

   C. 2 : 3

   D. 4 : 3

   E. 1 : 1

27. If the ratio of the radius of a cone and a cylinder of equal volume is 3 : 5, then the ratio of their heights :

   A. $\dfrac{25}{3}$

   B. $\dfrac{28}{3}$

   C. $\dfrac{23}{3}$

   D. 7

   E. $\dfrac{24}{8}$

28. If the zeroes of the quadratic polynomial $ax^2 + bx + c, c \neq 0$ are equal then,

    A. c and a have opposite signs   B. c and b have opposite signs

    C. c and a have same sign   D. c and b have same sign

    E. none of these

29. If $x . \tan 45^\circ . \sin 30^0 = \cos 30^0 . \tan 30^0$, then x is equal to

    A. $\sqrt{3}$ B. $\dfrac{1}{2}$ C. $\dfrac{1}{\sqrt{2}}$

    D. 1   E. 0

30. The probability that a non - leap year selected at random will contain 53 Sundays is

    A. $\dfrac{1}{7}$ B. $\dfrac{2}{7}$ C. $\dfrac{3}{7}$

    D. $\dfrac{5}{7}$ E. $\dfrac{4}{7}$

31. A fuse wire repeatedly gets burnt when used with a good heater. It is advised to use a fuse wire of:

    A. more length   B. less radius   C. less length

    D. more radius   E. more length and less radius

32. If R_1 and R_2 be the resistance of the filament of 40W and 60W bulbs respectively operating 220V, then

    A. $R_1 < R_2$ B. $R_2 < R_1$ C. $R_1 = R_2$

    D. $R_1 \geq R_2$ E. $R_1 \leq R_2$

33.
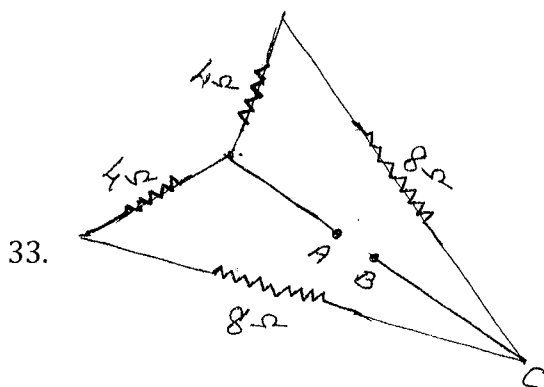
The equivalent resistance between the points A and B shown in the above figure is

    A. $6\,\Omega$ B. $24\,\Omega$ C. $8\,\Omega$

    D. $4\,\Omega$ E. $12\,\Omega$

34. A parallel combination of three resistors take a current 7.5 A from a 30 v supply. If the 2 resistors are $10\,\Omega$ and 12Ω, the third one is:

    A. $8\,\Omega$ B. $10\,\Omega$ C. $15\,\Omega$

    D. $20\,\Omega$ E. $4\,\Omega$

35. A uniform magnetic field exists in the plane of paper pointing from left to right as shown in figure. The electron and proton experience:

   A. forces both pointing into the plane of paper

   B. forces both pointing out of the plane of paper

   C. forces pointing into the plane of paper and out of the plane of paper respectively.

   D. forces pointing opposite and along the direction of uniform magnetic field respectively.
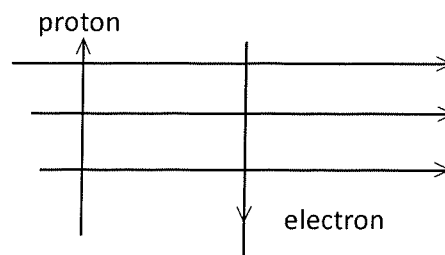
   E. forces will be cancelled.

36. Which of the following factors affect the strength of force experinced by a current carrying conductor in a magnetic field?

   A. magnetic field strength   B. magnitude of current in a conductor

   C. length of the conductor within magnetic field   D. All of the above

   E. None of the above

37. A battery of 10 V carries 20,000 C of charge through a resistance of 20Ω. The work done in 10 S is

   A. 2×10^3 J   B. 2×10^5 J   C. 2×10^4 J

   D. 2×10^2 J   E. 2×10^8 J

38. How many 40W, 220 V lamps can be safely connected to a 220V, 5A line?

   A. 30   B. 20   C. 25

   D. 22   E. 27

39. In an electric circuit 2 resistors of 2Ω and 4Ω respectively are connected in series to a 6V battery. The heat dessipated by the 4Ω resistor in 5 S will be

   A. 5J   B. 20 J   C. 10 J

   D. 30 J   E. 25 J

40. A constant current flows in a horizontal wire in the plane of the paper from East to West as shown in the figure. The direction of magnetic field at a point will be North to South:

   A. directly above the wire

   B. directly below the wire

   C. at a point located in the plane of paper, on the North side of the wire.

   D. at a point located in the plane of paper, on the South side of the wire.

   E. at the tip of the wire on the East.
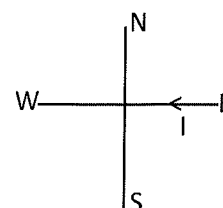
41. A wire of the length ℓ made of material resistivity 'ρ' is cut into two equal parts. The resistivity of the two parts are equal to

   A. ρ   B. ρ/2   C. 2 ρ

   D. 4 ρ   E. $\dfrac{\rho}{4}$

42. Which of the following statement is correct regarding the wavelength of light ?

    A. blue > yellow > green   B. yellow > green > blue

    C. yellow > blue > green   D. green > blue > yellow

    E. blue > green > yellow

43. When an object is at infinity is slowly moved towards the pole of a convex mirror. Then the image

    A. also will move towards the mirror and its size increases

    B. will move away from the mirror and its size decreases

    C. will move away from the mirror and its size increases

    D. will not move towards or away from the mirror

    E. will move towards the mirror and no change in its size

44. If a man's face is at 25cm infront of a concave shaving mirror producing an erect image 1.5 times the size of the face. The focal length of the mirror would be

    A. 75cm   B. 37.5 cm   C. 25cm

    D. 15cm   E. 60 cm

45. Which of the following statement is correct regarding the propogation of light of different colours through vacuum.

    A. Red light travels fastest

    B. Blue light moves faster than green light

    C. All the colours of white light move with the same speed

    D. Violet colour moves faster than red light

    E. Violet colour moves slower than red light

46. Sun appears flattened at sunrise and sunset is due to

    A. reflection of light by clouds

    B. scattering of light by dust particles

    C. total internal reflection

    D. dispersion of light by water drops

    E. atmospheric refraction of light

47. A Spherical mirror and a thin spherical lens each have focal length of +15 cm. The mirror and the lens are likely to be

    A. both are concave

    B. both are convex

    C. the mirror is concave and the lens is convex

    D. the mirror is convex but the lens is concave

    E. plane mirror

48. Refractive index of diamond with respect to glass is 1.6 and absolute refractive index of glass is 1.5. The absolute refractive index of diamond is

    A. 1.33   B. 2.4   C. 1.52

    D. 1.65   E. 1.44

49. A convex lens of focal length 20 cm is placed in contact with a concave lens of focal length 10cm. What is the focal length of this combination?

    A. 10 cm   B. 20cm   C. -10cm

    D. -20cm   E. -25cm

50. The focal length of a concave lens of power 2 dioptre is

    A. +25cm   B. -25cm   C. +50cm

    D. -50cm   E. -0.5cm

51. An element X has mass number 40 and contains 21 neutrons in its atom. To which group of the periodic table does it belong?

    A. Group 1   B. Group 14   C. Group 2

    D. Group 3   E. Group 15

52. Which one of the following statements is not correct about the trends in the properties of the elements of a period on going from left to right?

    A. The oxides become more acidic.   B. The elements become less metallic.

    C. There is an increase in the number of valence electrons.

    D. The valency first increases, then decreases.   E. The atoms lose their electrons more easily.

53. Which of the following belongs to the homologous series of alkynes.

    A. C_6H_6 B. C_2H_6 C. C_2H_4

    D. C_3H_4 E. CH_4

54. Which of the following compounds of carbon does not consist of ions.

    A. $CHCl_3$ B. $CaCO_3$ C. $NaHCO_3$

    D. Ca_2C E. Na_2CO_3

55. The IUPAC name of $CH_3CH_2CH = CH_2$ is

    A. 3 butene   B. Prop–1-ene   C. Pent -1-ene

    D. But-1-ene   E. Butyne

56. Which of the following pairs will give displacement reactions?

    A. $FeSO_4$ solution and Copper metal.   B. $MgCl_2$ solution and Aluminium metal

    C. $CuSO_4$ solution and Silver metal   D. $AgNO_3$ solution and Copper metal.

    E. NaCl solution and Copper metal.

57. Reaction between X and Y, forms compound Z. X loses electron and Y gains electron. Which of the following properties is not shown by Z?

    A. Has high melting point   B. Has low melting point

    C. Conducts electricity in molten state.   D. Occurs as solid.

    E. Soluble in water.

58. Which of the following are not ionic compounds?

   i) KCl   ii) HCl   iii) CCl_4 iv) NaCl

   A. (i) and (ii)   B. (ii) and (iii)   C. (iii) and (iv)

   D. (i) and (iii)   E. (i) and (iv)

59. The following reaction is used for the preparation of Oxygen gas in the laboratory.

$$2KClO_3(s) \xrightarrow[\text{Catalyst}]{\text{heat}} 2KCl(s) + 3O_2(g)$$
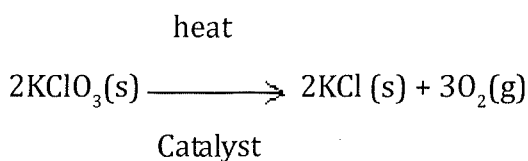
   Which of the following statement (s) is (are) correct about the reaction?

   A. It is a decomposition reaction and endothermic in nature

   B. It is a combination reaction.

   C. It is decomposition reaction and accompanied by release of heat.

   D. It is a photochemical decomposition reaction and exothermic in nature.

   E. It is a double displacement reaction.

60. Zinc reacts with silver nitrate to form which compounds?

   A. $Zn(NO_3)_2 + Ag$ B. $ZnNO_3 + Ag$ C. $AgNO_3 + Zn(NO_3)_2$

   D. $Ag + Zn(NO_3)_3$ E. $Ag(NO_3)_2 + ZnNO_3$

61. A dilute ferrous sulphate solution was gradually added to the beaker containing acidified permanganate solution. The light purple colour of the solution fades and finally disappears. Which of the following is the correct explanation for the observation?

   A. $KMnO_4$ is an oxidizing agent, it oxidises $FeSO_4$.

   B. $FeSO_4$ acts as an oxidizing agent and oxidises $KMnO_4$.

   C. The colour disappears due to dilution, no reaction is involved.

   D. $KMnO_4$ is an unstable compound and decomposes in presence of $FeSO_4$ to a colourless compound.

   E. $KMnO_4$ acts as a reducing agent.

62. Which of the following is the molecular formula of cyclobutane ?

   A. C_4H_{10} B. C_4H_6 C. C_4H_8

   D. C_4H_4 E. C_4H_5

63. Which of the following statements about graphite and diamond is true?

   A. They have the same crystal structure   B. They have the same degree of hardness

   C. They have the same electrical conductivity   D. They can undergo the same chemical reaction

   E. They have similar physical properties

64. The molecular formula of the first member in the homologous series of ketone.

   A. CH_3CO B. CH_3CH_2CO C. CH_3COCH_3

   D. $CH_3CH_2COCH_3$ E. none of these

-10-

65. Name the neutral atom in the periodic table which has the same number of electrons as K^+ and Cl^-

A. Argon   B. Helium   C. Neon

D. Krypton   E. Radon

66. An element X combines with oxygen to form an oxide XO. This oxide is electrically conducting. Write the formula of the compound formed when X reacts with chlorine.

A. XCl   B. XCl_3 C. XCl_2

D. XCl_5 E. X_2Cl

67. Which of the following set of elements is writtern in order of their increasing metallic character.

A. Na, Li, K   B. C, O, N   C. Mg, Al, Si

D. Be, Mg, Ca   E. None of these

68. Barium Chloride, on reacting with ammonium sulphate forms barium sulphate and ammonium chloride. Which of the following correctly represents the type of the reaction involved.

(i) Displacement reaction   (ii) Precipitation reaction (iii) combination reaction

(iv) double displacement reaction

A. (iv) only   B. (i) only   C. (ii) and (iv)

D. (ii) only   E. (i) and (ii)

69. Select the oxidising agent for the following reaction.

$H_2S + I_2 \longrightarrow 2HI + S$

A. I_2 B. H_2I C. HI

D. S   E. HI and H_2S

70. Which one of the following salts does not contain water of crystalisation?

A. Blue Vitroiol   B. Baking Soda   C. Washing Soda

D. Gypsum   E. Green Vitriol

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A. Blue Vitroiol   B. Baking Soda   C. Washing Soda

D. Gypsum   E. Green Vitriol

71. If OFFICE is coded as '264', how will you code 'UNABLE'

A. 264   B. 330   C. 350

D. 400   E. 303

72. A gardener fence around a square garden. If he used 10 fence pole on each side of the garden, then how many poles did he need altogether?

A. 40   B. 30   C. 44

D. 36   E. 48

73. Find the missing number
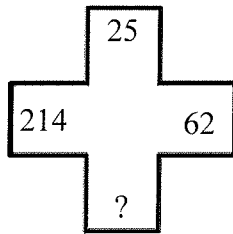
A. 120   B. 121   C. 122

D. 123   E. 124

74. In the following question one term in the number series is wrong. Find out the wrong term.

10, 16, 64, 5, 25, 125

A. 16   B. 5   C. 25

D. 10   E. 64

75. In the following question five group of letters, marked (A) to (E) are given, of which four are alike in some way, choose the one which is different.

A. ONP   B. LKM   C. IHJ

D. STR   E. XWY

76. Rani facing south - east moved 150m forward and turned 90^0 anticlockwise and moved 100m. Which direction is she facing now?

A. South - West   B. East   C. South

D. North   E. North - East

77. Pointing towards a person in a newspaper, Payal said, 'He is the only son of the father of my sister". How is that person related to Payal ?

A. Son   B. Father   C. Brother

D. Paternal uncle   E. Grand Father

78. If the 9th of the month falls on the day preceding sunday, on what day will the first of the month fall?

A. Friday   B. Saturday   C. Sunday

D. Monday   E. Wednesday

79. A Series is given, with one term missing. Choose the correct alternative from the given ones that will complete the series.

68, 81, 96, ? 132

A. 105   B. 110   C. 113

D. 130   E. 125

80. Mani is double the age of Prabhu. Ramona is half the age of Prabhu. If Mani is Sixty, find out the age of Ramona.

A. 20   B. 15   C. 10

D. 24   E. 30

◆◆◆