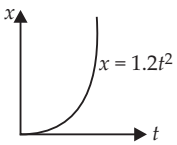
VERY SIMILAR
PRACTICE TEST 2

Time : 3 hrs. Max. Marks : 300

PHYSICS

1. Figure shows the distance-time graph of the motion of a car. It follows from the graph that the car is



(a) at rest
(b) in uniform motion
(c) in non-uniform motion
(d) uniformly accelerated.

2. Half-life of a radioactive substance is 20 minute. The time between 20% and 80% decay will be
(a) 20 min (b) 30 min
(c) 40 min (d) 25 min

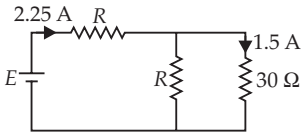
3. A particle is projected at 60° to the horizontal with a kinetic energy K. The kinetic energy at the highest point is
(a) K (b) zero (c) $\frac{K}{4}$ (d) $\frac{K}{2}$

4. Two waves coming from two coherent sources, having different intensities interfere. Their ratio of maximum intensity to the minimum intensity is 25. The intensities of the sources are in the ratio
(a) 25 : 1 (b) 25 : 16 (c) 9 : 4 (d) 5 : 1

5. If the energy, $E = G^p h^q c^r$, where G is the universal gravitational constant, h is the Planck's constant and c is the speed of light, then the values of p, q and r are, respectively
(a) $\frac{-1}{2}, \frac{1}{2}$ and $\frac{5}{2}$ (b) $\frac{1}{2}, \frac{-1}{2}$ and $\frac{-5}{2}$
(c) $\frac{-1}{2}, \frac{1}{2}$ and $\frac{3}{2}$ (d) $\frac{1}{2}, \frac{-1}{2}$ and $\frac{-3}{2}$

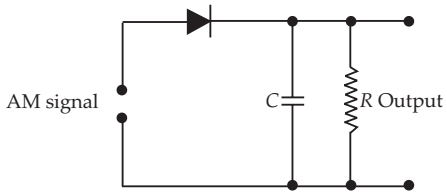
6. A body floats in water with one-third of its volume above the surface of water. If it is placed in oil, it floats with half of its volume above the surface of the oil. The specific gravity of oil is
(a) $\frac{5}{3}$ (b) $\frac{4}{3}$ (c) $\frac{3}{2}$ (d) 1

7. In the circuit shown, the value of



(a) $R = 15\ \Omega$ (b) $R = 30\ \Omega$
(c) $E = 36$ V (d) $E = 180$ V

8. Given below is the circuit diagram of an AM demodulator. For good demodulation of AM signal of carrier frequency υ, the value of RC should be



(a) $RC = \frac{1}{\upsilon}$ (b) $RC < \frac{1}{\upsilon}$
(c) $RC \leq \frac{1}{\upsilon}$ (d) $RC >> \frac{1}{\upsilon}$

9. The third overtone of an open organ pipe is in resonance with the second overtone of a closed organ pipe. If the length of the open pipe is 8 cm, then the length of the closed pipe is
(a) 10 cm (b) 8 cm (c) 12 cm (d) 5 cm

10. The ratio of de Broglie wavelength of a proton and an α particle accelerated through the same potential difference is
(a) $3\sqrt{2}$ (b) $2\sqrt{2}$ (c) $2\sqrt{3}$ (d) $2\sqrt{5}$

11. Two massless springs of force constants k_1 and k_2 are joined end to end. The resultant force constant K of the system is

(a) $\frac{k_1 + k_2}{k_1 k_2}$ (b) $k_1 + k_2$

(c) $\frac{k_1 k_2}{k_1 + k_2}$ (d) $\frac{k_1 k_2}{k_1 - k_2}$

12. The current gain of a transistor in a common base arrangement is 0.98. Find the change in collector current corresponding to a change of 5.0 mA in emitter current. What would be the change in base current?
(a) 4.9 mA, 0.1 mA (b) 4.9 mA, 0.2 mA
(c) 5.9 mA , 0.3 mA (d) 5.9 mA, 0.8 mA

13. A particle is executing linear simple harmonic motion. The fraction of the total energy to its potential energy, when its displacement is $\frac{1}{2}$ of its amplitude is
(a) $\frac{1}{16}$ (b) $\frac{1}{8}$ (c) $\frac{1}{2}$ (d) $\frac{1}{4}$

14. A convex lens of focal length 20 cm made of glass of refractive index 1.5 is immersed in water having refractive index 1.33. The change in the focal length of lens is
(a) 62.2 cm (b) 5.82 cm
(c) 58.2 cm (d) 6.22 cm

15. A black body has maximum wavelength λ_m at 2000 K. Its corresponding wavelength at 3000 K will be
(a) $\frac{3}{2}\lambda_m$ (b) $\frac{2}{3}\lambda_m$ (c) $\frac{16}{81}\lambda_m$ (d) $\frac{81}{16}\lambda_m$

16. The plates of a parallel plate capacitor are charged up to 100 V. A 2 mm thick plate is inserted between the plates, then to maintain the same potential difference, the distance between the capacitor plates is increased by 1.6 mm. The dielectric constant of the plate is
(a) 5 (b) 1.25 (c) 4 (d) 2.5

17. A body starting from rest moves with constant acceleration. The ratio of distance covered by the body during the 5^{th} second to that covered in 5 seconds is
(a) $\frac{9}{25}$ (b) $\frac{3}{25}$ (c) $\frac{25}{9}$ (d) $\frac{1}{25}$

18. The specific heat c of a solid at low temperature shows temperature dependence according to the relation $c = DT^3$ where D is a constant and T is the temperature in kelvin. A piece of this solid of mass m kg is taken and its temperature is raised from 20 K to 30 K. The amount of heat required in the process in energy units is
(a) $5 \times 10^4\ Dm$ (b) $(33/4) \times 10^4\ Dm$
(c) $(65/4) \times 10^4\ Dm$ (d) $(5/4) \times 10^4\ Dm$

19. The instantaneous magnetic flux ϕ in a circuit is $\phi = 4t^2 - 4t + 1$ Wb
The total resistance of the circuit is 10 Ω. At $t = \frac{1}{2}$ s, the induced current in the circuit is
(a) 0 A (b) 0.6 A (c) 0.4 A (d) 0.2 A

20. The rms value of the electric field of the light coming from the sun is 720 N C^{-1}. The average total energy density of the electromagnetic wave is
(a) 3.3×10^{-3} J m^{-3} (b) 4.58×10^{-6} J m^{-3}
(c) 6.37×10^{-9} J m^{-3} (d) 81.35×10^{-12} J m^{-3}.

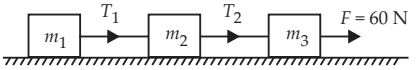
NUMERICAL VALUE TYPE

21. A geostationary satellite is orbiting the earth at a height of 6R from the surface of the earth, where R is the radius of the earth. The time period of another satellite at a height of 2.5R from the surface of the earth is $\sqrt{2} \times n$ hours. The value of n is _____.

22. A solid sphere of radius R has a charge Q distributed in its volume with a charge density $\rho = \kappa r^a$, where κ and a are constants and r is the distance from its centre. If the electric field at $r = R/2$ is 1/8 times that at $r = R$, the value of a is _____.

23. An ideal monoatomic gas is compressed adiabatically to $\left(\frac{1}{8}\right)^{th}$ of its initial volume. If the initial temperature of the gas is T_i (in Kelvin) and the final temperature is aT_i, then the value of a will be _____.

24. Three blocks of masses m_1, m_2 and m_3 are connected by massless string as shown in the figure on a frictionless table. They are pulled with a force $F = 60$ N. If $m_1 = 10$ kg, $m_2 = 20$ kg and $m_3 = 30$ kg, then the ratio $\frac{T_2}{T_1}$ is _____.



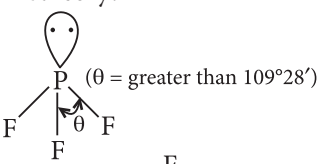
25. A capacitor and a coil in series are connected to a 6 volt AC source. By varying the frequency of the source, maximum current of 600 mA is

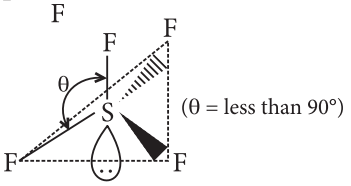
observed. If the same coil is now connected to a cell of emf 6 V and internal resistance of 2 Ω, then the current through it will be _____ A.

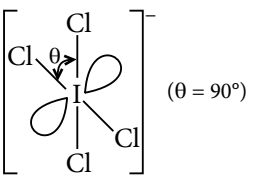
CHEMISTRY

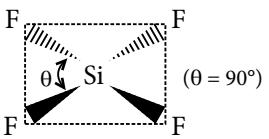
26. When copper pyrites is roasted in excess of air, a mixture of CuO and FeO is formed. FeO is present as impurities. This can be removed as slag during reduction of CuO. The flux added to form slag is
(a) SiO_2, which is an acidic flux
(b) lime stone, which is a basic flux
(c) SiO_2, which is a basic flux
(d) CaO, which is a basic flux.

27. Which of the following structure is correctly drawn according to fundamental idea of VSEPR theory?

(a) 

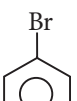
(b) 

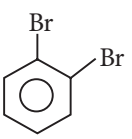
(c) 

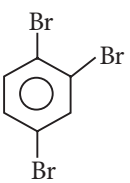
(d) 

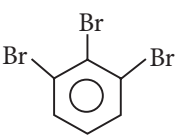
28. Identify *Z* in the following reactions :

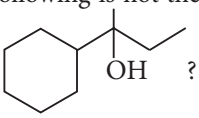
$$C_6H_5NH_2 \xrightarrow[280\ K]{NaNO_2/HCl} X \xrightarrow{CuBr/HBr} Z$$

(a) 

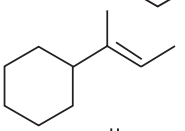
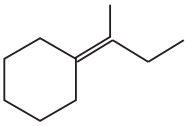
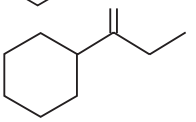
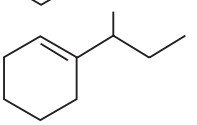
(b) 

(c) 

(d) 

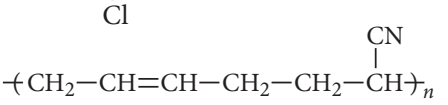
29. Which of the following is not the product of dehydration of 

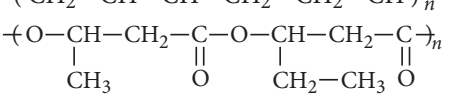
?

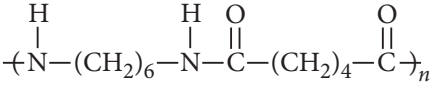
(a) 
(b) 
(c) 
(d) 

30. In the hydrolytic equilibrium,
$A^- + H_2O \rightleftharpoons HA + OH^-$
$K_a = 1.0 \times 10^{-5}$. The degree of hydrolysis of a 0.001 M solution of the salt is (a) 10^{-2} (b) 10^{-3} (c) 10^{-4} (d) 10^{-5}

31. Which of the following is a biodegradable polymer?

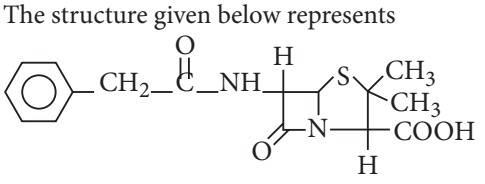
(b) 

(c) 

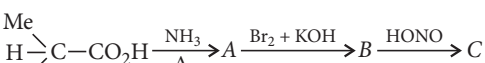
(d) 

32. Which of the following reactions is not associated with the Solvay process of manufacture of sodium carbonate?
(a) $CO_2 + H_2O \longrightarrow H_2CO_3$
(b) $NH_3 + H_2CO_3 \longrightarrow NH_4HCO_3$
(c) $NaCl + NH_4HCO_3 \longrightarrow NaHCO_3 + NH_4Cl$
(d) $2NaOH + CO_2 \longrightarrow Na_2CO_3 + H_2O$

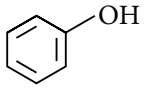
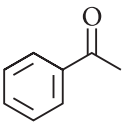
33. The structure given below represents

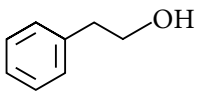
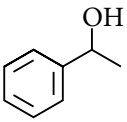


(a) Penicillin-F (b) Penicillin-G
(c) Penicillin-K (d) Ampicillin

34. 

The end product *C* is

(a)  (b) 

(c)  (d) 

35. The ions O^{2-}, F^-, Na^+, Mg^{2+} and Al^{3+} are isoelectronic. Their ionic radii show
(a) a decrease from O^{2-} to F^- and then increase from Na^+ to Al^{3+}
(b) a significant increase from O^{2-} to Al^{3+}
(c) a significant decrease from O^{2-} to Al^{3+}
(d) an increase from O^{2-} to F^- and then decrease from Na^+ to Al^{3+}.

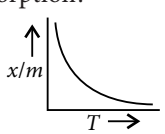
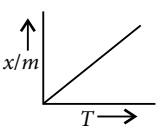
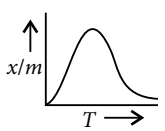
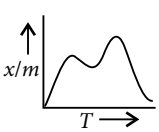
36. If the freezing point of a 0.01 molal aqueous solution of a cobalt(III) chloride-ammonia complex (which behaves as a strong electrolyte) is –0.0558°C, formula of complex is
[K_f of water = 1.86 K kg mol^{-1}]
(a) $[Co(NH_3)_5Cl]Cl_2$ (b) $[Co(NH_3)_4Cl_2]Cl$
(c) $[Co(NH_3)_3Cl_3]$ (d) $[Co(NH_3)_6]Cl_3$

37. Which of the given values is twice of the equivalent mass of the oxidising agent of the given reaction,

$$SO_2 + 2H_2S \longrightarrow 3S + 2H_2O$$

(a) 64 (b) 32 (c) 16 (d) 48

38. The energy absorbed by each molecule (A_2) of a substance is 4.4×10^{-19} J and bond energy per molecule is 4.0×10^{-19} J. The kinetic energy of the molecule per atom will be
(a) 2.2×10^{-19} J (b) 2.0×10^{-19} J
(c) 4.0×10^{-20} J (d) 2.0×10^{-20} J

39. Which of the following represents physical adsorption?
(a)  (b) 
(c)  (d) 

40. Which of the following reactions is said to be entropy driven?
(a) Endothermic reaction with positive entropy change and high temperature
(b) Endothermic reaction with negative entropy change and low temperature
(c) Exothermic reaction with positive entropy change and high temperature
(d) Exothermic reaction with negative entropy change and low temperature

41. Sodium extract of which of the following compounds does not form blood red ppt. with aqueous $FeCl_3$?
(a) NH_2NH_2
(b) $NH_2-\underset{\underset{O}{\|}}{C}-NH_2$
(c) $CH_3-\underset{\underset{SH}{|}}{CH}-CH_2NH_2$
(d) Both (a) and (b)

42. Growth of fish is not as healthy in warm water as in cold water because
(a) the amount of D.O. in warm water is higher than in cold water
(b) warm water is not liked by fish
(c) cold water contains more marine plants
(d) the amount of D.O. in warm water is less than in cold water.

43. White phosphorus on reaction with lime water gives calcium salt of an acid (*A*) along with a gas (*X*). Which of the following statements is correct?
(a) (*A*) on heating gives (*X*) and O_2.
(b) The bond angle in (*X*) is less than that in case of ammonia.
(c) (*A*) is a dibasic acid.
(d) (*X*) is more basic than ammonia.

44. MnO_4^- is of intense pink colour, though Mn is in (+7) oxidation state. It is due to
(a) oxygen gives colour to it.
(b) charge transfer when oxygen gives its electron to Mn making it Mn (+VI) hence, coloured.
(c) charge transfer when Mn gives its electron to oxygen.
(d) none of the above is correct.

45. $CH_3-C\equiv C-H \xrightarrow{2HCl} A \xrightarrow{Zn} B$; *B* is
(a) $CH_3-C\equiv C-H$
(b) $CH_3-C\equiv C-CH_3$
(c) $CH_3-CH=CH_2$
(d) $\begin{matrix} CH_3 & & CH_3 \\ & \diagdown \quad \diagup & \\ & C=C & \\ & \diagup \quad \diagdown & \\ CH_3 & & CH_3 \end{matrix}$

NUMERICAL VALUE TYPE

46. A metal (atomic mass = 75 g mol^{-1}) crystallizes in cubic lattice and the edge length of unit cell is 5Å. If the density of the metal is 2 g cm^{-3} then the radius of metal atom (in pm) is _____.

47. Out of N_2O, SO_2, I_3^+, I_3^-, H_2O, NO_2^-, N_3^-, the number of linear species is _____.

48. The rate constant for the first order decomposition of H_2O_2 is given by the following equation :

$$\log k = 14.2 - \frac{1.0\times10^4}{T}\text{K}$$

The multiplication of E_a for this reaction and rate constant k if its half-life period is 200 minutes is _____.

49. The total number of cyclic isomers possible for a hydrocarbon with the molecular formula C_4H_6 is ____.

50. The number of possible isomers of the complex, $Pt(NH_3)_2(SCN)_2$ is ____.

MATHEMATICS

51. The range of the function

$f(x) = \sin[x], -\frac{\pi}{4} \le x \le \frac{\pi}{4}$ where $[x]$ denotes the greatest integer is

(a) $\{0\}$ (b) $\{0, -1\}$
(c) $\{0, \pm \sin 1\}$ (d) $\{0, -\sin 1\}$

52. The least value of natural number n satisfying $C(n, 5) + C(n, 6) > C(n + 1, 5)$ is
(a) 11 (b) 10 (c) 12 (d) 13

53. If tangent to the curve $y^2 = x^3$ at its point (m^2, m^3) is also normal to the curve at (M^2, M^3), then what is the value of mM ?

(a) $-\frac{4}{9}$ (b) $-\frac{2}{9}$ (c) $-\frac{1}{3}$ (d) 1

54. If the $(r + 1)^{th}$ term in the expansion of $\left(\sqrt[3]{\frac{a}{\sqrt{b}}} + \sqrt{\frac{b}{\sqrt[3]{a}}}\right)^{21}$ has the same power of a and b, then the value of r is
(a) 9 (b) 10 (c) 8 (d) 6

55. The value of $\int_0^{\pi/2} \frac{dx}{1+\cot x}$ is
(a) $\pi/4$ (b) $\pi/2$ (c) 0 (d) π

56. If $f(x) = a|\sin x| + be^{|x|} + c|x|^3$ and if $f(x)$ is differentiable at $x = 0$, then
(a) $b = 0, c = 0, a$ is any real
(b) $a = 0, b = 0, c$ is any real
(c) $c = 0, a = 0, b$ is any real
(d) $a + b = 0$

57. The minor axis of the ellipse with foci $(\pm 2, 0)$ and eccentricity $\frac{1}{3}$ is
(a) 4 (b) 3 (c) $8\sqrt{2}$ (d) $4\sqrt{2}$

58. If $x^2 - 2x\cos\theta + 1 = 0$ then, $x^{2n} - 2x^n \cos n\theta + 1$ is equal to
(a) $\cos 2n\theta$ (b) $\sin 2n\theta$
(c) 0 (d) $R - \{0\}$

59. In an experiment with 15 observations on x, the following results were available.
$\Sigma x^2 = 2830$, $\Sigma x = 170$
One observation that was 20 was found to be wrong and was replaced by the correct value 30. Then the corrected variance is
(a) 78 (b) 188.66
(c) 177.33 (d) 8.33

60. If $\sin x + \sin^2 x = 1$, then the value of $\cos^{12}x + 3\cos^{10}x + 3\cos^8 x + \cos^6 x - 2$ is equal to
(a) 0 (b) 1 (c) – 1 (d) 2

61. $\lim_{x\to\infty}\left(\sqrt{x+\sqrt{x+\sqrt{x}}} - \sqrt{x}\right) =$
(a) ∞ (b) 0 (c) 1 (d) $\frac{1}{2}$

62. If $\frac{1}{p+q}, \frac{1}{r+p}, \frac{1}{q+r}$ are in A.P., then
(a) p, q, r are in A.P.
(b) p^2, q^2, r^2 are in A.P.
(c) $\frac{1}{p}, \frac{1}{q}, \frac{1}{r}$ are in A.P.
(d) None of these

63. $\begin{vmatrix} 1+i & 1-i & i \\ 1-i & i & 1+i \\ i & 1+i & 1-i \end{vmatrix} =$
(a) $-4 - 7i$ (b) $4 + 7i$
(c) $3 + 7i$ (d) $7 + 4i$

64. The locus of the midpoint of the intercept of the line $x\cos\alpha + y\sin\alpha = p$ between the coordinate axes is
(a) $x^{-2} + y^{-2} = 4p^{-2}$ (b) $x^{-2} + y^{-2} = p^{-2}$
(c) $x^2 + y^2 = 4p^{-2}$ (d) $x^2 + y^2 = p^2$

65. The area of the region bounded by the curves $y = x^3$, $y = \frac{1}{x}$, $x = 2$ is

(a) $4 - \log_e 2$ (b) $\frac{1}{4} + \log_e 2$

(c) $3 - \log_e 2$ (d) $\frac{15}{4} - \log_e 2$

66. If $\tan\theta - \cot\theta = a$ and $\sin\theta + \cos\theta = b$, then $(b^2 - 1)^2(a^2 + 4)$ is equal to

(a) 2 (b) – 4 (c) 3 (d) 4

67. For the binomial distribution $(p + q)^n$, whose mean is 20 and variance is 16, pair (n, p) is

(a) $\left(100, \frac{1}{5}\right)$ (b) $\left(100, \frac{2}{5}\right)$

(c) $\left(50, \frac{1}{5}\right)$ (d) $\left(50, \frac{2}{5}\right)$

68. If n is a natural number, then

(a) $1^2 + 2^2 + ... + n^2 < n^3/3$

(b) $1^2 + 2^2 + ... + n^2 = n^3/3$

(c) $1^2 + 2^2 + ... + n^2 > n^3$

(d) $1^2 + 2^2 + ... + n^2 > n^3/3$

69. If the lines $\frac{1-x}{3} = \frac{y-2}{2\alpha} = \frac{z-3}{2}$ and $\frac{x-1}{3\alpha} = y - 1 = \frac{6-z}{5}$ are perpendicular, then the value of α is

(a) $\frac{-10}{7}$ (b) $\frac{10}{7}$ (c) $\frac{-10}{11}$ (d) $\frac{10}{11}$

70. If a is an arbitrary constant, then the solution of the differential equation $\frac{dy}{dx} + \sqrt{\frac{1-y^2}{1-x^2}} = 0$ is

(a) $y\sqrt{1-y^2} + x\sqrt{1-x^2} = a$

(b) $x\sqrt{1-y^2} + y\sqrt{1-x^2} = a$

(c) $x\sqrt{1-y^2} - y\sqrt{1-x^2} = a$

(d) $y\sqrt{1-y^2} - x\sqrt{1-x^2} = a$

NUMERICAL VALUE TYPE

71. If $2 - i$ is a root of the equation $ax^2 + 12x + b = 0$ (where a and b are real), then the value of ab is _____ .

72. If $\begin{bmatrix} \cos\frac{2\pi}{3} & -\sin\frac{2\pi}{3} \\ \sin\frac{2\pi}{3} & \cos\frac{2\pi}{3} \end{bmatrix}^k = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ then the least value of k equals $(k \neq 0)$

73. The shortest distance between the z-axis and the line, $x + y + 2z - 3 = 0$, $2x + 3y + 4z - 4 = 0$ is _____ .

74. If $(\vec{a} \times \vec{b})^2 + (\vec{a} \cdot \vec{b})^2 = 144$ and $|\vec{a}| = 4$, then $|\vec{b}|$ is _____.

75. The sum of the terms of an infinitely decreasing G.P. is equal to the greatest value of the function $f(x) = x^3 + 3x - 9$ on the interval $[-4, 3]$ and the difference between the first and second terms is $f'(0)$. Then the value of $3r$ (where r is common ratio) is .

Practice Test-2

- Use Blue/Black ball point pen only for marking responses.
- Mark only one choice for each question as indicated.

Correct marking ● ⓑ ⓒ ⓓ

Wrong marking ⊗ ⊘ ◐ ◉

1.	ⓐ	ⓑ	ⓒ	ⓓ	26.	ⓐ	ⓑ	ⓒ	ⓓ	51.	ⓐ	ⓑ	ⓒ	ⓓ
2.	ⓐ	ⓑ	ⓒ	ⓓ	27.	ⓐ	ⓑ	ⓒ	ⓓ	52.	ⓐ	ⓑ	ⓒ	ⓓ
3.	ⓐ	ⓑ	ⓒ	ⓓ	28.	ⓐ	ⓑ	ⓒ	ⓓ	53.	ⓐ	ⓑ	ⓒ	ⓓ
4.	ⓐ	ⓑ	ⓒ	ⓓ	29.	ⓐ	ⓑ	ⓒ	ⓓ	54.	ⓐ	ⓑ	ⓒ	ⓓ
5.	ⓐ	ⓑ	ⓒ	ⓓ	30.	ⓐ	ⓑ	ⓒ	ⓓ	55.	ⓐ	ⓑ	ⓒ	ⓓ
6.	ⓐ	ⓑ	ⓒ	ⓓ	31.	ⓐ	ⓑ	ⓒ	ⓓ	56.	ⓐ	ⓑ	ⓒ	ⓓ
7.	ⓐ	ⓑ	ⓒ	ⓓ	32.	ⓐ	ⓑ	ⓒ	ⓓ	57.	ⓐ	ⓑ	ⓒ	ⓓ
8.	ⓐ	ⓑ	ⓒ	ⓓ	33.	ⓐ	ⓑ	ⓒ	ⓓ	58.	ⓐ	ⓑ	ⓒ	ⓓ
9.	ⓐ	ⓑ	ⓒ	ⓓ	34.	ⓐ	ⓑ	ⓒ	ⓓ	59.	ⓐ	ⓑ	ⓒ	ⓓ
10.	ⓐ	ⓑ	ⓒ	ⓓ	35.	ⓐ	ⓑ	ⓒ	ⓓ	60.	ⓐ	ⓑ	ⓒ	ⓓ
11.	ⓐ	ⓑ	ⓒ	ⓓ	36.	ⓐ	ⓑ	ⓒ	ⓓ	61.	ⓐ	ⓑ	ⓒ	ⓓ
12.	ⓐ	ⓑ	ⓒ	ⓓ	37.	ⓐ	ⓑ	ⓒ	ⓓ	62.	ⓐ	ⓑ	ⓒ	ⓓ
13.	ⓐ	ⓑ	ⓒ	ⓓ	38.	ⓐ	ⓑ	ⓒ	ⓓ	63.	ⓐ	ⓑ	ⓒ	ⓓ
14.	ⓐ	ⓑ	ⓒ	ⓓ	39.	ⓐ	ⓑ	ⓒ	ⓓ	64.	ⓐ	ⓑ	ⓒ	ⓓ
15.	ⓐ	ⓑ	ⓒ	ⓓ	40.	ⓐ	ⓑ	ⓒ	ⓓ	65.	ⓐ	ⓑ	ⓒ	ⓓ
16.	ⓐ	ⓑ	ⓒ	ⓓ	41.	ⓐ	ⓑ	ⓒ	ⓓ	66.	ⓐ	ⓑ	ⓒ	ⓓ
17.	ⓐ	ⓑ	ⓒ	ⓓ	42.	ⓐ	ⓑ	ⓒ	ⓓ	67.	ⓐ	ⓑ	ⓒ	ⓓ
18.	ⓐ	ⓑ	ⓒ	ⓓ	43.	ⓐ	ⓑ	ⓒ	ⓓ	68.	ⓐ	ⓑ	ⓒ	ⓓ
19.	ⓐ	ⓑ	ⓒ	ⓓ	44.	ⓐ	ⓑ	ⓒ	ⓓ	69.	ⓐ	ⓑ	ⓒ	ⓓ
20.	ⓐ	ⓑ	ⓒ	ⓓ	45.	ⓐ	ⓑ	ⓒ	ⓓ	70.	ⓐ	ⓑ	ⓒ	ⓓ
21.					46.					71.				
22.					47.					72.				
23.					48.					73.				
24.					49.					74.				
25.					50.					75.				