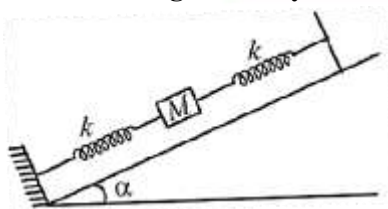


PART-I : PHYSICS

- The amplitude of magnetic field in an electromagnetic wave propagating along y-axis is 6.0×10^{-7} T. The maximum value of electric field in the electromagnetic wave is:
 - $5 \times 10^{14} \text{Vm}^{-1}$
 - 180Vm^{-1}
 - $2 \times 10^{15} \text{Vm}^{-1}$
 - $6.0 \times 10^{-7} \text{Vm}^{-1}$
- The ratio of powers of two motors is $\frac{3\sqrt{x}}{\sqrt{x}+1}$, that are capable of raising 300 kg water in 5 minutes and 50 kg water in 2 minutes respectively from a well of 100 m deep. The value of x will be
 - 2
 - 4
 - 2.4
 - 16
- The electric intensity due to a dipole of length 10 cm and having a charge of $500 \mu\text{C}$, at a point on the axis at a distance 20 cm from one of the charges in air, is
 - $6.25 \times 10^7 \text{ N/C}$
 - $9.28 \times 10^7 \text{ N/C}$
 - $13.1 \times 10^{11} \text{ N/C}$
 - $20.5 \times 10^7 \text{ N/C}$
- If the rms speed of oxygen molecules at 0°C is 160 m/s, find the rms speed of hydrogen molecules at 0°C .
 - 640 m/s
 - 40 m/s
 - 80 m/s
 - 332 m/s
- Focal length of a convex lens of refractive index 1.5 is 2 cm . Focal length of the lens when immersed in a liquid of refractive index of 1.25 will be
 - 10 cm
 - 2.5 cm
 - 5 cm
 - 7.5 cm
- If E and G respectively denote energy and gravitational constant, then $\frac{E}{G}$ has the dimensions of
 - $[\text{M}^2][\text{L}^{-2}][\text{T}^{-1}]$
 - $[\text{M}^2][\text{L}^{-1}][\text{T}^0]$
 - $[\text{M}][\text{L}^{-1}][\text{T}^{-1}]$
 - $[\text{M}][\text{L}^0][\text{T}^0]$
- Light of frequency 1.5 times the threshold frequency is incident on a photosensitive material. What will be the photoelectric current if the frequency is halved and intensity is doubled?
 - four times
 - one-fourth
 - zero
 - doubled
- The centre of mass of a system of particles does not depend upon
 - masses of the particles
 - forces acting on the particles
 - position of the particles
 - relative distances between the particles
- In the given figure, a body of mass M is held between two massless springs, on a smooth inclined plane. The free ends of the springs are attached to firm supports. If each spring has spring constant k , the frequency of oscillation of given body is :



- $\frac{1}{2\pi} \sqrt{\frac{k}{2M}}$
- $\frac{1}{2\pi} \sqrt{\frac{2k}{Mg \sin \alpha}}$
- $\frac{1}{2\pi} \sqrt{\frac{2k}{M}}$
- $\frac{1}{2\pi} \sqrt{\frac{k}{Mg \sin \alpha}}$

- A parallel plate capacitor has a uniform electric field E in the space between the plates. If the distance between the plates is d and area of each plate is A , the energy stored in the capacitor is :

- (a) $\frac{1}{2} \epsilon_0 E^2$ (b) $E^2 Ad / \epsilon_0$
 (c) $\frac{1}{2} \epsilon_0 E^2 Ad$ (d) $\epsilon_0 EAd$

11. The height y and the distance x along the horizontal plane of a projectile on a certain planet [with no surrounding atmosphere] are given by $y = [5t - 8t^2]$ metre and $x = 12t$ metre where t is the time in second. The velocity with which the projectile is projected, is:
 (a) 5 m/s (b) 12 m/s
 (c) 13 m/s (d) not obtainable from the data
12. A square loop of side 1 m and resistance 1Ω is placed in a magnetic field of 0.5 T. If the plane of loop is perpendicular to the direction of magnetic field, the magnetic flux through the loop is:
 (a) 0.5 weber (b) 1 weber
 (c) Zero weber (d) 2 weber
13. A car moves at a speed of 20 ms^{-1} on a banked track and describes an arc of a circle of radius $40\sqrt{3}$ m. The angle of banking is ($g = 10 \text{ ms}^{-2}$)
 (a) 25° (b) 60°
 (c) 45° (d) 30°
14. A closed organ pipe has a fundamental frequency of 1.5 kHz. The number of overtones that can be distinctly heard by a person with this organ pipe will be: (Assume that the highest frequency a person can hear is 20,000 Hz)
 (a) 6 (b) 4
 (c) 7 (d) 5
15. From Ampere's circuital law for a long straight wire of circular cross-section carrying a steady current, the variation of magnetic field in the inside and outside region of the wire is:
 (a) a linearly increasing function of distance upto the boundary of the wire and then linearly decreasing for the outside region.
 (b) a linearly increasing function of distance r upto the boundary of the wire and then decreasing one with $1/r$ dependence for the outside region.
 (c) a linearly decreasing function of distance upto the boundary of the wire and then a linearly increasing one for the outside region.
 (d) uniform and remains constant for both the regions.
16. A wire of resistance 160Ω is melted and drawn in wire of one-fourth of its length. The new resistance of the wire will be
 (a) 10Ω (b) 640Ω
 (c) 40Ω (d) 16Ω
17. A block of mass M is pulled along a horizontal frictionless surface by a rope of mass m . If a force P is applied at the free end of the rope, the force exerted by the rope on the block is
 (a) $\frac{Pm}{M+m}$ (b) $\frac{Pm}{M-m}$
 (c) P (d) $\frac{PM}{M+m}$
18. A 12 V, 60 W lamp is connected to the secondary of a step-down transformer, whose primary is connected to ac mains of 220 V. Assuming the transformer to be ideal, what is the current in the primary winding?
 (a) 0.27 A (b) 2.7 A
 (c) 3.7 A (d) 0.37 A
19. If $\vec{F}$ is the force acting on a particle having position vector $\vec{r}$ and $\vec{\tau}$ be the torque of this force about the origin, then:
 (a) $\vec{r} \cdot \vec{\tau} > 0$ and $\vec{F} \cdot \vec{\tau} < 0$
 (b) $\vec{r} \cdot \vec{\tau} = 0$ and $\vec{F} \cdot \vec{\tau} = 0$

(c) $\vec{r} \cdot \vec{\tau} = 0$ and $\vec{F} \cdot \vec{\tau} \neq 0$

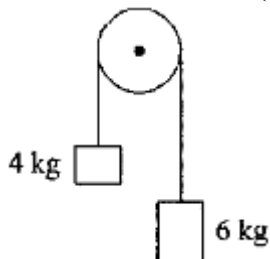
(d) $\vec{r} \cdot \vec{\tau} \neq 0$ and $\vec{F} \cdot \vec{\tau} = 0$

20. If the nucleus ${}^{27}_{13}\text{Al}$ has nuclear radius of about 3.6 fm, then ${}^{125}_{32}\text{Te}$ would have its radius approximately as

(a) 9.6 fm (b) 12.0 fm

(c) 4.8 fm (d) 6.0 fm

21. Two bodies of mass 4 kg and 6 kg are tied to the ends of a massless string. The string passes over a pulley which is frictionless (see figure). The acceleration of the system in terms of acceleration due to gravity (g) is:



(a) $g/2$ (b) $g/5$

(c) $g/10$ (d) g

22. In a Young's double slit experiment, a student observes 8 fringes in a certain segment of screen when a monochromatic light of 600 nm wavelength is used. If the wavelength of light is changed to 400 nm, then the number of fringes he would observe in the same region of the screen is:

(a) 8 (b) 9

(c) 12 (d) 6

23. In a reverse biased diode when the applied voltage changes by 1 V, the current is found to change by $0.5 \mu\text{A}$. The reverse bias resistance of the diode is

(a) $2 \times 10^5 \Omega$ (b) $2 \times 10^6 \Omega$

(c) 200Ω (d) 2Ω

24. A student measures the terminal potential difference (V) of a cell (of emf E and internal resistance r) as a function of the current (I) flowing through it. The slope and intercept, of the graph between V and I, then, respectively, equal:

(a) -r and E (b) r and -E

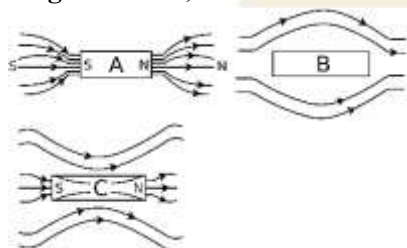
(c) -E and r (d) E and -r

25. Proton (P) and electron (e) will have same deBroglie wavelength when the ratio of their momentum is (assume, $m_p = 1849 m_e$)

(a) 1:43 (b) 43:1

(c) 1:1849 (d) 1:1

26. Three identical bars A, B and C are made of different magnetic materials. When kept in a uniform magnetic field, the field lines around them look as follows:



Make the correspondence of these bars with their material being diamagnetic (D), ferromagnetic (F) and paramagnetic (P):

(a) $A \leftrightarrow D, B \leftrightarrow P, C \leftrightarrow F$

(b) $A \leftrightarrow F, B \leftrightarrow D, C \leftrightarrow P$

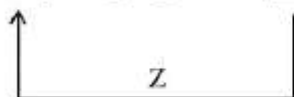
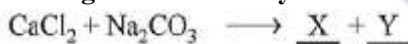
(c) $A \leftrightarrow P, B \leftrightarrow F, C \leftrightarrow D$

(d) $A \leftrightarrow F, B \leftrightarrow P, C \leftrightarrow D$

27. Two solid metal balls of radii r and $2r$ are falling with their terminal speeds in a viscoous liquid. What is the ratio of drag force acting on these two balls?
- (a) 1:2 (b) 1:4
(c) 1:8 (d) 4:1
28. A metre scale is balanced on a knife edge at its centre. When two coins, each of mass 10 g are put one on the top of the other at the 10.0 cm mark the scale is found to be balanced at 40.0 cm mark. The mass of the metre scale is found to be $x \times 10^{-2}$ kg. The value of x is
- (a) 6 (b) 12
(c) 18 (d) 24
29. The approximate height from the surface of earth at which the weight of the body becomes $\frac{1}{3}$ of its weight on the surface of earth is:
- [Radius of earth $R = 6400$ km and $\sqrt{3} = 1.732$]
- (a) 3840 km (b) 4685 km
(c) 2133 km (d) 4267 km
30. The length of a rubber cord is l_1 meter when tension is 4 N and l_2 meter when tension is 6 N respectively. The length when tension is 9 N is
- (a) $(6l_2 - 1.5l_1)$ m (b) $(3l_2 - 2l_1)$ m
(c) $(2.5l_1 - 3.5l_2)$ m (d) $(2.5l_2 - 1.5l_1)$ m

PART - II : CHEMISTRY

31. The equilibrium constant for the reaction $\text{SO}_3(\text{g}) \rightleftharpoons \text{SO}_2(\text{g}) + \frac{1}{2}\text{O}_2(\text{g})$ is $K_c = 4.9 \times 10^{-2}$. The value of K_c for the reaction given below is $2\text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{SO}_3(\text{g})$ is
- (a) 4.9 (b) 41.6
(c) 49 (d) 416
32. The complex that shows Facial - Meridional isomerism is
- (a) $[\text{Co}(\text{NH}_3)_3\text{Cl}_3]$ (b) $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]^+$
(c) $[\text{Co}(\text{en})_3]^{3+}$ (d) $[\text{Co}(\text{en})_2\text{Cl}_2]^+$
33. Identify the factor from the following that does not affect electrolytic conductance of a solution.
- (a) The nature of solvent used.
(b) Concentration of the electrolyte.
(c) The nature of the electrode used.
(d) The nature of the electrolyte added.
34. In the given reaction cycle



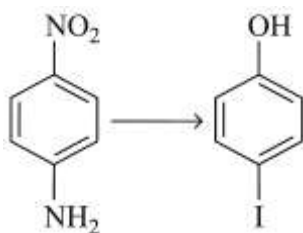
X, Y and Z respectively are

	X	Y	Z
(a)	CaO	NaCl + CO ₂	KCl
(b)	CaCO ₃	NaCl	KCl
(c)	CaCO ₃	NaCl	HCl
(d)	CaO	NaCl + CO ₂	NaCl

35. Allyl phenyl ether can be prepared by heating:

- (a) $\text{C}_6\text{H}_5\text{Br} + \text{CH}_2 = \text{CH} - \text{CH}_2 - \text{ONa}$
(b) $\text{CH}_2 = \text{CH} - \text{CH}_2 - \text{Br} + \text{C}_6\text{H}_5\text{ONa}$
(c) $\text{C}_6\text{H}_5 - \text{CH} = \text{CH} - \text{Br} + \text{CH}_3 - \text{ONa}$
(d) $\text{CH}_2 = \text{CH} - \text{Br} + \text{C}_6\text{H}_5 - \text{CH}_2 - \text{ONa}$

36. The correct sequential order of the reagents for the given reaction is :



- (a) $\text{HNO}_2, \text{Fe}/\text{H}^+, \text{HNO}_2, \text{KI}, \text{H}_2\text{O}/\text{H}^+$
 (b) $\text{HNO}_2, \text{KI}, \text{Fe}/\text{H}^+, \text{HNO}_2, \text{H}_2\text{O}/\text{warm}$
 (c) $\text{HNO}_2, \text{KI}, \text{HNO}_2, \text{Fe}/\text{H}^+, \text{H}_2\text{O}/\text{H}^+$
 (d) $\text{HNO}_2, \text{Fe}/\text{H}^+, \text{KI}, \text{HNO}_2, \text{H}_2\text{O}/\text{warm}$

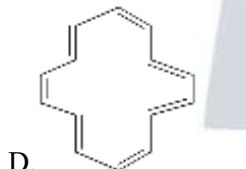
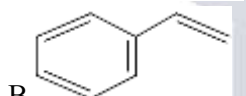
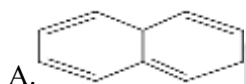
37. A sugar 'X' dehydrates very slowly under acidic condition to give furfural which on further reaction with resorcinol gives the coloured product after sometime. Sugar 'X' is

- (a) Aldopentose (b) Aldotetrose
 (c) Oxalic acid (d) Ketotetrose

38. A similarity between optical and geometrical isomerism is that

- (a) each forms equal number of isomers for a given compound
 (b) if in a compound one is present then so is the other
 (c) both are included in stereoisomerism
 (d) they have no similarity

39. Which of the following are aromatic?



- (a) B and D only (b) A and C only
 (c) A and B only (d) C and D only

40. $t_{1/4}$ can be taken as the time taken for the concentration of a reactant to drop to $3/4$ of its initial value. If the rate constant for a first order reaction is k , the $t_{1/4}$ can be written as

- (a) $0.75/k$ (b) $0.69/k$
 (c) $0.29/k$ (d) $0.10/k$

41. A sample of red ink (a colloidal suspension) is prepared by mixing eosin dye, egg white, HCHO and water. The component which ensures stability of the ink sample is :

- (a) Egg white (b) Water
 (c) HCHO (d) Eosin dye

42. At 300 K, the density of a certain gaseous molecule at 2 bar is double to that of dinitrogen (N_2) at 4 bar. The molar mass of gaseous molecule is:

- (a) 28 g mol^{-1} (b) 56 g mol^{-1}
 (c) 112 g mol^{-1} (d) 224 g mol^{-1}

43. $\text{S}(\text{g}) + \frac{3}{2} \text{O}_2(\text{g}) \rightarrow \text{SO}_3(\text{g}) + 2x \text{ kcal}$ $\text{SO}_2(\text{g}) + \frac{1}{2} \text{O}_2(\text{g}) \rightarrow \text{SO}_3(\text{g}) + y \text{ kcal}$ The heat of formation of $\text{SO}_2(\text{g})$ is given by:

- (a) $\frac{2x}{y} \text{ kcal}$ (b) $y - 2x \text{ kcal}$
 (c) $2x + y \text{ kcal}$ (d) $x + y \text{ kcal}$

44. Which of the following electronegativity order is incorrect?

- (a) $\text{Al} < \text{Mg} < \text{B} < \text{N}$
 (b) $\text{Al} < \text{Si} < \text{C} < \text{N}$
 (c) $\text{Mg} < \text{Be} < \text{B} < \text{N}$
 (d) $\text{S} < \text{Cl} < \text{O} < \text{F}$

45. What will be the decreasing order of basic strength of the following conjugate bases ?



- (a) $\text{Cl}^- > \text{OH}^- > \text{RO}^- > \text{CH}_3\text{COO}^-$
 (b) $\text{RO}^- > ^-\text{OH} > \text{CH}_3\text{COO}^- > \text{Cl}^-$
 (c) $^-\text{OH} > \text{RO}^- > \text{CH}_3\text{COO}^- > \text{Cl}^-$
 (d) $\text{Cl}^- > \text{RO}^- > ^-\text{OH} > \text{CH}_3\text{COO}^-$

46. 2-Hexene $\xrightarrow[\text{(ii) H}_2\text{O}]{\text{(i) O}_3}$ Products

The two products formed in above reaction are-

- (a) Butanoic acid and acetic acid
 (b) Butanal and acetic acid
 (c) Butanal and acetaldehyde
 (d) Butanoic acid and acetaldehyde

47. Preparation of potassium permanganate from MnO_2 involves two step process in which the 1st step is a reaction with KOH and KNO_3 to produce

- (a) $\text{K}_4[\text{Mn}(\text{OH})_6]$ (b) K_3MnO_4
 (c) KMnO_4 (d) K_2MnO_4

48. Arrange the carbanions, $(\text{CH}_3)_3\text{C}^-$, CCl_3^- , $(\text{CH}_3)_2\text{CH}^-$, $\text{C}_6\text{H}_5\text{CH}_2^-$ in order of their decreasing stability.

- (a) $(\text{CH}_3)_2\text{CH}^- > \text{CCl}_3^- > \text{C}_6\text{H}_5\text{CH}_2^- > (\text{CH}_3)_3\text{C}^-$
 (b) $\text{CCl}_3^- > \text{C}_6\text{H}_5\text{CH}_2^- > (\text{CH}_3)_2\text{CH}^- > (\text{CH}_3)_3\text{C}^-$
 (c) $(\text{CH}_3)_3\text{C}^- > (\text{CH}_3)_2\text{CH}^- > \text{C}_6\text{H}_5\text{CH}_2^- > \text{CCl}_3^-$
 (d) $\text{C}_6\text{H}_5\text{CH}_2^- > \text{CCl}_3^- > (\text{CH}_3)_3\text{C}^- > (\text{CH}_3)_2\text{CH}^-$

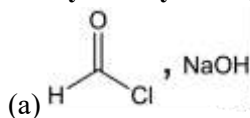
49. What pressure (bar) of H_2 would be required to make emf of hydrogen electrode zero in pure water at 25°C ?

- (a) 10^{-14} (b) 10^{-7}
 (c) 1 (d) 0.5

50. Element not showing variable oxidation state is:

- (a) Bromine (b) Iodine
 (c) Chlorine (d) Fluorine

51. Salicylaldehyde is synthesized from phenol, when reacted with



- (b) CO_2 , NaOH
 (c) CCl_4 , NaOH
 (d) HCCl_3 , NaOH

52. Reaction of trans 2-phenyl-1-bromocyclopentane on reaction with alcoholic KOH produces

- (a) 1-phenylcyclopentene
 (b) 3-phenylcyclopentene
 (c) 4-phenylcyclopentene
 (d) 2-phenylcyclopentene

53. An element has a face-centred cubic (fcc) structure with a cell edge of a . The distance between the centres of two nearest tetrahedral voids in the lattice is :

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

54. The correct set of four quantum numbers for the valence electrons of rubidium atom ($Z = 37$) is:

- (a) $5, 0, 0, +\frac{1}{2}$ (b) $5, 1, 0, +\frac{1}{2}$
(c) $5, 1, 1, +\frac{1}{2}$ (d) $5, 0, 1, +\frac{1}{2}$

55. Consider the ions/molecule O_2^+ , O_2 , O_2^- , O_2^{2-} . For increasing bond order the correct option is :

- (a) $O_2^{2-} < O_2^- < O_2 < O_2^+$
(b) $O_2^- < O_2^{2-} < O_2 < O_2^+$
(c) $O_2^- < O_2^{2-} < O_2^+ < O_2$
(d) $O_2^- < O_2^+ < O_2^{2-} < O_2$

56. Which one of the following is used as antihistamine?

- (a) Omeprazole (b) Chloranphenicol
(c) Diphenhydramine (d) Norethindrone

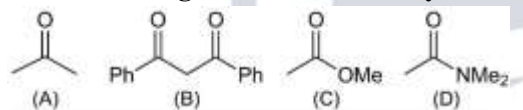
57. 2,4-DNP test can be used to identify

- (a) Aldehydes (b) Amines
(c) Ethers (d) Halogens

58. Thermal power plants can lead to :

- (a) Acid rain (b) Blue baby syndrome
(c) Ozone layer depletion (d) Eutrophication

59. The increasing order of the acidity of the α -hydrogen of the following compounds is :



- (a) (D) < (C) < (A) < (B)
(b) (B) < (C) < (A) < (D)
(c) (A) < (C) < (D) < (B)
(d) (C) < (A) < (B) < (D)

60. Which of the following mixing of 1 M base and 1 M acid leads to the largest increase in temperature?

- (a) 30 mL HCl and 30 mL NaOH
(b) 30 mL CH_3COOH and 30 mL NaOH
(c) 50 mL HCl and 20 mL NaOH
(d) 45 mL CH_3COOH and 25 mL NaOH

PART - III (A):

ENGLISH PROFICIENCY

DIRECTION (Q. 61): In the following question, four alternatives are given for the Idiom/Phrase underlined in the sentence. Choose the alternative which best expresses the meaning of the Idiom/Phrase.

61. After losing the final match, the team had to face the music from their disappointed coach.

- (a) Enjoy the praise
(b) Accept the punishment or criticism
(c) Dance to the tunes
(d) Start a new performance

DIRECTIONS (Qs. 62-63): In the question given below; the 1st and the last sentences /parts of the passage/sentence are numbered 1 and 6. The rest of the passage/ sentence is split into four parts and named P, Q, R and S. These four parts are not given in their proper order. Read the passage/ sentence and find out which of the four combinations is correct. Then find the correct answer:

62. 1. Creativity is not a talent reserved for a chosen few, but a skill that can be nurtured with practice and patience.

- (P) This often means allowing oneself to explore new ideas without the fear of judgment or failure.
 (Q) Like any skill, it flourishes in environments that encourage curiosity, risk-taking, and persistence.
 (R) Over time, these habits strengthen cognitive flexibility and deepen original thinking.
 (S) Engaging regularly in creative pursuits, even in small ways, builds confidence and resilience.
 6. Therefore, cultivating creativity is as much about mindset as it is about method.

- (a) QPSR (b) PQSR
 (c) QSRP (d) PSQR

63. (1) Human memory is not a perfect recorder of events.

- (P) Instead, memories are reconstructed, often influenced by our current beliefs and emotions.
 (Q) Studies show that people frequently misremember details of events they've experienced.
 (R) This explains why eyewitness testimonies can sometimes be unreliable.
 (S) Even vivid memories may change subtly each time we recall them.
 (6) Thus, memory is more malleable and subjective than we usually assume.

- (a) PSQR (b) SPQR
 (c) SQPR (d) PQSR

64. Choose the word opposite in meaning to the word given in capital.

WRANGLE

- (a) Argue (b) Fight
 (c) Agree (d) Dispute

65. Choose the word which is nearest in meaning to the given word.

Gaudy

- (a) Modest (b) Elegant
 (c) Dull (d) Flashy

DIRECTIONS(Qs. 66-67): Choose the most effective word from the given options to fill in the blank and make the sentence meaningfully complete.

66. In an age dominated by social media, the line between authentic emotion and performative___ has grown increasingly thin.

- (a) isolation (b) sympathy
 (c) outrage (d) detachment

67. The CEO's decision to resign was seen as a___ move, aimed at protecting the company's reputation during the scandal.

- (a) Cowardly (b) Tactical
 (c) Abrupt (d) Emotional

DIRECTIONS (Qs. 68-69): In the questions given below, find out the part of sentence which contains an error:

68. Hardly had the meeting begun

- (a) when the delegates
 (b) starts raising objections
 (c) to the proposed resolution.
 (d) No error

69. Scarcely had she stepped

- (a) out of the room when
 (b) she remembered she left
 (c) her phone on the table.
 (d) No error

DIRECTION (Q. 70): In a question below, a part of the sentence is underlined. Below are given alternatives to the underlined part at (a), (b),(c) which may improve the sentence. Choose the correct alternative. In case no improvement is needed, mark your answer as option (d).

70. She has been knowing the secret for several months.

- (a) knows (b) knew
 (c) has known (d) No improvement

PART - III (B) :

LOGICAL REASONING

DIRECTIONS (Qs 71-90) : On the following questions, select the related word/letters/numbers from the attractive

71. $\sqrt{AFI} = M : \sqrt{ADD} = L :: \sqrt{ABA} = ?$

- (a) I (b) N
(c) O (d) K

72. **AKP: 1121256:: LNO:?**

- (a) 196125144 (b) 144196225
(c) 144225196 (d) 41521196

73. **Find the odd one out:**

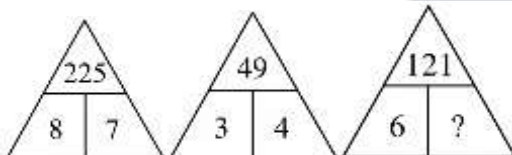
Ostrich, Crow, Pigeon, Sparrow.

- (a) Ostrich (b) Pigeon
(c) Crow (d) Sparrow

74. **If it is possible to form a word with the first, fourth, seventh and eleventh letters in the word 'SUPERFLUOUS, write the first letters of that word.**

- (a) O (b) E
(c) S (d) L

75. **Select the missing number from the given responses.**



- (a) 20 (c) 4
(b) 5 (d) 21

76. **If PALE is coded as 5293, EARTH is coded as 32681, how is PEARL coded in that code?**

- (a) 53269 (b) 53629
(c) 53829 (d) 53289

77. **Which one set of letters when sequentially placed at the gaps in the given letter series would complete it?**

fgg ___ gff ___ f ___ gfg ___ fgf

- (a) fgff (b) ccfc
(c) fgfg° (d) ffgg

DIRECTIONS (Qs. 78-79): In each questions below are given two statements followed by two conclusions numbered I and II. You have take the two given statements to be true even if they seem to be at variance with commonly known facts. Read the conclusions logically follows from the given statements disregarding commonly known facts. Give answer:

- (a) If only conclusion I follows.
(b) If only conclusion II follows.
(c) If either conclusion I or conclusion II follows.
(d) If neither conclusion I nor conclusion follows.
(e) If both conclusion I and li conclusion follow.

78. **Statement:**

All mangoes are grapes.
Some grapes are black.

Conclusion

- (I) Some mangoes being black is a possibility
(II) There is a possibility that some mangoes are not black

79. **Statement:**

Some dreams are nights
Some nights are days

Conclusion:

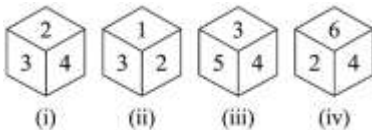
- (I) All days are either nights or dreams
(II) Some days are nights

80. Find the missing number from the given responses,

7	3	10
3	4	7
2	7	?
42	84	140

- (a) 2 (b) 17
(c) 9 (d) 34

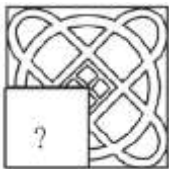
81. 1, 2, 3, 4, 5 and 6 have written on surface of dice. Four forms of dice shown below. In this dice which digit will be on the surface opposite to the digit 3?



- (a) 4 (b) 5
(c) 6 (d) 1

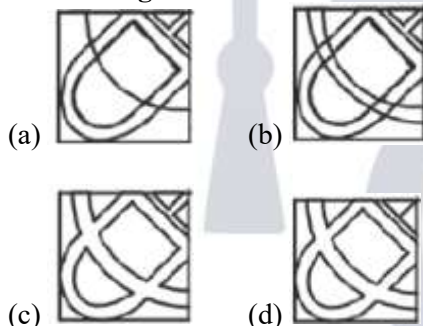
DIRECTION(Q. 82): Which answer figure complete the form in question figure ?

82. Question Figure:



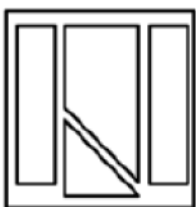
X

Answer Figures:

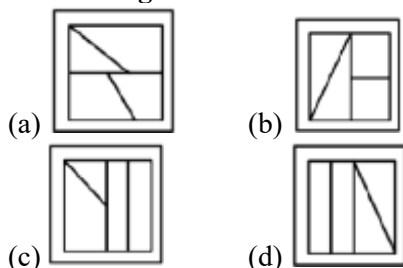


DIRECTION (Q. 83): Question figure and four answer figures marked (a), (b), (c) and (d) are given. Select the answer figure which can be formed from the cut-out pieces given in the question figure.

83. Question Figure:

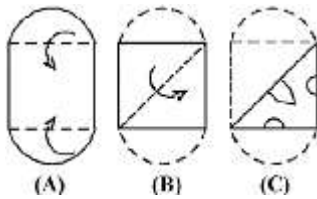


Answer Figures:

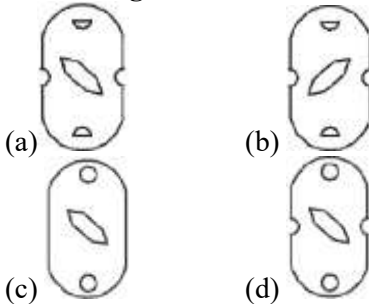


DIRECTION(Q. 84): Question consist set of 3 figures *A*, *B*, and *C* showing a sequence of folding of a piece of paper. Figure *C* shows manner in which paper has been cut. You have to choose a figure which would most closely resembled the unfolded form of *C*.

84. Question Figure:

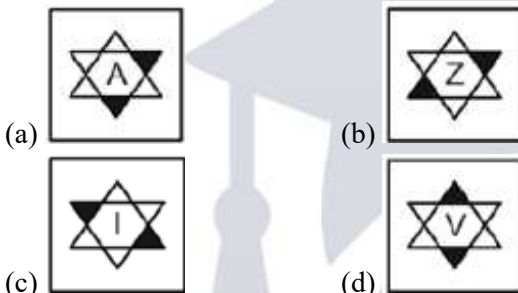


Answer-figure:



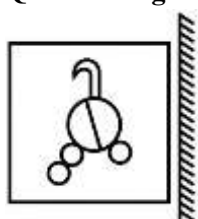
DIRECTION: In questions 85, four figures (a), (b), (c), (d) have been given in each question. Of these four figures three figures are similar in some way and one figure is different. Select the figure which is different.

85.

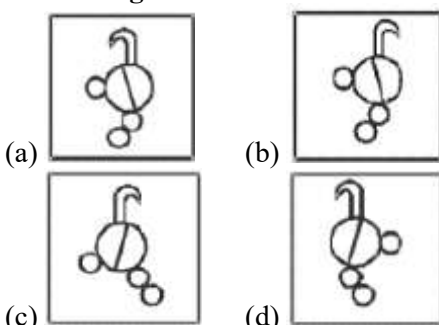


DIRECTION: In questions 86, there is a problem figure and four answer figures marked (a), (b), (c), (d) are given. Select the answer figure which is exactly the mirror image of the problem figure.

86. Question Figure:



Answer-figure:



87. Select the correct option that indicates the arrangement of the following words in a logical and meaningful order.

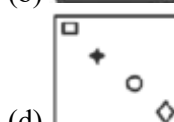
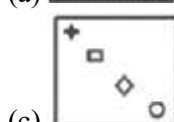
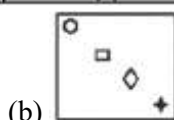
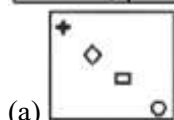
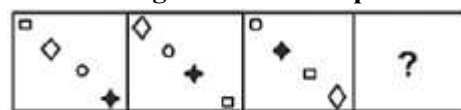
- | | |
|-------------------|-----------------------|
| (1) Drive vehicle | (2) Unlock vehicle |
| (3) Start vehicle | (4) Reach destination |

(5) Parking of vehicle

(a) 2,3,4,1,5 (b) 2,3,1,4,5

(c) 1,5,4,3,2 (d) 2,4,1,3,5

88. Select the figure that will replace the question mark (?) in the following figure series.



89. Deepika tells Shraddha "Your mother's father's son is the husband of my sister." How is Deepika related to Shraddha?

(a) Sister-in-law

(b) Cousin.

(c) Aunt

(d) Data inadequate

(e) None of these

90. Choose the correct alternative from the given ones that will complete the series.

Double, Triple, Quadruple, ?

(a) Quintuple

(b) Nonuple

(c) Sextuple

(d) Octuple

PART - IV : MATHEMATICS

91. Given the sets $A = \{1, 3, 5\}$, $B = \{2, 4, 6\}$ and $C = \{0, 2, 4, 6, 8\}$. Which of the following may be considered as universal set for all the three sets A , B and C ?

(a) $\{0, 1, 2, 3, 4, 5, 6\}$

(b) ϕ

(c) $\{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$

(d) $\{1, 2, 3, 4, 5, 6, 7, 8\}$

92. Which of the following relation is a function?

(a) $\{(a, b)(b, e)(c, e)(b, x)\}$

(b) $\{(a, d)(a, m)(b, e)(a, b)\}$

(c) $\{(a, d)(b, e)(c, d)(e, x)\}$

(d) $\{(a, d)(b, m)(b, y)(d, x)\}$

93. If $\sin A = \frac{3}{5}$ and A is in first quadrant, then the values of $\sin 2A$, $\cos 2A$ and $\tan 2A$ are

(a) $\frac{24}{25}, \frac{7}{25}, \frac{24}{7}$

(b) $\frac{1}{25}, \frac{7}{25}, \frac{1}{7}$

(c) $\frac{24}{25}, \frac{1}{25}, \frac{24}{7}$

(d) $\frac{1}{25}, \frac{24}{25}, \frac{1}{24}$

94. If $2\tan^2 \theta = \sec^2 \theta$, then general value of θ are

(a) $n\pi \pm \frac{\pi}{4}, n \in \mathbb{I}$

(b) $n\pi \pm \frac{\pi}{6}, n \in \mathbb{I}$

(c) $2n\pi + \frac{\pi}{4}, n \in \mathbb{I}$

(d) $2n\pi \pm \frac{\pi}{6}, n \in \mathbb{I}$

95. If $\left(\frac{1-i}{1+i}\right)^{100} = a + ib$ then

(a) $a = 2, b = -1$

(b) $a = 1, b = 0$

(c) $a = 0, b = 1$

(d) $a = -1, b = 2$

96. Let α, β be the roots of the equation $x^2 - \sqrt{2}x + \sqrt{6} = 0$ and $\frac{1}{\alpha^2} + 1, \frac{1}{\beta^2} + 1$ be the roots of the equation $x^2 + ax + b = 0$. Then the roots of the equation $x^2 - (a + b - 2)x + (a + b + 2) = 0$ are:

- (a) non-real complex numbers
- (b) real and both negative
- (c) real and both positive
- (d) real and exactly one of them is positive

97. The set of values of k for which the equation $4x^2 - 2x + k = 0$ has two roots lying in the interval $(-1, 1)$ is

- (a) $\left(-2, \frac{1}{4}\right]$
- (b) $(-6, \infty)$
- (c) $\left(-\infty, \frac{1}{4}\right]$
- (d) $(-2, \infty)$

98. The set of all x satisfying the inequality $\frac{4x-1}{3x+1} \geq 1$

- (a) $\left(-\infty, -\frac{1}{3}\right) \cup \left[\frac{1}{4}, \infty\right)$
- (b) $\left(-\infty, -\frac{2}{3}\right) \cup \left[\frac{5}{4}, \infty\right)$
- (c) $\left(-\infty, -\frac{1}{3}\right) \cup [2, \infty)$
- (d) $\left(-\infty, -\frac{2}{3}\right] \cup [4, \infty)$

99. The number of three digit numbers having only two consecutive digits identical is

- (a) 153
- (b) 162
- (c) 168
- (d) 163

100. The number of 3 digit numbers having at least one of their digit as 5 are

- (a) 250
- (b) 251
- (c) 252
- (d) 253

101. The smallest natural number n , such that the coefficient of x in the expansion of $\left(x^2 + \frac{1}{x^3}\right)^n$ is ${}^nC_{23}$, is :

- (a) 38
- (b) 58
- (c) 23
- (d) 35

102. If a, b, c are in G.P., then

- (a) a^2, b^2, c^2 are in G.P.
- (b) $a^2(b+c), c^2(a+b), b^2(a+c)$ are in G.P.
- (c) $\frac{a}{b+c}, \frac{b}{c+a}, \frac{c}{a+b}$ are in GP.
- (d) None of the above

103. If $A = 1 + r^a + r^{2a} + r^{3a} + \dots \infty$ and $B = 1 + r^b + r^{2b} + r^{3b} + \dots \infty$, then $\frac{a}{b}$ is equal to

- (a) $\log_B(A)$
- (b) $\log_{1-B}(1-A)$
- (c) $\log_{\frac{B-1}{B}}\left(\frac{A-1}{A}\right)$
- (d) None of these

104. If the point $P(x, y)$ is equidistant from the points $A(a+b, b-a)$ and $B(a-b, a+b)$, then

- (a) $ax = by$
- (b) $bx = ay$ and P can be (a, b)
- (c) $x^2 - y^2 = 2(ax + by)$
- (d) None of the above

105. Equation of the straight line making equal intercepts on the axes and passing through the point $(2, 4)$ is :

- (a) $4x - y - 4 = 0$
- (b) $2x + y - 8 = 0$
- (c) $x + y - 6 = 0$
- (d) $x + 2y - 10 = 0$

106. If the slope of one of the lines given by $a^2x^2 + 2hxy + b^2y^2 = 0$ be three times of the other then h is equal to

- (a) $2\sqrt{3}ab$
- (b) $-2\sqrt{3}ab$
- (c) $\frac{2}{\sqrt{3}}ab$
- (d) None of these

107. A circle touches both the y -axis and the line $x + y = 0$. Then the locus of its center is
- (a) $y = \sqrt{2}x$ (b) $x = \sqrt{2}y$
 (c) $y^2 - x^2 = 2xy$ (d) $x^2 - y^2 = 2xy$
108. The circle described on focal radii of a parabola as diameter touches
- (a) the axis (b) the tangent at the vertex
 (c) the directrix (d) none of these
109. If the perpendicular distance of the point $(6, 5, 8)$ from the Y -axis is 5λ unit, then λ is equal to
- (a) 5 (b) 3
 (c) 4 (d) 2
110. If value of $\lim_{x \rightarrow \frac{\pi}{4}} \frac{4\sqrt{2} - (\cos x + \sin x)^5}{1 - \sin 2x}$ is $a\sqrt{2}$, then the value of 'a' is
- (a) 2 (b) 3
 (c) 4 (d) 5
111. If the letters of the word ATTEMPT are written down at random, the chance that all T's are consecutive, is
- (a) $\frac{1}{42}$ (b) $\frac{6}{7}$
 (c) $\frac{1}{7}$ (d) None of these
112. The mean and SD of 63 children on an arithmetic test are respectively 27.6 and 7.1. To them are added a new group of 26 who had less training and whose mean is 19.2 and SD 6.2. The values of the combined group differ from the original as to (i) the mean and (ii) the SD is
- (a) 25.1, 7.8 (b) 2.3, 0.8
 (c) 1.5, 0.9 (d) None of these
113. Let $f: R \rightarrow R, g: R \rightarrow R$ be two functions such that $f(x) = 2x - 3, g(x) = x^3 + 5$. The function $(f \circ g)^{-1}(x)$ is equal to
- (a) $\left(\frac{x+7}{2}\right)^{1/3}$ (b) $\left(x - \frac{7}{2}\right)^{1/3}$
 (c) $\left(\frac{x-2}{7}\right)^{1/3}$ (d) $\left(\frac{x-7}{2}\right)^{1/3}$
114. If $\tan^{-1}(x+1) + \cot^{-1}(x-1) = \sin^{-1}\frac{4}{5} + \cos^{-1}\frac{3}{5}$, then x has the value :
- (a) $4\sqrt{\frac{3}{7}}$ (b) $4\sqrt{\frac{7}{3}}$
 (c) $14\sqrt{3}$ (d) $6\sqrt{7}$
115. If $A = \begin{bmatrix} 1 & 0 & 3 \\ 2 & 1 & 1 \\ 0 & 0 & 2 \end{bmatrix}$, then the value of $|\text{adj}(\text{adj}A)|$ is
- (a) 14 (b) 16
 (c) 15 (d) 12
116. The number of $\theta \in (0, 4\pi)$ for which the system of linear equations $3(\sin 3\theta)x - y + z = 2, 3(\cos 2\theta)x + 4y + 3z = 3, 6x + 7y + 7z = 9$ has no solution, is:
- (a) 6 (b) 7
 (c) 8 (d) 9
117. If $x = b \cos^{-1} \sqrt{\frac{y}{b}} + \sqrt{by - y^2}$, then $\frac{dy}{dx} =$
- (a) $-\sqrt{\frac{b}{y} - 1}$ (b) $\sqrt{1 - \frac{b}{y}}$
 (c) $\sqrt{by - y^2}$ (d) 0

118. Let $f(x) = \begin{cases} \frac{x-4}{|x-4|} + a, & x < 4 \\ a + b, & x = 4 \\ \frac{x-4}{|x-4|} + b, & x > 4 \end{cases}$. Then $f(x)$ is continuous at $x = 4$ when

- (a) $a = 0, b = 0$ (b) $a = 1, b = 1$
(c) $a = -1, b = 1$ (d) $a = 1, b = -1$

119. The height of the cylinder of maximum volume that can be inscribed in a sphere of radius a is

- (a) $\frac{a}{\sqrt{3}}$ (b) $\frac{2a}{\sqrt{3}}$
(c) $\frac{3}{2}a$ (d) None

120. $\int \frac{2x^4+x-1}{2(x-1)(x^2+1)} dx$ is equal to

- (a) $\frac{x^2}{2} + x + \frac{1}{2}\log(x-1) - \frac{1}{4}\log(x^2+1)$
(b) $\frac{x^2}{2} + x + \frac{1}{2}\log(x-1) + \frac{1}{4}\log(x^2+1)$
(c) $\frac{x^2}{2} - x + \frac{1}{2}\log(x-1) + \frac{1}{4}\log(x^2+1) + \frac{1}{2}\tan^{-1}x + C$
(d) None of these

121. The integral $\int_0^{\frac{\pi}{2}} \frac{1}{3+2\sin x + \cos x} dx$ is equal to:

- (a) $\tan^{-1}(2)$ (b) $\tan^{-1}(2) - \frac{\pi}{4}$
(c) $\frac{1}{2}\tan^{-1}(2) - \frac{\pi}{8}$ (d) $\frac{1}{2}$

122. The area bounded by curves $(x-1)^2 + y^2 = 1$ and $x^2 + y^2 = 1$ is

- (a) $\left(\frac{2\pi}{3} - \frac{\sqrt{3}}{2}\right)$ (b) $\frac{2\pi}{3}$
(c) $\frac{\sqrt{3}}{2}$ (d) $\frac{2\pi}{3} + \frac{\sqrt{3}}{2}$

123. The solution of the differential equation $\frac{dy}{dx} + \frac{y}{x\log x} = \frac{1}{x}$ is

- (a) $y = \frac{1}{2}\log x + c(\log x)^{-1}$
(b) $y = \log x + c(\log x)^{-1}$
(c) $y = \frac{1}{2}\log x + \frac{c}{(\log x)^2}$
(d) $y = \frac{1}{3}\log x - c(\log x)^{-1}$

124. The solution of $x dx + y dy = x^2 y dy - x y^2 dx$ is

- (a) $x^2 - 1 = c(1 + y^2)$
(b) $x^2 + 1 = c(1 - y^2)$
(c) $x^3 - 1 = c(1 + y^3)$
(d) $x^3 + 1 = c(1 - y^3)$

125. For three vectors $\vec{u}, \vec{v}, \vec{w}$ which of the following expressions is not equal to any of the remaining three?

- (a) $\vec{u} \cdot (\vec{v} \times \vec{w})$ (b) $(\vec{v} \times \vec{w}) \cdot \vec{u}$
(c) $\vec{v} \cdot (\vec{u} \times \vec{w})$ (d) $(\vec{u} \times \vec{v}) \cdot \vec{w}$

126. If $\vec{a} = \hat{i} + 2\hat{j} + 3\hat{k}, \vec{b} = 2\hat{i} + 3\hat{j} + \hat{k}, \vec{c} = 3\hat{i} + \hat{j} + 2\hat{k}$ and $\alpha\vec{a} + \beta\vec{b} + \gamma\vec{c} = -3(\hat{i} - \hat{k})$, then the ordered triplet (α, β, γ) is

- (a) $(2, -1, -1)$ (b) $(-2, 1, 1)$
(c) $(-2, -1, 1)$ (d) $(2, 1, -1)$

127. A line makes the same angle θ , with each of the x and z axis. If the angle β , which it makes with y -axis, is such that $\sin^2 \beta = 3\sin^2 \theta$, then $\cos^2 \theta$ equals

- (a) $\frac{2}{5}$ (b) $\frac{1}{5}$
 (c) $\frac{3}{5}$ (d) $\frac{2}{3}$

128. The plane $x + 3y + 13 = 0$ passes through the line of intersection of the planes $2x - 8y + 4z = p$ and $3x - 5y + 4z + 10 = 0$. If the plane is perpendicular to the plane $3x - y - 2z - 4 = 0$, then the value of p is equal to

- (a) 2 (b) 5
 (c) 9 (d) 3

129. Let A and B be two events such that $P(B | A) = \frac{2}{5}$, $P(A | B) = \frac{1}{7}$ and $P(A \cap B) = \frac{1}{9}$. Consider

(S1) : $P(A' \cup B) = \frac{5}{6}$

(S2) : $P(A' \cap B') = \frac{1}{18}$

- (a) Both (S1) and (S2) are true
 (b) Both (S1) and (S2) are false
 (c) Only (S1) is true
 (d) Only (S2) is true

130. If A and B are two independent events and $P(C) = 0$, then A, B, C are :

- (a) independent
 (b) dependent
 (c) not pairwise independent
 (d) none of the above

