1. The statement 'nothing lives forever, yet life continues' illustrates the role of:

(a) Embryogenesis

(b) morphogenesis

(c) replication

(d) reproduction

2. Amongst all the kingdoms, the only taxon that exists in nature as a biologically cohesive unit is the:

(a) Species

(b) genus

(c) phylum or division

(d) kingdom

3. Which of the following 'suffixes' used for units of classification in plants indicates a taxonomic category of 'family'?

(a) – Ales

(b) – Onae

(c) – Aceae

(d) – Ae

4. The common characteristics between tomato and potato will be maximum at the level of their:

(a) family

(b) order

(c) division

(d) genus

5. Red tides in warm coastal water develop due to the abundance of:

(a) dinoflagellates

(b) euglenoids

(c) diatoms and desmids

(d) slime moulds

6. The multinucleate slimy mass of protoplasm which forms the body of slime moulds is called:

(a) plasmodium

(b) myxamoeba

(c) sporocytes

(d) periplasmodium

7. Fungi show asexual reproduction by all of the following kinds of spores except:

(a) conida

(b) oospores

(c) sporangiospores

(d) zoospores

Rough Work

8. Which of the following is not a viral disease of plants?

(a) Potato leaf roll

(b) Tobacco mosaic diseas

(c) Leaf curl of tomato

(d) Rust of wheat

9. Which of the following are lateral appendages in annelida?

(a) Proboscis gland

(b) Malpighian tubules

(c) Parapodia

(d) Flame cells

10. Bilateral symmetry, segmentation, coelom and open circulatory system characterise which of the following phyla?

(a) Annelida

(b) Mollusca

(c) Arthropoda

(d) Echinodermata

11. Which of the following is commonly called "pearl oyster"?

(a) Limulus

(b) Dentalium

(c) Pinctada

(d) Aurelia

12. Select the odd one out.

(a) *Corvus*

(b) *Psittacula*

(c) *Calotes*

(d) *Neophorn*

13. Which among these is not a homeotherm?

(a) Aptenodytes

(b) Testudo

(c) Columba

(d) Neophorn

14. _____ are the green stems of limited growth which have taken over the function of photosynthesis from leaves.

(a) Phylloclades

(b) Cladodes

(c) Phyllodes

(d) Stem thorns

15. Monadelphous condition of stamens, *i.e.* stamens united into one bunch or one bundle is a characteristic of:

Rough Work

(a) citrus

(b) China rose

(c) pea

(d) both (a) and (c)

16. Which floral family has (9) + 1 arrangement of anthers in the androecium?

(a) Malvaceae

(b) Asteraceae

(c) Fabaceae

(d) Brassicaceae

17. Non-endospermic seeds are found in:

(a) Bean

(b) castor

(c) pea

(d) Both (a) and (c)

18. 'X' is a structure found in prokaryotes that is concerned with storage of reserve food materials like cyanophycean granules 'X' could be:

(a) gas vacoule

(b) plasmid

(c) inclusion body

(d) mesosome

19. The best material for the study of structure of cell membrane is:

(a) RBC of human

(b) liver cell

(c) kidney cell

(d) muscle cell

20. Which organelle is not a part of the endomembrane system?

(a) ER

(b) Golgi complex

(c) Lysosomes

(d) Mitochondria

21. Cell wall of an algae have:

(a) suberin

(b) chitin

(c) calcium carbonate

(d) cutin

22. Which of the following chromosomes have almost equal arm?

(a) Metacentric

(b) Acrocentric

Rough Work

(c) Polycentric

(d) Acentric

23. Mitotic apparatus is formed of:

(a) centrosomes and phragmoplasts

(b) two asters with spindle fibres

(c) single aster with phragmoplast

(d) spindle fibres only

24. In which of the following stages, a chromosome is minimum coiled?

(a) Interphase

(b) Metaphase

(c) Prophase

(d) Anaphase

25. In onion root tip during metaphase stage of mitosis the number of kinetochores will be:

(a) 4

(b) 8

(c) 16

(d) 32

26. Which of the following stages of meiosis involves division of centromere?

(a) Telophase II

(b) Metaphase I

(c) Metaphase II

(d) Anaphase II

27. The pCO_2 (in mmHg) of the atmospheric air is about:

(a) 40

(b) 45

(c) 0.3

(d) 95

28. After forceful inspiration, the amount of air that can be breathed out is equal to:

(a) Inspiratory Reserve Volume (IRV) + Expiratory Reserve Volume (ERV) + Tidal Volume + Residual Volume (RV)

(b) IRV + RV + ERV

(c) IRV + TV + ERV

(d) TV + RV + ERV

29. An additional volume of air, a person can inspire by forcible inspiration is about:

(a) 100 – 1100 mL

(b) 1200 mL

(c) 2500 – 3000 mL

(d) 3600 mL

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30. Underproduction of hormones by adrenal cortex causes _____.

(a) Addison's disease

(b) Diabetes mellitus

(c) Diabetes insipidus

(d) Grave's disease

31. In a certain code language, HUNTER is written as ELQWDU. How is MASTER written in that code?

A) PZVWDU

B) JYWTDU

C) HYVQDU

D) LZUTDU

32. Pointing to a woman in a photograph, Ajay says, "She is the daughter of my father's only sister." How is the woman related to Ajay?

A) Cousin

B) Sister

C) Aunt

D) Niece

33. A person starts walking from point A. He walks 7 km east, then turns left and walks 9 km, then turns left again and walks 5 km. Finally, he turns left and walks 9 km. How far is he from the starting point?

A) 2 km

B) 4 km

C) 7 km

D) 5 km

34. In a row of students, Arjun is 15th from the left and 9th from the right. Four new students join the row, and they occupy positions to the left of Arjun. What is Arjun's new position from the left?

A) 19th

B) 16th

C) 15th

D) 18th

Rough Work

35. A cube is painted on all its faces. It is then cut into 64 smaller cubes of equal size. How many cubes have exactly two faces painted?

A) 12

B) 24

C) 16

D) 20

36. What will be the day of the week on 15th August 2080, if 1st January 2000 was a Saturday?

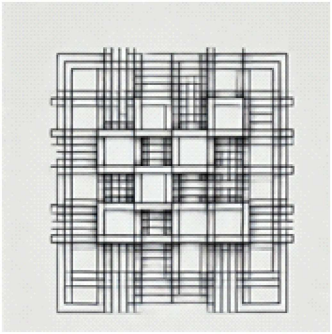
A) Thursday

B) Saturday

C) Sunday

D) Tuesday

37. In the following diagram, how many squares are there?



A) 12

B) 14

C) 16

D) 18

38. Statements:

1. No cat is a dog.

2. All dogs are animals.

Conclusions:

3. No cat is an animal.

4. Some animals are dogs.

Choose the correct option:

A) Only conclusion 1 follows

B) Only conclusion 2 follows

C) Both conclusions follow

D) Neither conclusion follows

39. Find the pair that exhibits the same relationship:

Mirror : Reflection :: Water : ?

A) Transparency

B) Image

C) Refraction

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D) Shadow

40. Find the odd one out:

A) 13

B) 17

C) 19

D) 21

41. If P, Q, R are physical quantities, having different dimensions, which of the following combinations can never be a meaningful quantity ?

a) $\frac{P-Q}{R}$

(b) PQ – R

c) $\frac{PQ}{R}$

d) $\frac{PR-Q^2}{R}$

42. The time period of oscillations of a body is given by $T=2\pi\sqrt{\frac{mGA}{K}}$, K represents the kinetic energy, m mass, g acceleration due to gravity an A is unknow. If $[A]=M^xL^y/T^z$; then what is the value of x + y + z ?

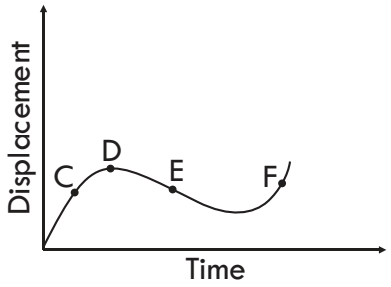
a) 3

b) 2

c) 1

d) 5

43. The displacement - time graph of a moving particle is as shown in the figure. The instantaneous velocity of the particle is negative at the point.



a) C

b) D

c) E

d) F

44. The stones are thrown up simultaneously from the edge of a cliff 200 m high with initial speeds of 15 m s^{-1} and 30 m s^{-1} respectively. The time variation of the relative position of the second stone with respect to the first is shown in the figure. The equaiton of the linear part is

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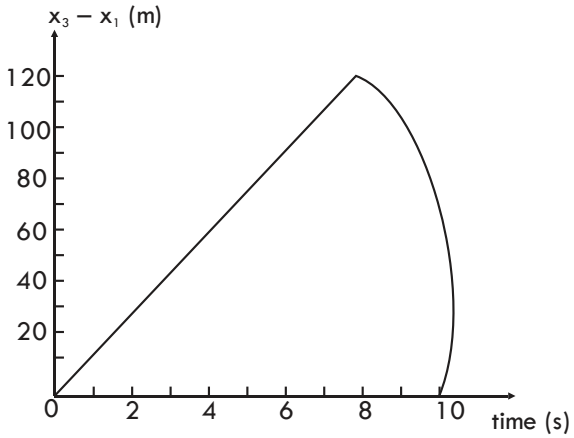


a) $x_2 - x_1 = 50t$

b) $x_2 - x_1 = 10t$

c) $x_2 - x_1 = 15t$

d) $x_2 - x_1 = 20t$

45. A police van moving on a highway with a speed of 30 km h^{-1} fires a bullet at a thief's car speeding away in the same direction with a speed of 192 km h^{-1}. If the muzzle speed of the bullet is 150 m s^{-1}, with what speed (in m s^{-1}) does the bullet hit the thief's car ?

a) 95

b) 105

c) 115

d) 125

46. On an open ground, a motorist follows a track that turns to his left by an angle of 60^0 after every 500 m. Starting from a given turn, the displaement of the motorist at the third turn is

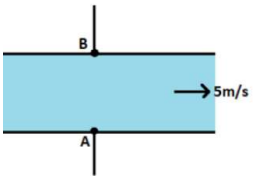
a) 500 m

b) $500\sqrt{3}\,m$

c) 1000 m

d) $1000\sqrt{3}\,m$

47. A river is flowing from west to east with a speed 5 m s^{-1}. A swimmer can swim in still water at a speed of 10 m s^{-1}. If the wants to start from point A on south bank and reach opposite point B on north bank, in what directon should he swim?



a) 30^0 east of north

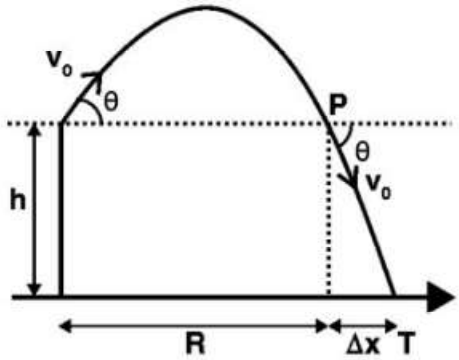
b) 60^0 east of north

c) 30^0 west of north

d) 60^0 west of north

48. A gun can fire shells with maximum speed v_0 and the maximum horizontal range that can be achieved is $R = \frac{v_0^2}{g}$. If a target farther away by distance Δx (beyong R) has to hit with the same gun (see figure), then it could be achieved by raising the gun to a height at least

Rough Work



a) $h = \Delta x\left[1+\frac{\Delta x}{R}\right]$

b) $h = \Delta x\left[1-\frac{\Delta x}{R}\right]$

c) $h = \Delta x\left[1+\frac{2\Delta x}{R}\right]$

d) $h = \Delta x\left[1+\frac{\Delta x}{2R}\right]$

49. A Bullet is fired from a gun at the speed of 280 m s^{-1} in the directon 30^0 above the horizontal. The maximum height attained by the bullet is
(g = 9.8 m s^{-2}, sin 30^0 = 0.5)

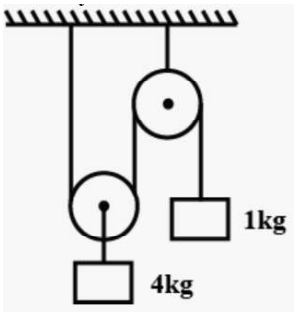
a) 1000 m

b) 3000 m

c) 2800 m

d) 2000 m

50. In the system shown in the figure, the aceleration of 1 kg mass is



a) $\frac{g}{4}$ downwqards

b) $\frac{g}{2}$ downwqards

c) $\frac{g}{2}$ upwqards

d) $\frac{g}{4}$ upwards

51. A cricket bal of mass 150 g has an initial velocity $\vec{u} = \left(3\hat{i} + 4\hat{j}\right) m\,s^{-1}$ and a final velocity $\vec{v} = -\left(3\hat{i} + 4\hat{j}\right) m\,s^{-1}$ after being hit. The change in momentum (final momentum – initial momentum) is (in kg m s^{-1})

a) zero

b) $-\left(0.45\hat{i} + 0.6\hat{j}\right)$

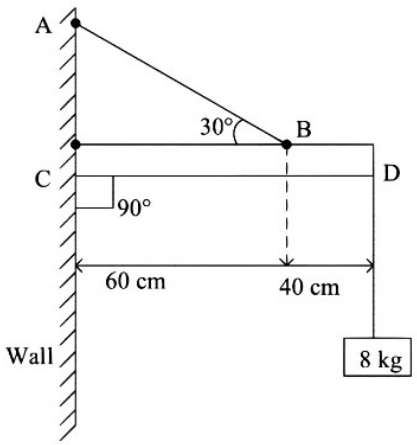
c) $-\left(0.9\hat{i} + 1.2\hat{j}\right)$

d) $-5\left(\hat{i} + j\right)$

52. An object of mass 8 kg is hanging from one end of a uniform rod CD of mass 2 kg length

Rough Work

1m pivoted at its end C on a vertical wall as shown in figure. It is supported by a cable AB such that the system is in equilibrim. The tension in the cable is (Take g = 10 m/s²)



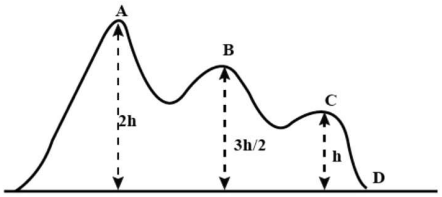
a) 240 N

b) 30 N

c) 300 N

d) 90 N

53. A smal roller coaster starts at point A with speed u on a curved track as shown in the figure.



The friciton between the roller coaster and the track is negligible and it always remain in contact D on the track will be

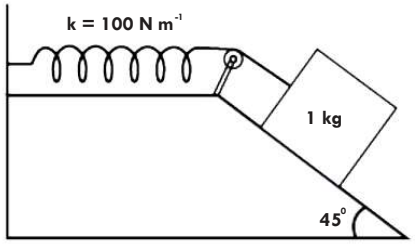
a) $(u^2 + gh)^{1/2}$

b) $(u^2 + 2gh)^{1/2}$

c) $(u^2 + 4gh)^{1/2}$

d) u

54. A 1 kg block situated on arough incline is connected to a spring of negliguible mass having spring constant 100 N m^{-1} as shown in the figure. The block is released from rest with the spring in the unstretched position. The block moves 10 cm down the incline before coming to rest. The coefficient of friction between the block and the incline is (Take g = 10 m s^{-2}) and assume that the pulleyis frictionless)



a) 0.2

b) 0.3

c) 0.5

d) 0.6

55. A track has two inclined surfae AB and DC each of length 3 m and angle of inclination of 30° with the horizontal and a central horizontal part of length 4 m as shown in figure. A block of mass 0.2 kg slidesfrom rest from point A. The inclined surfaces are frictionless. If the coefficient of friciton between the block and the horizontal flat surface is 0.2, where will the block finally come to rest ?

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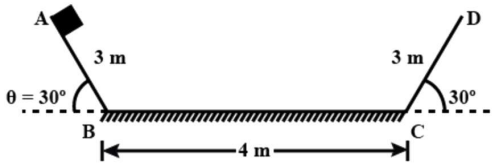


a) 0.5 m away from point B

b) 3.5 m away from point B

c) 0.5 m away from point C

d) 1.5 m may from point C

56. A particle in a certain conservative force field has a potential energy given by $V = \frac{20xy}{z}$.

The force exerted on its is

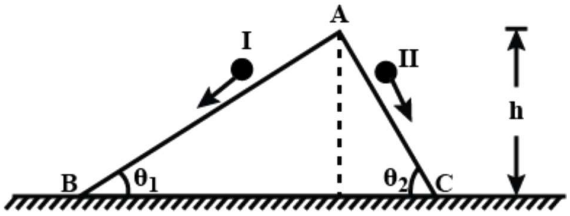
a) $\left(\frac{20y}{z}\right)\hat{i} + \left(\frac{20x}{z}\right)\hat{j} + \left(\frac{20xy}{z^2}\right)\hat{k}$

b) $-\left(\frac{20y}{z}\right)\hat{i} - \left(\frac{20x}{z}\right)\hat{j} + \left(\frac{20xy}{z^2}\right)\hat{k}$

c) $-\left(\frac{20y}{z}\right)\hat{i} - \left(\frac{20x}{z}\right)\hat{j} - \left(\frac{20xy}{z^2}\right)\hat{k}$

d) $\left(\frac{20y}{z}\right)\hat{i} + \left(\frac{20x}{z}\right)\hat{j} - \left(\frac{20xy}{z^2}\right)\hat{k}$

57. Two inclined friction tracks, one gradual and the other steep meet at A from where two stones are allowed to slide down from rest, one on each track as shown in figure. Which of the following statements is correct ?



a) Both the stones reach th bottom at th same time but not with the same speed

b) Both the stones reach the bottom with the same speed and stone I reaches the bottom earlier than stone II.

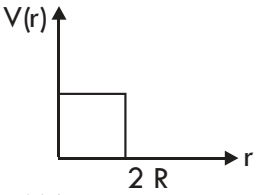
c) Both the stones reach the bottom with the same speed and stone II reaches the bottom earlier than stone I.

d) Both the stones reach the d

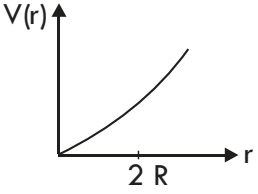
58. Which of the following potential energy curves possibly describes the elastic collision of two billiard balls each of radius R ?

Here r is the distance between centres of the balls.

a)



b)



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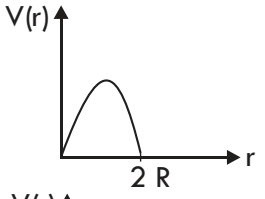
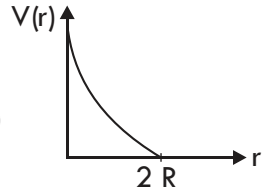
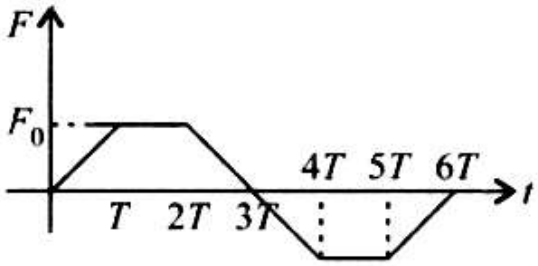
c)



d)



59. A particle of mass m experience a force that varies with time as shown. If the particle was at rest at t = 0. Find the velocity of the particle at the end of tiem t = 3T



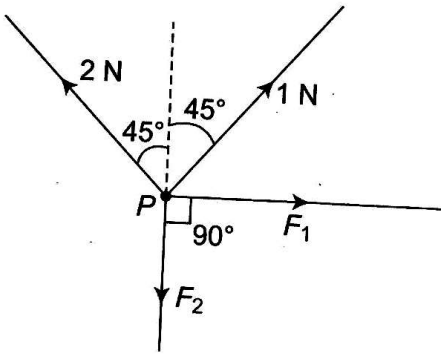
a) $2TF_0$

b) $\frac{TF_0}{m}$

c) $\frac{2TF_0}{m}$

d) $\frac{3F_0T^2}{2m}$

60. There are four forces acting at a point P produced by strings as shown in figure, which is at rest. The forces F_1 and F_2 are



a) $\frac{1}{\sqrt{2}}N, \frac{3}{\sqrt{2}}N$

b) $\frac{3}{\sqrt{2}}N, \frac{1}{\sqrt{2}}N$

c) $\frac{1}{\sqrt{2}}N, \frac{1}{\sqrt{2}}N$

d) $\frac{3}{\sqrt{2}}N, \frac{3}{\sqrt{2}}N$

61. The range of the projectile projected at an angle of 15^0 with horizontal is 50 m. If the projectile is projected with same velocity at an angle of 45^0 with horizontal, then its range will be

a) 50 m

b) 100 m

c) $50\sqrt{2}$ m

d) $100\sqrt{2}$ m

62. A point P moves in counter-clockwise direction on a circular path as shown in the figure. The movement of P is such that it sweeps out a

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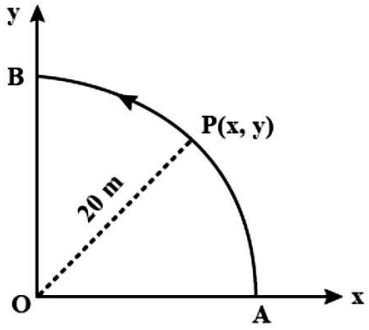
length $s = t^2 + 5$, where s in metres and t is in seconds. The radius of the path is 20 m. The acceleration of P when t = 2 s is nearly



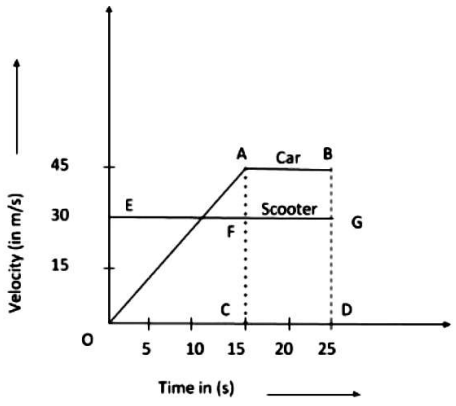
a) 14 m/s^2

b) 13 m/s^2

c) 12 m/s^2

d) 7.2 m/s^2

63. The velocity - time graphs of a car and a scooter are shown in the figure. (i) The differene between the distance travelled by the car and the scooter in 15 s and (ii) the time at which the car will catch up with the scooter are, respectively



a) 112.5 m and 15 s

b) 337.5 m and 25 s

c) 225.5 m and 10 s

d) 112.5 m and 22.5 s

64. At a metro station, a girl walks up a stationary escalator in time t_1, If she remains stationary on the escalator, then the escalator take her up in time t_2. The time taken by her to walk up on the moving escalator will be

a) $\frac{t_1 + t_2}{2}$

b) $\frac{t_1 t_2}{t_2 - t_1}$

c) $\frac{t_1 t_2}{t_2 + t_1}$

d) $t_1 - t_2$

65. A particle moves rectilinearly. Its displacement x at time t is given by $x^2 = at^2 + b$ where a and b are constants. Its acceleration at time t is proportional to

a) $\frac{1}{x^3}$

b) $\frac{1}{x} - \frac{1}{x^2}$

c) $-\frac{t}{x^2}$

d) $\frac{1}{x} - \frac{t^2}{x^3}$

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66. The equation of stationary wave is

$$y = 2a\sin\left(\frac{2\pi nt}{\lambda}\right)\cos\left(\frac{2\pi x}{\lambda}\right).$$

Which of the following is not correct ?

a) The dimensions of n is $[LT^{-1}]$

b) The dimensions of x is [L]

c) The dimensions of nt is $[L^1]$

d) The dimensions of $\frac{n}{\lambda}$ is [T]

67. If momentum (p), area (A) and time (t) are taken to be fundamental quantities, then energy has the dimensional formula

a) $\left[p^1 A^{-1} t^{-1}\right]$

b) $\left[p^2 A^1 t^1\right]$

c) $\left[p^1 A^{-1/2} t^1\right]$

d) $\left[p^1 A^{1/2} t^{-1}\right]$

68. The coefficient of fricton between the tyres and the road is 0.1. The maximum speed with which a cylist can take a circular turn of radius 3 m without skidding is

(Take g = 10 m s^{-2})

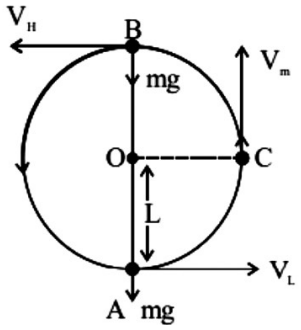
a) $\sqrt{15}\ ms^{-1}$

b) $\sqrt{3}\ ms^{-1}$

c) $\sqrt{30}\ ms^{-1}$

d) $\sqrt{10}\ ms^{-1}$

69. A bob of mass 'm' is suspended by a light string of length 'L'. It is imparted a minimum horizontal velocity at the lowest point A such that it just completes half circle reahing the top most position B. The ratio of kinetic energies $\frac{(K.E.)_A}{(K.E.)_B}$ is



a) 3 : 2

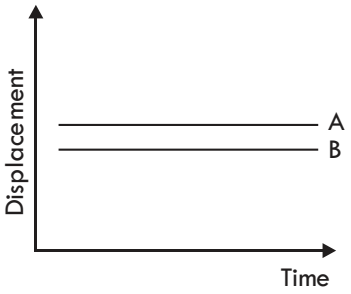
b) 1 : 5

c) 2 : 5

d) 5 : 1

70. Which one of the following represents displacement - time graph of two objects A and B moving with zero relative velocity ?

a)



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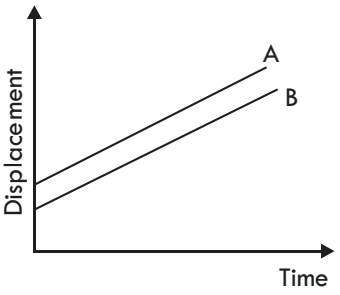
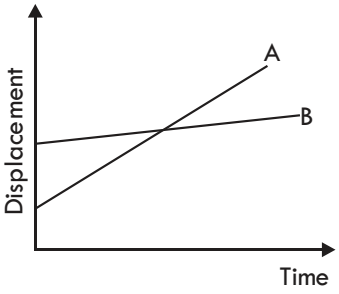
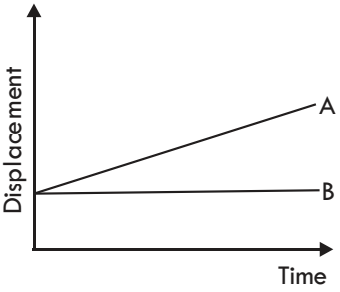
b)



c)



d)



71. A mixture of $MgCO_3$ and $CaCO_3$ was heated for a long time, the weight is decreased by 50%. The percentage composition of $MgCO_3$ and that of $CaCO_3$ in the mixture will be respectively

a) 28.5% and 71.5%

b) 84% and 16%

c) 71.5% and 28.5%

d) 44.5% and 55.5%

72. The electronic transition from $n = 2$ to $n = 1$ will produce shortest wavelength in

a) H-atom

b) D-atom

c) He^+ ion

d) Li^{2+} ion

73. Which of the following sets of quantum numbers represents the highest energy of an atom?

a) n = 3, l = 0, m = 0, s = +1/2

b) n = 3, l = 1 , m = 1, s =+ 1/2

c) n = 3, l = 2, m = 1, s = +1/2

d) n = 4, l = 0, m = 0, s = +1/2

74. Which of the following statements is not correct about the characteristics of cathode rays?

a) They start from the cathode and move towards the anode.

b) They travel in straight line in the absence of an external electrical or magnetic field.

c) Characteristics of cathode rays do not depend upon the material of electrodes in cathode ray tube.

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d) Characteristics of cathode rays depend upon the nature of gas present in the cathode ray tube.

75. The probability of finding out an electron at a point within an atom is proportional to the

a) square of the orbital wave function i.e., Ψ^2

b) orbital wave function *i.e.,* Ψ

c) Hamiltonian operator *i.e., H*

d) principal quantum number *i.e., n*

76. Match the values of column II with column I and mark the appropriate choice.

Column I		Column II	
(A)	Mass of electron	(i)	1.673×10^{-27} kg
(B)	Mass of proton	(ii)	-1.602×10^{-19} C
(C)	Charge of electron	(iii)	9.1×10^{-31} kg
(D)	e/m for an electron	(iv)	1.76×10^{8} C/g

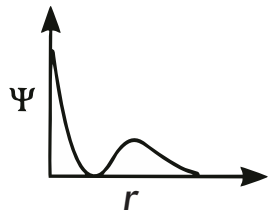
a) (A)→ (i), (B) → (ii), (C) → (iv), (D) → (iii)

b) (A)→ (iii), (B) → (i), (C) → (ii), (D) → (iv)

c) (A) → (ii), (B) → (iii), (C) → (iv), (D) → (i)

d) (A) → (i), (B) → (iii), (C) → (ii), (D) → (iv)

77. The graph between $|\Psi|^2$ **and r(radial distance) is shown below. This represents.**



a) 3s orbital

b) 2p orbital

c) 1s orbital

d) 2s orbital.

78. Oxygen occurs in nature as a mixture of isotopes ^{16}O, ^{17}O and ^{18}O having atmic masses of 15.1995 u, 16.999 u and 17.999u and relative abundance of 99.763%, 0.037% and 0.200% respectively. What is the average atomic mass of oxygen?

a) 15.999 u

b) 16.999 u

c) 17.999 u

d) 18.999 u

79. The ratio of mass percent of C and H of an organic compound (CxHyOz) is 6 : 1. If one molecule of the above compound (CxHyOz) contains half as much oxygen as required to burn one molecule of compound CxHy completely to CO_2 and H_2O the empirical formula of compound CxHyOz is

a) $C_3H_6O_3$

b) C_2H_4O

c) $C_3H_4O_2$

d) $C_2H_4O_3$

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80. For the following reaction, the mass of water produced from 445 g of $C_{57}H_{110}O_6$ is

$2C_{57}H_{110} + O_{6(s)} + 163O_{2(g)} \rightarrow 114CO_{2(g)} + 110H_2O_{(l)}$

a) 490 g

b) 495 g

c) 445 g

d) 890 g

81. Match the coloumn I with column II and mark the appropriate choice.

Column I		Column II	
(A)	Mass of H_2 produced when 0.5 mole of zinc reacts with excess of HCl	(i)	3.01×10^{23} molecules
(B)	Mass of all atoms of a compoun with formula $C_{70}H_{22}$	(ii)	6.023×10^{23} molecules
(C)	Number of molecules in 35.5 g of Cl_2	(iii)	1.43×10^{-21} g
(D)	Number of molecules in 64 g of SO_2	(iv)	1 g

a) (A)→ (ii), (B) → (i), (C) → (iv), (D) → (iii)

b) (A)→ (i), (B) → (ii), (C) → (iii), (D) → (iv)

c) (A) → (iv), (B) → (iii), (C) → (i), (D) → (ii)

d) (A) → (iv), (B) → (iii), (C) → (ii), (D) → (i)

82. The most abundant elements by mass in the body of a healthy human adult are : oxygen (61.4%), carbon (22.9%), hydrogen (10.0%) and nitrogen (2.6%). The weight which a 75 kg person would gain if all ^1H atoms are replaced by ^2H atoms is

a) 7.5 kg

b) 10 kg

c) 15 kg

d) 37.5 kg

83. Which of the following is a chemical fertilizer?

a) Urea

b) Sodium nitrate

c) Ammonium sulphate

d) All of these

84. Which of the following order is correct?

a) $AlCl_3 < MgCl_2 < NaCl$: Polarising power

b) $CO > CO_2 >> HCO_2^- > CO_3^{2-}$: Bond length

c) $BeCl_2 < NF_3 < NH_3$: Dipole moments

d) $H_2S > NH_3 > SiH_4 > BF_3$: Bond angle

85. Which of the following statements about CO_3^{2-} ion is correct?

a) The C–O bond order is 1.5.

b) The formal charge on each oxygen atom is –0.67.

c) It has two C–O single bonds and one C=0 double bond.

d) The hybridization of central atom is sp^3.

Rough Work

86. **Statement I** : H_2^- is paramagnetic in nature.

Statement II : H_2^- has one unpaired electron in antibonding molecular orbital.

a) Both statement I and statement II are true and statement II is the correct explanation of statement I.

b) Both statement I and statement II are true but statement II is not the correct, explanation of statement I.

c) Statement I is true but statement II is false.

d) Both statement I and statement II are false.

87. **Given below is the table showing shapes of some molecules having lone pairs of electrons. Fill up the blanks left in it.**

Molecule type	*bp*	*lp*	Shape	Example
AB_2E_2	2	P	Bent	H_2O
AB_3E_2	3	2	Q	ClF_3
AB_5E	5	R	S	BrF_5
AB_4E_2	4	2	T	U

	P	Q	R	S	T	U
a)	2	Square Pyramidal	2	T-Shaped	Square Planar	H_2O_2
b)	4	T-Shaped	5	Square Planar	Square Pyramidal	SO_3
c)	2	T-Shaped	1	Square Pyramidal	Square Planar	XeF_4
d)	2	Square Planar	2	T-Shaped	Square Pyramidal	$BrCl_3$

88. **Two elements X and Y combine to form a compound XY. Under what conditions the bond formed between them will be ionic?**

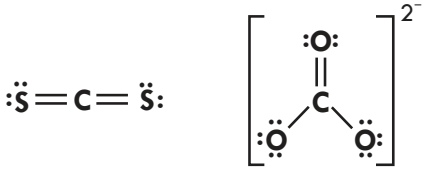
(a) If the difference in electronegativities of X and Y is 1.9.

(b) If the difference in electronegativities of X and Y is more than 1.9.

(c) If the difference in electronegativities of X and Y is less than 1.9.

(d) If both X and Y are highly electronegative.

89. **What ios the formal charger on carbon in the following two structures ?**



a) 0, –2

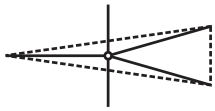
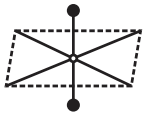
b) 0, 0

c) +0, –2

d) +1, –1

90. Match the molecules given in column I with their shapes given in column II and mark the appropriate choice.

Rough Work

Column I (Molecule)		Column II (Shape)	
(A)	SF_6	(i)	
(B)	$SiCl_4$	(ii)	
(C)	AsF_5	(iii)	
(D)	BCl_3	(iv)	

a) (A) → (iv), (B) → (ii), (C) → (iii), (D) → (i)

b) (A) → (iv), (B) → (i), (C) → (ii), (D) → (iii)

c) (A) → (iii), (B) → (i), (C) → (ii), (D) → (iv)

d) (A) → (ii), (B) → (iii), (C) → (i), (D) →(iv)

91. Assertion: Helium has the highest value of ionisation energy among all the elements known. Reason Helium has the highest value of electron affinity among all the elements known.

a) If both assertion and reason are true and reason is the correct explanation of assertion affinity among all the elements known.

b) If both assertion and reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false.

d) If both assertion and reason are false.

92. The element with Z=120 (not yet discovered) willl be an/a

a) inner-transition metal

b) alkaline earth metal

c) alkali metal

d) transition metal.

93. Which of the following sets of oxides is amphoteric in nature?

(a) Al_2O_3, As_2O_3, ZnO

(b) CO, NO, N_2O

(c) SO_3, SO_2, Cl_2O_7

(d) Na_2O, MgO, BaO

94. The formation of the oxide ion, from oxygen atom requires first an exothermic and then an endothermic step as shown below:

$$O_{(g)} + e^- \rightarrow O^-_{(g)}; \Delta H^\circ = -141 kJ mol^{-1}$$
$$O^-_{(g)} + e^- \rightarrow O^{2-}_{(g)}; \Delta H^\circ = +780 kJ mol^{-1}$$

Thus process of formation of O^{2-} in gas phase is unfavourable even though O^{2-} is isoelectronic with neon. It is due to the fact that,

a) oxygen is more electronegative

b) addition of electron in oxygen results in larger size of the ion.

Rough Work

c) electron repulsion outweighs the stability gained by achieving noble gas configuration

d) O^- ion has comparatively smaller size than oxygen atom.

95. The correct order of the decreasing ionic radii among the following isoelectronic isoelectronic species is

a) $Ca^{2+} > K^+ > S^{2-} > Cl^-$

b) $Cl^- > S^{2-} > C^{2+} > k^+$

b) $S^{2-} > Cl^- > K^+ > Ca^{2+}$

d) $k^{2-} > Cl^{2+} > Cl^- > S^{2-}$

96. Element "E" belongs to the period 4 and group 16 of the periodic table. The valence shell electron configuration of the element which is just above "E" in the group is

a) $3d^2, 3p^4$

b) $3d^{10}, 4s^2, 4p^4$

c) $4d^{10}, 5s^2, 5^4$

d) $2s^2, 2p^4$

97. The IUPAC name of an element with atomic number 119 is

a) ununennium

b) unnilennium

c) unununnium

d) ununoctium

98. How many number of molecules and atoms respectively are present in 2.8 litres of a diatomic gas at STP?

a) $6.023 \times 10^{23}, 7.5 \times 10^{23}$

b) $6.023 \times 10^{23}, 15 \times 10^{22}$

c) $7.5 \times 10^{22}, 15 \times 10^{22}$

d) $15 \times 10^{22}, 7.5 \times 10^{23}$

99. Calculate molarity of 63% w/w HNO_3 solution if density is 1.4 g/mL.

a) 14 M

b) 12 M

c) 10 M

d) 8 M

100. The Bohr's energy of a stationary state of hydrogen atom is given as $E_n = \frac{-2\pi^2 mc^4}{n^2h^2}$. Putting the values of *m* and e for n^{th} energy level which is not the correct value?

a) $E_n = \frac{-21.8 \times 10^{-19}}{n^2} J \text{ atom}^{-1}$

b) $E_n = \frac{-13.6}{n^2} \text{eV atom}^{-1}$

c) $E_n = \frac{-1312}{n^2} \text{kJ mol}^{-1}$

d) $E_n = \frac{-12.8 \times 10^{-19}}{n^2} \text{erg atom}^{-1}$

Rough Work