INDIAN ASSOCIATION OF PHYSICS TEACHERS

NATIONAL STANDARD EXAMINATION IN JUNIOR SCIENCE 2014 -15

Q. Paper Code: JS 530

1) Three identical vessels carrying equal amount of water are placed in three lifts. Lift **A** is accelerating upwards, lift **B** is accelerating downwards while lift **C** is moving up with constant velocity. The pressure at a depth **h** from free surface in the three vessel is measured as p_A , p_B and p_c then which of the following is true

a) $p_A = p_C > p_B$ b) $p_A > p_C > p_B$ c) $p_A > p_C = p_B$ d) $p_A = p_C = p_B$

Solution (b): The pressure at a depth h is given by $p = h\rho(g \pm a)$. In case of lift moving up $p_A = h\rho(g + a)$. Lift moving down $p_B = h\rho(g - a)$. Lift moving with constant velocity $p_A = h\rho g$.
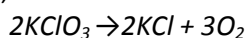
2) In the reaction,
$$2KClO_3 \rightarrow 2KCl + 3O_2$$
What is the volume of oxygen released under NTP conditions when 36.75g of $KClO_3$ is heated?

a) 3.6 litres   b) 7.2 litres   c) 10 litres   d) 1.8 litres

Solution (c)   **245g of $KClO_3$ → 67.2L of Oxygen gas**
                        36.75g → 10 Litres

3) Figure shows a square grid of order 3, which of the following is correct formula for the total number of squares in a similar grid of order n.

(a) $\dfrac{n(n+1)}{2}$ b) $\dfrac{n(n+1)(2n+1)}{6}$ c) $\dfrac{n^2(n+1)^2}{4}$ d) $\dfrac{n(n+1)(n+2)}{6}$
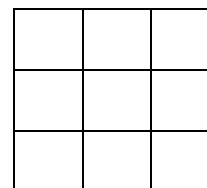
Solution (b)

4) If the distance between genes - *W. X. Y,* and *Z* on a chromosome are as follows: from *W-Y* is 18 units, *W-X* is 26 units, *W-Z* is 40 units, *X-Y* is 8 units and *X-Z* is 14 units, the sequence of *W, X, Y, Z* genes on the chromosome would be:

a) W, X, Y, Z.   b) X, Y, W, Z.   c) Y, W, X, Z.   d) W, Y, X, Z.

Solution : (d)

5) In a plant, 30 megaspore mother cells are generated. If all the ovules are fertilised, how many seeds are expected to be formed?

a) 30   b) 60   c) 90   d) 120

Solution : (a)

6) A water filter advertisement claims to provide 8 litres of water per hour. How much time does it take to fill four bottles of 1.5 litres each?

a) 2 hr   b) 1 hr   c) 45 min   d) 30 min

Solution (c)

7) Which among the following salts will not change the pH of water on addition
    a)Sodium chloride   b) Sodium cyanide
    c) Sodium bicarbonate   d) Sodium carbonate
Solution (a): Apart from sodium chloride rest are salts of weak acids.

8) A particle starting from rest is moving with uniform acceleration in a straight line. The percentage increase of the displacement of the particle in 9th second compared to that in the immediate previous second is about

a) 8.3%   b) 13.3%   c) 20.6%   d) 24.5%

Solution (b): The displacement in n^{th} second is given by $S_n = \frac{a}{2}(2n - 1)$. Thus percentage change in displacements

$$\left(\frac{S_9}{S_8} - 1\right)100 = \left(\frac{2X9 - 1}{2X8 - 1} - 1\right)100 = 13.3\%$$

9) An inflated balloon with a heavy rock tied to it submerges in water. As the balloon sinks deeper and deeper, the buoyant force acting on it

a) increases   b) decreases
c) remains nearly unchanged   d) Initially increases and then decreases

Solution (b): b is correct. Other choices indicate failure to see that the balloon is compressed by water pressure—and compression is greater with greater depth—displacing less water.

10) For a first order reaction, the ratio of the times taken for completion of 99.9% and 50% of the reaction is

a) 8   b) 9   c) 10   d) 12

Solution (c): 100→ 50 → 25 → 12.5 → 6.25→3.125 → 1.6 → 0.8 →0.4 → 0.2 → 0.1. Each arrow corresponds to one $t_{1/2}$ required. Numbers represent amount of reactant left after each $t_{1/2}$

11) If set of marbles, of radius 5 cm, is poured into a cube of side 1 m. The maximum number of marbles that can be filled into the box are

a) 1000   b) 2000   c) 1500   d) 3000

Solution (a)

12) Most of the insects have egg, larva, pupa and adult stages in the life cycle. This is primarily due to :

a) relatively short adult phase.   b) terrestrial habitat they have adapted to.

c) eggs storing little reserved food.   d) flying mode of locomotion majority have.

Solution : (c)

13) Which of the following has been proved to contribute to the transport of water in vasular plants?

i. Positive root pressure
ii. Hyrophilic cell walls
iii. Capillarity
iv. Transpirational pull
v. Cohesion between water molecules

a) i, ii, iii, iv and v   b) only I, iii and v

c) only ii, iv and v   d) only I, ii, iv and v

Solution : (c)

14) A round table cover has six equal designs as shown in the adjacent figure. If the radius of the cover is 4 cm, then cost of making the designs at the rate of Rs 10.00 per cm^2 (round off your answer to a nearest rupee) is
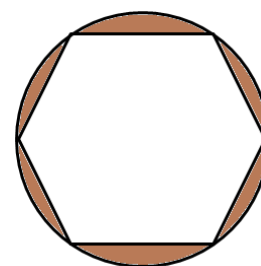
a)   Rs 85   b) 86   c) 87   (d)   90

Solution (c)

15) Which of the following series of elements have nearly the same atomic radii?
   a)   F, Cl, Br, I   b) Na, K, Rb, Cs   c) Li, Be, B, C   d) Fe, Co, Ni, Cu
Solution (d) In transition elements of one row, electrons are added to the same orbital i.e 3d in this case.

16) A particle is moving along a straight line. Its velocity time graph is as shown in the adjacent figure. Then
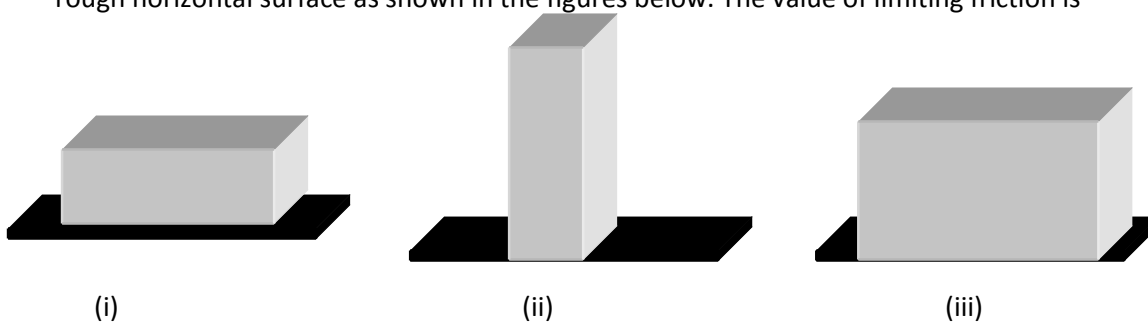   Match the following

Physical quantity	Remarks
(i) Acceleration at 4 second	(p) Positive
(ii) Velocity at 4 second	(q) Negative
(iii) Direction of motion at 2 second	(r) Zero
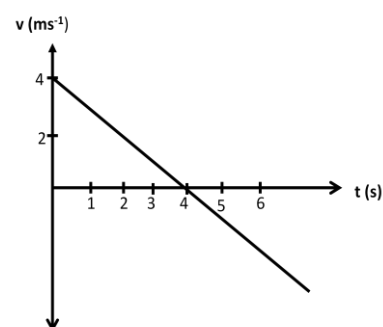
   a) (i) is (p); (ii) is (q) and (iii) is (r)
   b) (i) is (q); (ii) is (r) and (iii) is (p)
   c) (i) is (r); (ii) is (r) and (iii) is (p)
   d) (i) is (q); (ii) is (p) and (iii) is (r)

Solution (b): Slope of v-t graph represents acceleration and hence in this case negative
            Velocity at 4 s from v-t graph is zero
             V at 2 s is positive and hence direction of motion is positive

17) A rectangular parallelepiped with sides *a, b* and *c* in the ratio 3:2:1 is kept on a uniformly rough horizontal surface as shown in the figures below. The value of limiting friction is

          (i)   (ii)   (iii)

   a)   Minimum in (i)   b) Minimum in (ii)   c) Minimum in (iii)   d) Same in all cases
   Solution (d): Limiting value of friction depends on the mass of the object but not the area of surface of the object in contact with the floor.

18) Which of the following has the maximum number of unpaired electrons?
   a) Ti^{3+} b) V^{3+} c) Fe^{3+} d) Fe^{2+}
Solution (c)Fe^0 has $s^2 d^6$ configuration. Fe^{3+} has $s^0 d^5$ configuration. All 5 are unpaired.

19) The houses of a row are numbered consecutively from 1 to 49. Find the value of *x* such that the sum of the numbers of houses preceding the house numbered *x* is equal to the sum of the numbers of the houses following it.

   a) 25   b) 37   c) 35   d) No such value exists

Solution (c)

20) Urea is the principle excretary waste in larval as well as adult phases of:

   a) Cockroach   b) Frog   c) Crab   d) Starfish

Solution : (b)

21) Use of excessive NKP fertilizers has resulted in:

   i. Reduction in number as well as species of nitrogen fixing bacteria
   ii. Increase in number as well as types of denitrifying bacteria
   iii. Increase in the proportion of coarse particles in soil.
   iv. Increase in number as well as types of ammonifying microbes
   v. Increase in number as well as types of nitrifying bacteria

a) i, ii, iii, iv and v   b) only ii, iv and v   c) only i and ii   d) only i, ii and iii

Solution : (d)

22) Along a road lie an odd number of stones placed at intervals of 10 metre. These stones have to be assembled around the middle stone. A person can carry only one stone at a time. If a man starts from one of the end stones, and by carrying them in succession he covers 3 km to pile all stones at the centre. The number of stones is then

   a) 12   b) 15   c) 25   d) 30

 Solution (c)

23) The following variation of properties is generally seen in the periodic table.
   a) Atomic radius and ionization energy both increase across a period.
   b) Atomic radius increases and ionization energy decreases across a period.
   c) Atomic radius decreases and ionization energy increases across a period.
   d) Atomic radius and ionization energy both decreases across a period.
Solution (c)

24) The erythrocytes separated from human blood were mixed with certain fluids on a slide and observed under the microscope. Which of the following will be the expected result?

   a) With distilled water the cells swell and eventually burst.
   b) With serum the cells clump and coagulate.
   c) With sea water the cells undergo no apparent change.
   d) With tap water cells shrink and appear cremated.
Solution : (a)

25) The largest of the jelly-fishes grow over 1 meter in diameter and can survive without any skeletal support due to:

   a) rapid beating of cilia creating an upthrust.
   b) the bottom dwelling habit.

c) high salinity and subsequent buoyancy of sea water.

d) upwelling currents in water.

Solution : (c)

26) The diagram shows a road network. All vehicles drive in one direction from A to B. Numbers represent the maximum flow rate (capacity of roads) in vehicles per hour. The maximum number of vehicles that can drive through the network every hour is
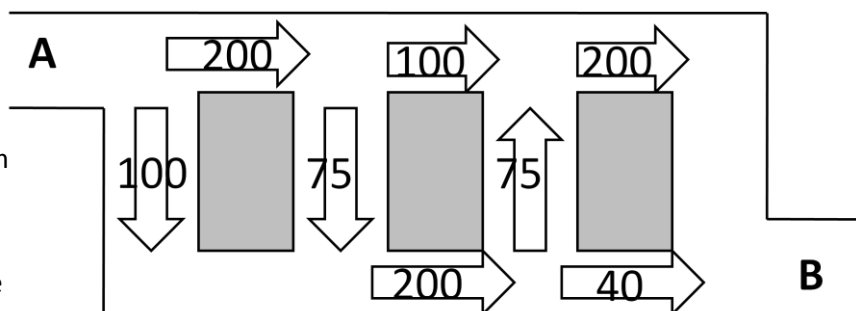
a) 315   b) 215   c) 240   d) 340

Solution (b)

27) An excess of NaOH solution is added gradually to an aqueous solution of $ZnSO_4$. Which of the following will happen?
   a) A white precipitate is formed which does not dissolve in excess NaOH.
   b) A green precipitate is formed which dissolves in excess NaOH.
   c) A white precipitate is formed which dissolves in excess NaOH.
   d) No observable change occurs.

Solution (c): Forms Zinc hydroxide first (white ppt.) on excess addition of hydroxide, forms water soluble zinc tetrahydroxide complex.

28) If two bodies of different masses, initially at rest, are acted upon by the same force for the same time, then both bodies acquire the same
   a) Velocity   b) momentum   c) acceleration   d) kinetic energy

Solution (b) Product of force and time (Impulse) is equal to increase in momentum.

29) It is more difficult to walk on a sandy road than on a concrete road. The most appropriate reason for this is

   a) sand is soft and concrete is hard
   b) the friction between sand and feet is less than that between concrete and feet
   c) the friction between sand and feet is more than that between concrete and feet
   d) the sand is grainy but concrete is solid

Solution (d)

30) In which of the following series of transition metal ions, all metal ions have $3d^2$ electronic configuration?
   a) Ti^+, V^{4+}, Cr^{6+}, Mn^{7+} b) Ti^{2+}, V^{3+}, Cr^{4+}, Mn^{5+} c) Ti^{3+}, V^{2+}, Cr^{3+}, Mn^{4+} d) Ti^{4+}, V^{3+}, Cr^{2+}, Mn^{3+}

Solution (b): From Ti to Mn, configuration changes from s^2d^2 to s^2d^5. On oxidation they all lose their electrons starting from the s orbital. So in option B all have d^2 configuration.

31)A piece of wire 60 cm long is cut into two parts, one of them being 24 cm long. Each part is then bent to form a square. The ratio of the area of the larger square to the smaller square is

a) 11/3   b) 7/4   c) 3/2   d) 9/4

Solution (d)

32) In the cells of oil seeds which of the cell organelles have to be more active?

a) Mitochondria.   b) Smooth Endoplasmic Reticulum.

c) Rough Endoplasmic Reticulum.   d) Nucleoli.

Solution : (b)

33) Which of the following sugars tastes most sweet?

a) Fructose.   b) Ribose.   c) Sucrose.   d) Lactose.

Solution : (a)

34)Scientists in an R & D company made three design improvements on a car: the first saves 50% of fuel, the second saves 30% of fuel and the third saves 20%. If the company implements all three design changes at once, the new car will consume fuel that is _____ % of the fuel consumption of normal car.

a) 50%   b) 28%   c) 100%   d) 20%

Solution (b)

35) Aluminum is extracted from its oxide by
   a)   Calcination   b) Reduction
   c) Thermal decomposition   d) Electrolysis

Solution (d)
36) The magnetic force on a moving charged particle can change the particle's

   a) speed only   b) direction only
   c) Both speed and direction   d) neither of speed nor direction

Solution (b). The magnetic force is perpendicular to displacement and hence no work is done. The kinetic energy does not change and hence speed remains the same. The change in acceleration is due to change in direction of velocity only .

37) A ray of light is incident on system of mirror as shown in the adjacent figure. What is the total deflection ($\hat{d}$) of the ray when it emerges out after two reflections?
   a) 220^0 b)180^0 c)140^0 d) 120^0

Solution (c):

38) The oxidation number of sulphur in sodium thiosulphate ($Na_2S_2O_3$) is

   a) +1   b) +2   c) +3   d) +4

Solution (b): 2+2x-6=0, therefore x= +2

39) The adjacent figure is a modification of the Switzerland flag to suit the problem! Five identical small squares form the central cross. The length of each side of the big square is 10 m. If the area of the white cross is 20% of the area of the square flag, then the length of the side of the small square is

   a) 1.75 m   b) 2.25 m   c) 1.6 m   d) 2 m

Solution (d)

40) The algae belonging to which group can sustain normal growth at the greater depth of ocean?

   a) Green algae.   b) Blue-green algae.   c) Brown algae.   d) Red algae.

Solution : (d)

41) Snakes, the cold blooded animals, flick their bifid tounge often to:

   a) sample air for chemoreceptors.   b) sense vibrations in earth.
   c) sense the nature of substratum.   d) sense the temperature of air.

Solution : (a)

42) We all know that the sky appears to touch the ground at a distance. The distance at which we perceive the sky to touch the ground is called horizon. The reason for the perception is due to the fact that the Earth is a sphere (almost) and not a flat surface. Which of these pictures below accurately depict the horizon for a person standing on a high rise building like Burj Khalifa in Dubai? (Here, 'h' represents the height of the building while line 'H' represents the horizon)
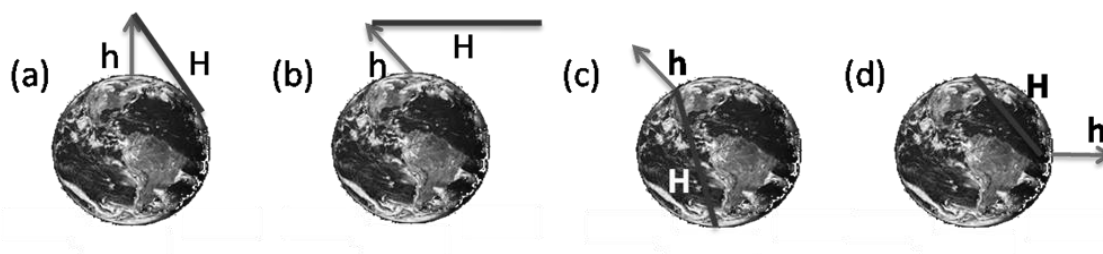
Solution (a)

43) Sulphuric acid is manufactured by the contact process in which sulphur dioxide reacts with oxygen in presence of a catalyst. If 5.6 moles of SO_2 reacts with 4.8 moles of O_2 and a large excess of water, the maximum number of moles of H_2SO_4 that can be obtained is.

   a) 5.6   b) 11.2   c) 4.8   d) 1.4

44) The element essential for determining the three dimentional structure of proteins is:

   a) carbon.   b) hydrogen.   c) nitrogen.   d) sulphur.

Solution : (d)

45) The general indigestion experienced by a patient suffering from obstructive jaundice is due to:

   a) the lack of emulsification of lipids.
   b) the low pH in the intestine not supporting optimal activity of enzymes.
   c) the acceleration of intestinal peristalsis reducing the retention time for food.
   d) the diffusion of bile pigments in blood suppressing secretion of digestive juices.

Solution : (b)

46) A number is said to be a triangular number if it is the sum of consecutive numbers beginning with 1. Which one of the following is **not** a triangular number

   a) 1431   b) 190   c) 506   d) 28

Solution (c)

47) The equivalent weight of $MnSO_4$ is half its molecular weight when it is converted to
   a) Mn_2O_3 b) MnO_2 c) MnO_4^- d)MnO_4^{2-}

48) A light source of diameter 2 cm is placed 20 cm behind a circular opaque disc of diameter 4cm. Shadow is formed on a screen at a distance of 80cm. The ratio of the area of umbra and penumbra shadow regions is equal to.

   a) 0.22   b) 0.18
   c) 0.58   d) 0.11
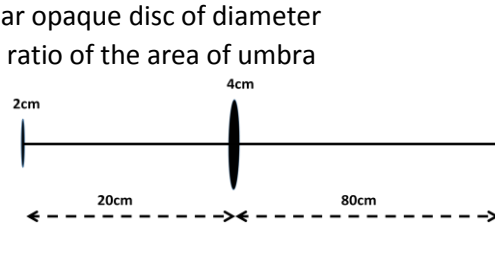
Solution (a): Consider triangle ABC and BDE $\frac{Y_1}{80} = \frac{1}{20}$ and therefore Y₁= 4 cm. Thus the area of umbral region is $A_U = \pi(4 + 2)^2 = 113.1\ cm^2$.
Consider triangle HBG and BFE. $\frac{Y_2}{80} = \frac{3}{20}$ and therefore Y₂ = 12cm. The area of penumbral region is $A_P = \pi\ (14^2 - 6^2) = 502.65\ cm^2$. The ratio is 0.22.
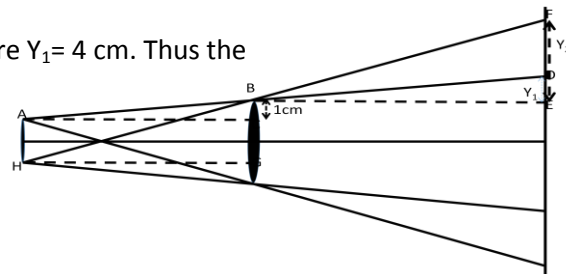
49) Consider the following two statements.
   Statement 1: The direction of acceleration of a particle must be always same as that of velocity.
   Statement 2: Acceleration is the rate of change of velocity.

Choose the correct option
a) Statement (1) is correct while statement (2) is wrong
b) Statement (1) and (2) are correct
c) Statement (1) is wrong while statement (2) is correct
d) Statement (1) and (2) are wrong.

Solution (C): Acceleration is in the direction of change in velocity and not velocity. Thus they can be in different direction.

50) Rust is a mixture of

    a)$FeO + Fe(OH)_2$ b) $FeO + Fe(OH)_3$

    c) $Fe_2O_3 + Fe(OH)_3$ d) $Fe_3O_4 + Fe(OH)_3$

Solution (c)

51) If the distance between A and B is 230 km, B and C is 120 km, C and A is 350 km. Also, if the distance between C and D is 200 km, distance between D and B is 330 km and distance from A to E is 100 km and distance between D and E is 570 km. The diagram (not drawn to scale) that represents this graphically is
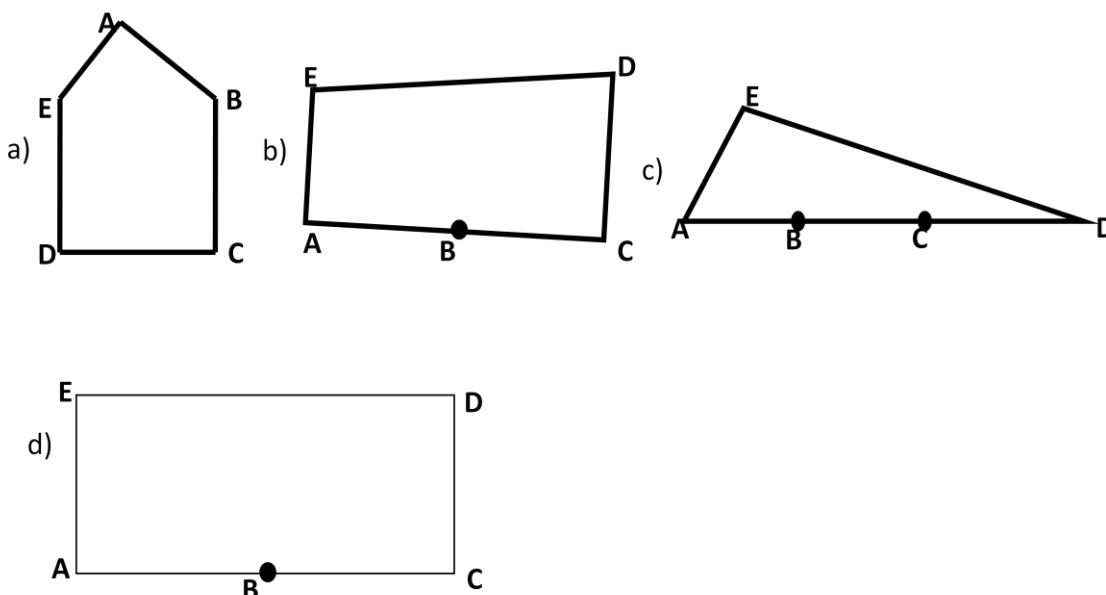
Solution (b)

52) Which of the following contains the same number of atoms as 13.5 grams of aluminum?

    a)10 g of sodium   b) 10 g of magnesium

    c) 20 g of potassium   d) 20 g of calcium

Solution (d): 13.5g of Aluminum is equal to 0.5 moles = 0.5 x 6.022×10^{23} atoms. Calcium - 20 grams is half mole.

53) Consider the following two statements. Statement 1 is an assertion of a concept while Statement 2 is the reason.

Statement (1): When red light travels from air to water, for observer in water it appears to be still red.

Statement (2): Colour of light is associated with frequency and frequency does not change, when it travels in different medium.
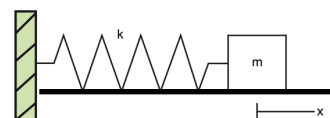
Choose the correct option
a) Statement (1) is correct while statement (2) is wrong
b) Statement (1) and (2) are correct

c) Statement (1) is wrong while statement (2) is correct

d) Statement (1) and (2) are wrong.

Solution (b):

54) A spring of spring constant 7600 Nm^{-1} are attached to a block of mass 0.25 kg as shown in figure. Frequency of oscillation on frictionless surface is

(a) 27.76 Hz   (b) 39.26 Hz   (c) 9681.5 Hz   (d) 98.39 Hz

Solution (a): Frequency of oscillation is $f = \frac{1}{2\pi}\sqrt{\frac{k}{m}} = \frac{1}{2\pi}\sqrt{\frac{7600}{0.25}} = 27.76 \, Hz$

55) The following data was recorded for the reaction A + B →Product at 298K.

Experiment No.	[A]	[B]	Rate of reaction
1	1.00M	0.15M	4.20 x 10^{-3}
2	2.00M	0.15M	8.40 x 10^{-3}
3	1.00M	0.30M	8.40 x 10^{-3}

From the above data one can conclude that

a) Rate $\propto$ [A]^2[B]   b) Rate $\propto$ [A][B]^2 c) Rate $\propto$ [A][B]   d) Rate $\propto$ [A]^2[B]^2

Solution (c): When amount of A is double the reaction rate doubles and as B doubles and A is kept same, again rate doubles. Indicating that rate is proportional to both A and B.

56) The sum of 2 digits *x* and *y* is divisible by 7. What can one say about a 3 digit number formed by these two digits.

a) xyx is divisible by 7   b) xxy is divisible by 7

c) xyx is divisible by 7^2 d) yyx is divisible by 7

Solution (a)

57) Most of the microbes employed in commercial fermentation for producing antibodies are:

a) thread bacteria.   b) yeasts.

c) eubacteria.   d) ascomycete fungi.

Solution : (a)

58) Most of the cellular RNA is synthesised and stored respectively in:

a) cytoplasm and ribosomes.   b) ribosomes and cytoplasm.

c) nucleus and ribosomes.   d) ribosomes and nucleus.

Solution : (c)

59)A number of bacteria are placed in a glass. 1 second later each bacterium divides in three, the next second each of the resulting bacteria divides in three again, and so on. After one minute the glass is full. When was 1/9th of the glass full?

a) 15 sec   b) 58 sec   c) 45 sec   d) 38 sec

Solution (b)

60) A number x is a rational number if there exists integers p and q such that x = p/q. This is the definition of rational numbers in which,

a) both p & q can be zero

b) both p & q should not be zero

c) p can be zero but not q

d) q can be zero but not p

Solution (c)

61) There is a solution of 1 Litre HCl of pH 5. When 9 L of water is added to this solution, the pH turns out to be

a) pH 5 itself   b) pH 10   c) pH 4   d) pH 6

Solution (d): Solution originally contains 10^{-5} moles of HCl in liter. As 9 liters of water is added, solution still contains 10^{-5} moles of HCl but in 10 Litres of water. Therefore the solution was diluted to a concentration of 10^{-6} Molar i.e. pH = 6

62) A wave is sent along a string by oscillating at one end. If the tension in the string is increased then speed of the wave and wavelength of the wave

a) both increase   b) speed increases, wavelength decreases

c) both decreases   d) wavelength increases, speed decreases

Solution (a): Speed is proportional to $\sqrt{Tension}$ and hence it increases. Wavelength is proportional to speed and hence even that increases as well.

63) Clock A based on oscillations of spring and clock B is based on pendulum motion. Both the clocks keep the same time on earth. If they are taken to a planet having half the density of earth and twice the radius

a) then A runs faster than B.   b) B runs faster than A.

c) both will run at same rate as earth   d) both will run at equal faster rate than earth.

Solution (c): Time period of Spring clock A is $= \frac{1}{2\pi}\sqrt{\frac{m}{k}}$. Thus it is independent of g and

hence on the planet. Time period of clock B is $= \frac{1}{2\pi}\sqrt{\frac{l}{g}} = \frac{1}{2\pi}\sqrt{\frac{l}{GM/R^2}} = \frac{1}{2\pi}\sqrt{\frac{lR^2}{G\rho\frac{4}{3}\pi R^3}} =$

$\frac{1}{2\pi}\sqrt{\frac{l}{G\rho\frac{4}{3}\pi R}}$. Thus time period will be same as that on earth.

64) Assuming ideal gas behavior, which among the following gases will have the least density under room temperature and pressure.

a) Nitrogen   b) Oxygen   c) Ozone   d) Fluorine

Solution (a): For all ideal gases the volume occupied by 1 mol of molecules is the same. Therefore the lightest gas is the one that has least molecular weight.

65) The least positive integer, n, such that 2 divides n, 3 divides $n + 1$, 4 divides $n + 2$, 5 divides $n + 3$ and 6 divides $n + 4$ is

a) 52   b) 120   c) 720   d) 62

Solution (d)

66) Which of the following places having same number of species is considered most biodiverse?

a) species belonging to more taxa.
b) many of the species endemic.
c) many of the species economically important.
d) species adapted to greater number of habitats.

Solution : (b)

67) Axolotl, the Mexican Salamander, shows 'neoteny' or larva becoming sexually mature (adult). Which of the following characters indicate larval features in it?

    i. Naked skin
    ii. External gills
    iii. Lidless eyes
    iv. Laterally compressed tail
    v. Clawless digits

a) i, ii, iii, iv and v.   b) only i, ii, iv and v
c) only ii, iii, iv and v.   d) only ii and iv.

Solution : (d)

68) The solution set of the inequality $0 < \frac{x}{x+1} < 1, x \in R$ is

a) Set of all positive real numbers   b) set of all non-negative real numbers
c) set of all real numbers except -1   d) Set of all numbers satisfying $0 \le x \le 1, x \in R$

Solution (b)

69) Which among the following organic compounds is likely to have more than one possible structure?
a) CH_4 b) C_3H_8 c) C_2H_4 d) C_3H_6

Solution (d): C_3H_6 is the only one which can represent either as propene or cyclopropane. While the rest represent only one single molecule.

70) In the circuit B_1, B_2, and B_3 represent identical bulbs.
Consider the case
(i) With resistance R_4 (ii) without the resistance R_4
   (R_4 comparable with resistance of bulb)
a) B_1, B_2 and B_3 glow with equal brightness in both cases.
b) B_1 brightest in (i) and in (ii) B_2 and B_3 become brighter and B_1 dimmer compared to case (i).
c) B_2B_3 brightest in case (i) and B_1 becomes brighter in (ii).
d) B_1 brightest in (i) and B_2 becomes brighter in comparison to B_3 in (ii).
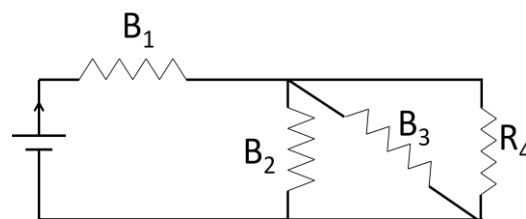
Solution (b): With R_4: the effective resistance of the circuit decreases. Hence current is larger. This leads to increase in brightness of B_1. The current is dived into three branches and B_2 and B_3 will be dimmer.
Without R_4: The effective resistance is higher and current reduces in the circuit. B_1 is dimmer than in case 1. The current in the branches of B_2 and B_3 is more and hence they are brighter than in case 1.

71) Three identical resistors each of resistance R are connected in the following four configurations. Rank the arrangement in the order of their equivalent resistors from highest to lowest.
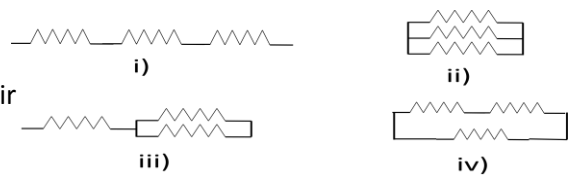
a) i,ii,iii & iv   b) iv,iii,ii & i

c) i,iii,iv & ii   d) ii,iv,iii & i

Solution (c): Effective resistance in case of   i)3R   ii) R/3   iii) 3R/2   iv)2R/3

72) Given below are the structures of the famous molecules called Aspirin and Paracetamol. Which among the listed functional groups do the two molecules put together **NOT** contain?

Paracetamol   Aspirin
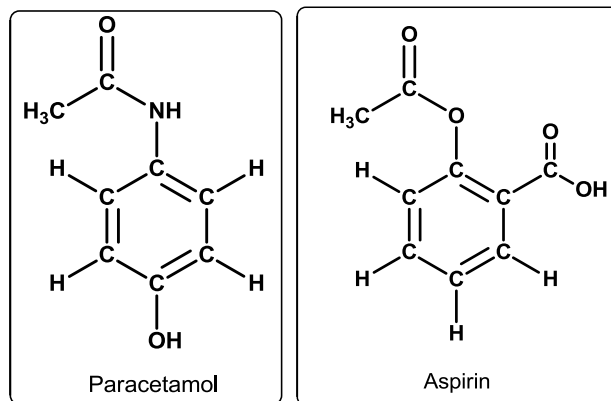
a) Ketone   b) Ester   c) Alcohol   d) Carboxylic acid

Solution (a): The functional groups contained by both of them are – Alcohol (phenolic), amide, ester and carboxylic acid.

73) Number plate of a vehicle consists of 4 digits. The first digit is the square of second. The third digit is thrice the second and the fourth digit is twice the second. The sum of all 4 digits is thrice the first. The number is

a) 1132   b) 4264   c) 9396   d) 1642

Solution (c)

74) The pteridophytic character that is considered to have led to the evolution of gymnosperms is:

a) homospory.   b) heterospory.

c) furcate venation.   d) sporophylls distinct from vegetative leaves.

Solution : (b)

75) Seeds trapped in crevices of rocks soak in water, swell and cause fragmentation of rock. The process involved is termed:

a) imbibition.   b) osmosis.   c) Tyndall effect.   d) water potential.

Solution : (a)

76) If the highest common factor of a, b and c is 1, where a, b and c belong to the set of natural numbers, then the highest common factor of (a X b) and c is

a) c   b) a X b   c) 1   d) Insufficient data

Solution (c)

77) If a firecracker burns with emission of red colour light, which cation is it likely to contain?
   a) Sodium   b) Copper   c) Iron   d) Lithium
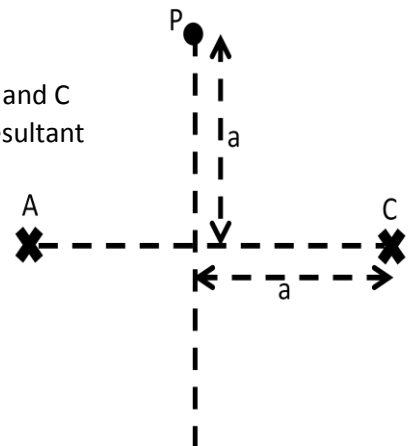**Solution (d):**

78) A positively charged insulator is brought in contact with an uncharged conductor then
   a) conductor acquires positive charge due to conduction
   b) conductor acquires negative charge due to induction
   c) conductor acquires positive charge due to induction
   d) conductor cannot acquire any charge.

   Solution (b): The insulator is a bad conductor of charge and hence it cannot transfer by conduction. It induces negative charge on the conductor.

79) Two infinite wires carrying identical current are placed at position A and C normal to plane of the paper as shown in the adjacent figure. The resultant magnetic field (B) at a point P on the perpendicular bisector is
   a) Along perpendicular bisector pointing towards line AC
   b) Along Line joining PC and pointing towards C
   c) Along line joining PA and pointing towards A
   d) Along line parallel to AC and pointing towards right

Solution(d) : The magnetic field due to current at position A and C are as shown in the adjacent figure. The field directions are perpendicular to line joining the P and current carrying wire. Thus resultant is parallel to AC.
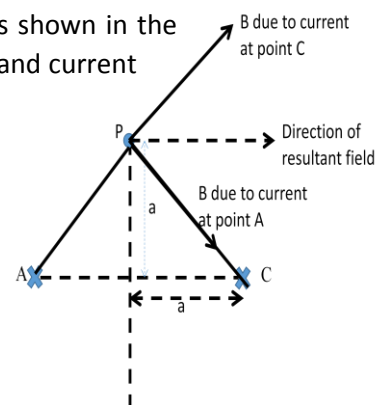
80) When an incandescent bulb is switched on and the outer glass bulb also gets heated up. This is due to
   a) Conduction and convection of heat from filament to the bulb by the medium inside the bulb at lower temperatures and by radiation of heat at higher temperature
   b) Convection of heat from filament to the bulb by the medium inside the bulb at all temperatures
   c) Radiation of heat from filament to the bulb at all temperatures

d) Conduction of heat from filament to the bulb by the medium inside the bulb at higher temperatures and by radiation of heat at lower temperature

Solution (a):