BK BIRLA CENTRE FOR EDUCATION

SARALA BIRLA GROUP OF SCHOOLS
SENIOR SECONDARY│CO-ED DAY CUM BOYS' RESIDENTIAL SCHOOL
ANNUAL EXAMINATION 2024-25
SCIENCE (086)

Class: IX	ANNUAL EXAMINATION 24-25	Duration: 3 Hrs.
Date : 00.02.25	MARKING SCHEME	Max. Marks: 80

Section–A

MCQ

1.(c) 373 K	1
2. (b) naphthalene	1
3. (c) Mercury, bromine	1
4. (b) It is permanent and Irreversible	1
5. (c) Phosphorus –P	1
6.(b) Fe	1
7. (d) None of the above	1
8. (c) Leucoplasts	1
9. (c) Osmosis	1
10. (b) Lateral meristems	1
11. (d) All of the above	1
12. (b) Adipose tissue	1
13. (b) Inter-cropping	1
14. (d) Poultry	1
15.(a) m/sec^2	1
16. (a) Longitudinal wave	1

A/R

17a) Both assertion and reason are true and reason is the correct explanation of assertion.	1
18.(c) Assertion is true but reason is false.	1
19 a) Both assertion and reason are true and reason is the correct explanation of assertion.	1
20.a) Both assertion and reason are true and reason is the correct explanation of assertion.	1

Section–B

21. Alloys are substances that combine a metal with another element, which can be either a metal or a non-metal.
    Brass: An alloy of copper and zinc.　　　　2
    Bronze: An alloy of copper and tin.

22.

Speed	Velocity
1. The distance travelled by the object in unit time is called its speed.	1. The distance travelled by the object in unit time in definite direction is called the velocity.
2. It is a scalar quantity.	2. It is a vector quantity.
3. Speed is always positive or zero but never negative.	3. Velocity can be positive, negative or zero.

1+1

23. Work is a measure of energy that results by applying a force on the body which displaces the body. Work done is given by the formula W = F s cos θ where F= force applied, s= displacement, = Angle between the force and displacement. The SI unit of work is Joule. The work done by the force of gravity on a satellite moving round the earth is Zero , cos 90 =0   1+1

OR

Kinetic energy is energy possessed by an object in motion.   1+1

$$v^2 - u^2 = 2a\,s$$

This gives

$$s = \frac{v^2 - u^2}{2a} \qquad (10.2)$$

From section 9.4, we know $F = m\,a$. Thus, using (Eq. 10.2) in Eq. (10.1), we can write the work done by the force, F as

$$W = m\,a \times \left(\frac{v^2 - u^2}{2a}\right)$$

or

$$W = \frac{1}{2} m\,(v^2 - u^2) \qquad (10.3)$$

If the object is starting from its stationary position, that is, $u = 0$, then

$$W = \frac{1}{2} m\,v^2 \qquad (10.4)$$

It is clear that the work done is equal to the change in the kinetic energy of an object.

If $u = 0$, the work done will be $\frac{1}{2}m\,v^2$.

Thus, the kinetic energy possessed by an object of mass, m and moving with a uniform velocity, v is

$$E_k = \frac{1}{2} m\,v^2 \qquad (10.5)$$

24. **Striated Muscles:** They have visible light and dark bands (striations).
   Unstriated Muscles: They do not have striations and appear smooth.   1+1

25. Manure and fertilizers are used in fields to enrich the soil with essential nutrients, improving   soil fertility and enhancing plant growth and yield.   2

26. **i) A plant cell is placed in a hypertonic solution:**
   Water moves out of the cell, causing it to shrink and undergo plasmolysis.
   ii) An animal cell is placed in a hypotonic solution:
   Water enters the cell, causing it to swell and potentially burst (lysis).   2

Section– C

27. (a) It states that the time rate of change of the momentum of a body is equal in both magnitude and direction to the force imposed on it.

   (b)

Solution:

From Eq. (8.4), we have $F = ma$.
Here we have $m_1 = 2$ kg; $a_1 = 5$ m s^{-2}
and $m_2 = 4$ kg; $a_2 = 2$ m s^{-2}.
Thus, $F_1 = m_1 a_1 = 2$ kg $\times$ 5 m s^{-2} = 10 N;
and $F_2 = m_2 a_2 = 4$ kg $\times$ 2 m s^{-2} = 8 N.
$\Rightarrow F_1 > F_2$.
Thus, accelerating a 2 kg mass at
5 m s^{-2} would require a greater force.

1+1+1

28.

Every object in the universe attracts every
other object with a force which is proportional
to the product of their masses and inversely
proportional to the square of the distance
between them. The force is along the line
joining the centres of two objects.
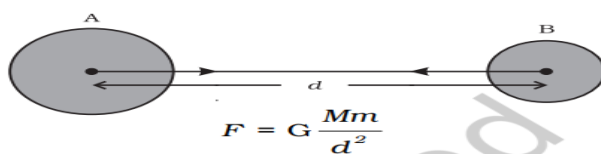
$$F = G \frac{Mm}{d^2}$$

$F \propto M \times m$ (9.1)

And the force between two objects is inversely
proportional to the square of the distance
between them, that is,

$$F \propto \frac{1}{d^2}$$ (9.2)

Combining Eqs. (10.1) and (10.2), we get

$$F \propto \frac{M \times m}{d^2}$$ (9.3)

or, $F = G \dfrac{M \times m}{d^2}$ (9.4)

where G is the constant of proportionality and
is called the universal gravitation constant.
By multiplying crosswise, Eq. (9.4) gives
$F \times d^2 = G\, M \times m$

1+2

29. (a) Force per unit area. SI unit is Pascal
(b)

The mass of the wooden block = 5 kg
The dimensions
$\qquad$ = 40 cm $\times$ 20 cm $\times$ 10 cm
Here, the weight of the wooden block
applies a thrust on the table top.
That is,
Thrust = F = $m \times g$
$\qquad$ = 5 kg $\times$ 9.8 m s^{-2}
$\qquad$ = 49 N
Area of a side = length $\times$ breadth
$\qquad$ = 20 cm $\times$ 10 cm
$\qquad$ = 200 cm^2 = 0.02 m^2
From Eq. (9.20),

$$\text{Pressure} = \frac{49\,N}{0.02\,m^2}$$
$\qquad$ = 2450 N m^{-2}.

1+ 1+1

30. a) Pasturage refers to the availability of flowers from which bees collect nectar and pollen.

It influences the quality and quantity of honey produced.
b) Beekeeping provides an additional source of income through the sale of honey, beeswax, and other bee products, as well as by enhancing crop yields through pollination.
c) Indigenous variety: *Apis cerana indica*   Exotic variety: *Apis mellifera*   1+ 1+1

31.
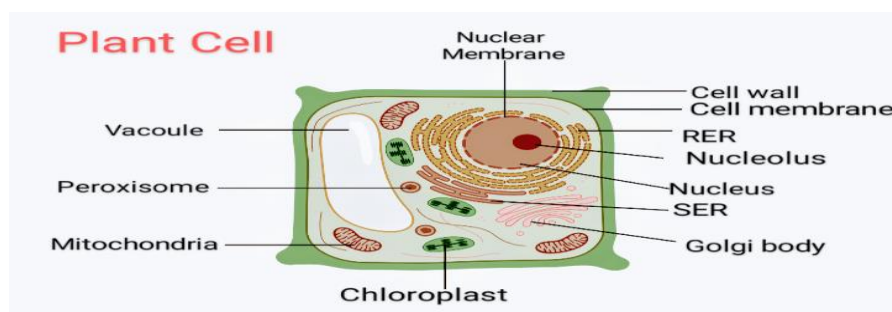
Nucleus: Contains DNA.
Golgi apparatus: Packages the materials coming from the endoplasmic reticulum.
Chloroplasts: Site for photosynthesis.
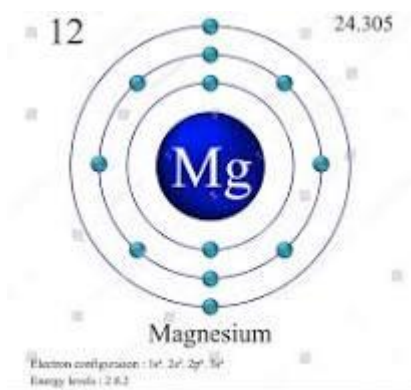Cytoplasm: Fluid contained inside the cell.   1 dia+2 labelling

32. (a) Sublimation is a chemical process where a solid turns into a gas without going through a liquid stage. 1
    (b) Convert 475-273= 202 ºC (degree celsius).   1
    (c) Oxygen < water < sugar   1

33. (a)

                                                                                              2
    (b) Find the number of electrons present in: 1

        (i) Na$^+$ → 10 electrons   (ii) Cl$^-$ → 18 electrons
                                   OR
Niels Bohr's model of the atom, also known as the planetary model,
describes the structure of an atom in the following ways:
Structure A small, positively charged nucleus is surrounded by negatively charged electrons
that revolve around it in fixed circular paths called orbits or shells.
Energy levels Each orbit has a fixed amount of energy, and electrons with more energy are
located farther from the nucleus. The energy levels are represented by quantum numbers,

which are integers that start at the nucleus and increase in value.

Electron movement Electrons can move between energy levels by gaining or losing energy. When an electron moves from a higher to a lower energy level, it emits energy in the form of light.

Stability Electrons do not lose or gain energy while moving in the same orbit, which explains the stability of the atom.
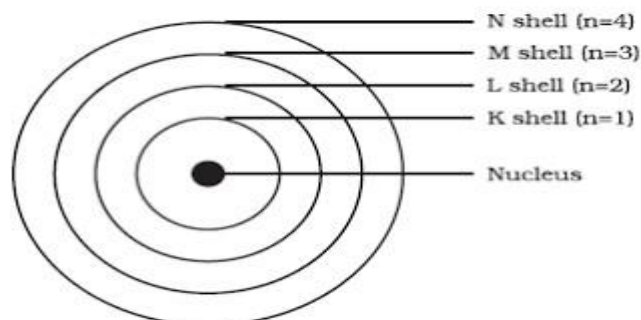
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Section– D

34. a) **i) Endocytosis:** The process by which a cell engulfs material from its external environment by forming a vesicle.

   ii) Plasmolysis: The process in which the cytoplasm of a plant cell shrinks away from the wall due to the loss of water when placed in a hypertonic solution.　　　2

   b) Lysosomes are called suicide bags because they contain digestive enzymes that can break down the cell's components if the lysosomal membrane ruptures.　　2

   c) Prokaryote-lacks nucleus.　　Eukaryotes-have nucleus　　　1

OR

   a) Lipids are synthesized in the smooth endoplasmic reticulum (SER), and proteins are synthesized in the rough endoplasmic reticulum (RER).　　2

   b) Mitochondria are called powerhouses because they generate energy in the form of ATP through cellular respiration.　　2

   c) Leucoplasts store starch, oils, or proteins in plant cells.　　　1

35. (a) "Atoms are indivisible particles, which can neither be created nor destroyed in a chemical reaction"　　　1

   (b)　　　(i) Na_2O　　　(ii) $AlCl_3$　　　2

   (c) Calculate the molecular masses of: (Atomic mass of C=12 u , H=1 u , K=39 u , O=16 u.)

   (i) C_2H_4 = 28 u　　　(ii) K2CO3 = 138 u　　　2

OR

   (a) "The relative number and kind of atoms in a given compound remain constant"　　　1

   (b) Write down the names of compounds represented by the following formulae.　　　2
      (i) Potassium nitrate　　　(ii) Calcium carbonate

   (c) Give the names of the elements present in the following compounds.　　　2
      (i) CaO Calcium and oxygen　　　(ii) Hydrogen and bromine

36. (a)

We know,
speed, $v = $ distance / time
$$= \frac{\lambda}{T}$$

Here λ is the wavelength of the sound wave. It is the distance travelled by the sound wave in one time period (T) of the wave. Thus,

$$v = \lambda v \left(\because \frac{1}{T} = v \right)$$

or $\quad v = \lambda v$

That is, speed = wavelength × frequency.

The speed of sound remains almost the same for all frequencies in a given medium under the same physical conditions.

1+1

(b)

Given,
Frequency, $v = 2$ kHz $= 2000$ Hz
Wavelength, $\lambda = 35$ cm $= 0.35$ m
We know that speed, v of the wave
= wavelength × frequency
$v = \lambda v$
$= 0.35$ m 2000 Hz $= 700$ m/s
The time taken by the wave to travel a distance, d of 1.5 km is

$$t = \frac{d}{v} = \frac{1.5 \times 1000 \text{ m}}{700 \text{ m s}^{-1}} = \frac{15}{7} \text{ s} = 2.1 \text{ s}.$$

Thus sound will take 2.1 s to travel a distance of 1.5 km.

1+1+1

OR

(a) Yes. Following are the laws of reflection of sound: The angle of reflection is always equal to the angle of incidence. The reflected sound, the incident sound, and the normal sound belong in the same plane

1+1

(b) The cracks or holes inside the metal blocks, which are invisible from outside reduces the strength of the structure. Ultrasonic waves are allowed to pass through the metal block and

detectors are used to detect the transmitted waves. If there is even a small defect, the ultrasound gets reflected back indicating the presence of the flaw or defect   2+1
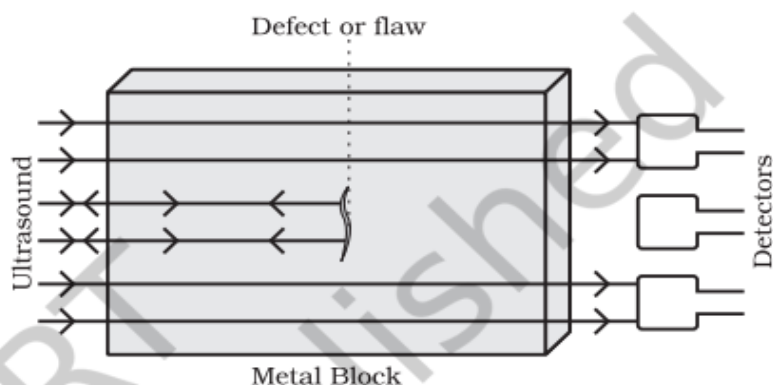

Fig 11.14: *Ultrasound is reflected back from the defective locations inside a metal block.*

Section–E

37.a) Tracheids These tube-like cells have tapered ends that overlap with other cells. They have thick, lignified walls and lack protoplasm.   1
   Vessels: These tube-like cells are long and cylindrical, with lignified walls and a large central cavity.
   b) Phloem parenchyma: These living cells store food and help move it short distances.
   Xylem fibers: These long, narrow cells are mostly dead and provide mechanical support to the xylem.   1
   c) Xylem conducts water and minerals and Phloem conducts food   2
                    OR
   c) Xylem and phloem are called complex tissues because they are made up of more than one type of cell that work together to perform a function.   2

38. (a) Isotopes   1
   (b) (i) Statement 1   1
   (c) An isotope of uranium is used as a fuel in nuclear reactors,   2
      Isotope of cobalt is used in the treatment of cancer,
     Isotope of iodine is used in the treatment of goitre.
            OR
   (c) Protium , Deuterium and Tritium   2

39. (a) Energy possessed by an object due to its height - Potential energy   1

(b) SI unit - Joule   1

(c)   P.E = mgh
            = 5 x 10 x 10 = 500 J   2

<div align="center">OR</div>

(c)

Solution:

Mass of the object, $m = 12$ kg,
potential energy, $E_p = 480$ J.

$$E_p = mgh$$
$$480 \text{ J} = 12 \text{ kg} \times 10 \text{ m s}^{-2} \times h$$
$$h = \frac{480 \text{ J}}{120 \text{ kg m s}^{-2}} = 4 \text{ m}.$$

The object is at the height of 4 m.

                                                                                              2

<div align="center">***BEST 0F LUCK***</div>