

**Maharashtra State Board**  
**Class IX**  
**Science and Technology Paper – II**  
**Sample Paper 3 Solution**

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**1. (A)**

- (1) Aluminium. All others are essential elements for plant growth.
- (2) Sessile flowers are flowers which lack a stalk or pedicel.
- (3) International Union for Conservation of Nature (IUCN) prepares the 'Red List' that contains the names of endangered species from different countries.
- (4) **Extinct animals of India:**
  - Asiatic cheetah
  - Himalayan wolf
- (5) **Tissue-grade organisation:**
  - Flatworm

**(B)**

- (1) Metaphase  
During metaphase, flexible protein fibres called spindle fibres are formed between the centromere of each chromosome and both centrioles.
- (2) *Lactobacilli*  
*Lactobacilli* culture is added to warm milk to convert it to yoghurt.
- (3) Bath sponge  
Jelly fish: Cnidaria  
Rohu: Pisces  
Grasshopper: Arthropoda
- (4) Samaralkota  
Samaralkota has a power plant based on natural gas.
- (5) Vision problem  
Excessive use of mobile phones can cause headache, vision problems and joint pain.

2.

(1) **Differences between monozygotic and dizygotic twins:**

<b>Monozygotic twins</b>	<b>Dizygotic twins</b>
<ul style="list-style-type: none"> <li>Formed from one single embryo which divides into two groups</li> </ul>	<ul style="list-style-type: none"> <li>Formed from two separate embryos which get implanted separately</li> </ul>
<ul style="list-style-type: none"> <li>Develop from the same oocyte</li> </ul>	<ul style="list-style-type: none"> <li>Develop from two different oocytes</li> </ul>
<ul style="list-style-type: none"> <li>Genetically exactly similar to each other</li> </ul>	<ul style="list-style-type: none"> <li>Genetically different from each other</li> </ul>
<ul style="list-style-type: none"> <li>Gender is same—either both boys or both girls</li> </ul>	<ul style="list-style-type: none"> <li>Gender may be same or different—either both boys or both girls or one boy and one girl</li> </ul>

(2) Biotechnology is used in agriculture to improve yield and variety.

- Genes of different crops have been recombined to form crop hybrids.
- Crops have been developed with desired characters by integrating foreign genes with their genome.
- Biofertilisers have been developed for nitrogen fixation and phosphate solubilisation.

(3) **Principle involved in the working of a thermal power plant:**

- In a thermal power station, coal is burnt in a boiler and the water in the boiler is converted to steam.
- Steam under high pressure is directed onto a turbine to turn the turbine shaft.
- This shaft which is connected to an electrical generator produces electricity as it turns.
- A condenser converts the spent steam from the turbine back to water and this water is pumped back to the boiler.

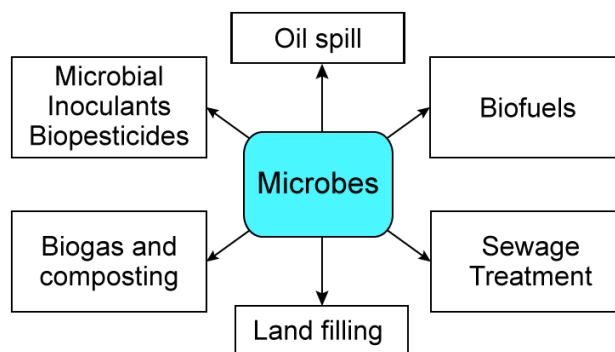
(4)

<b>Plant/Bacteria</b>	<b>Function</b>
<b><u>Fern <i>Pteris vitata</i></u></b>	Absorbing arsenic from the soil
Alfalfa	<b><u>Phytoremediation</u></b>
Indian mustard	<b><u>Absorbing selenium from soil</u></b>
<b><u><i>Pseudomonas</i></u></b>	Cleaning hydrocarbon and oil pollutants

(5) **Scopes of disasters:**

- Pre-disaster phase
- Warning phase
- Emergency phase
- Rehabilitation phase
- Recovery phase
- Reconstruction phase

(6) **Uses of microbes:**



(7) Salaam Mumbai Foundation runs programmes in various schools in Mumbai to empower slum dwelling children in the fields of education, sports, arts and business. It also helps these children to improve their health and lifestyle through proper education.

**3.**

(1) **Functioning of a sperm bank:**

- In a sperm bank, semen ejaculated by the desired men is collected after their thorough physical and medical check-up and then stored in the sperm bank. The name of the semen donor is strictly kept secret according to law.
- As per the wish of a needy couple, the oocyte of the woman of the concerned couple is fertilised by IVF technique using the semen from the sperm bank.
- The resultant embryo is implanted in the uterus of the same woman.

(2) Fuel used in a thermal power plant is coal. Coal contains chemical energy which releases heat energy on burning. This heat is used for the generation of electricity in a thermal power plant.

**Problems associated with power generation by a thermal power plant:**

- Burning of coal releases carbon dioxide, carbon monoxide, sulphur dioxide and nitrogen dioxide which are harmful and toxic to health.
- Soot particles emitted during combustion can cause severe respiratory problems such as asthma.
- Coal reserves are limited. Once exhausted, they will not be replenished later. This would result in energy crisis.

(3) Characters of Phylum Cnidaria:

- They are mostly marine; some are freshwater forms.
- Body is radially symmetrical, diploblastic and either polyp or medusa.
- Mouth is surrounded by tentacles.
- Each tentacle bears stinging cells called cnidoblasts.
- Examples: *Hydra*, *Aurelia*

(4) The science of heredity is useful in the following ways:

- For diagnosis, treatment and prevention of hereditary disorders
- For producing hybrid varieties of animals and plants
- For the use of microbes in industrial processes

(5) Biodiversity can be conserved in the following ways: (Any three)

- Protection of rare species of plants and animals
- Creation of habitats for animals and plants by establishing national parks and sanctuaries
- Declaration of biosphere reserves
- Conservation projects for protecting special species
- Conservation of flora and fauna
- Strict observance of acts and rules
- Use of traditional knowledge and maintaining records of traditional knowledge

(6) Differences between mitosis and meiosis:

<b>Mitosis</b>	<b>Meiosis</b>
Chromosome number does not change.	Chromosome number is reduced to half.
One cell gives rise to two daughter cells.	One cell gives rise to four daughter cells.
Essential for growth and development.	Essential for the formation of gametes.

(7) Objectives of disaster management:

- To save human life from disasters
- To supply essential commodities to affected people
- To bring the affected people back to normalcy
- To rehabilitate affected and displaced victims
- To execute protective measures to develop capability to face future disasters

4.

(1) The menstrual cycle is the events of cyclic changes that take place within the intervals of 28 to 30 days in a mature woman.

- It is divided into 4 phases – menstrual, follicular, ovulatory and luteal.
- Hormones from the pituitary [FSH (follicle-stimulating hormone) and LH (luteinising hormone)] and hormones from the ovary [oestrogen and progesterone] control the menstrual cycle.
- Menstrual phase: Lasts for 3–5 days. During this phase, blood is discharged.
- Follicular phase: As the follicle grows, it finally matures into the Graafian follicle. Oestrogen stimulates the thickening of the uterine endometrium.
- Ovulatory phase: On about the 13<sup>th</sup> or 14<sup>th</sup> day, the follicle ruptures, and the released ovum travels down the fallopian tube.
- Luteal phase: It lasts for 15–28 days. The uterus lining thickens further. The empty follicle turns into the corpus luteum. The corpus luteum secretes oestrogen and progesterone. If fertilisation does not occur, then the ovum disintegrates, and the endometrial lining starts shedding on the 28<sup>th</sup> day. If fertilisation occurs, then the embryo gets implanted in the uterine wall and there is no menstrual flow.

(2)

- (a) Annelidans have parapodia and setae as locomotory organs.
- (b) Phylum Arthropoda has a characteristic of jointed appendages.
- (c) Organisms which belong to Phylum Echinodermata move from one place to another with tube feet.
- (d) Class Reptilia belonging to Sub-phylum Vertebrata have weak limbs which enable them to creep on the ground.
- (e) Class Aves and Pisces belonging to Sub-phylum Vertebrata use wings and fins, respectively, for locomotion.