Daily Current Affairs Prelims Quiz 15-03-2024 (Online Prelims Test)

1) Consider the following statements with respect to Fast Breeder Reactor (FBRs)

1. FBRs can create more fissile material fuel than they consume by converting fertile material into fissile material through a process called nuclear transmutation.
2. India's first indigenous Prototype Fast Breeder Reactor (PFBR) is located in Kalpakkam Atomic Power Station, Tamil Nadu.
3. Fast Breeder Reactors belongs to second stage of India's three stage nuclear programme.

How many of the statements given above are correct?

a. Only one
b. Only two
c. All Three
d. None of the above

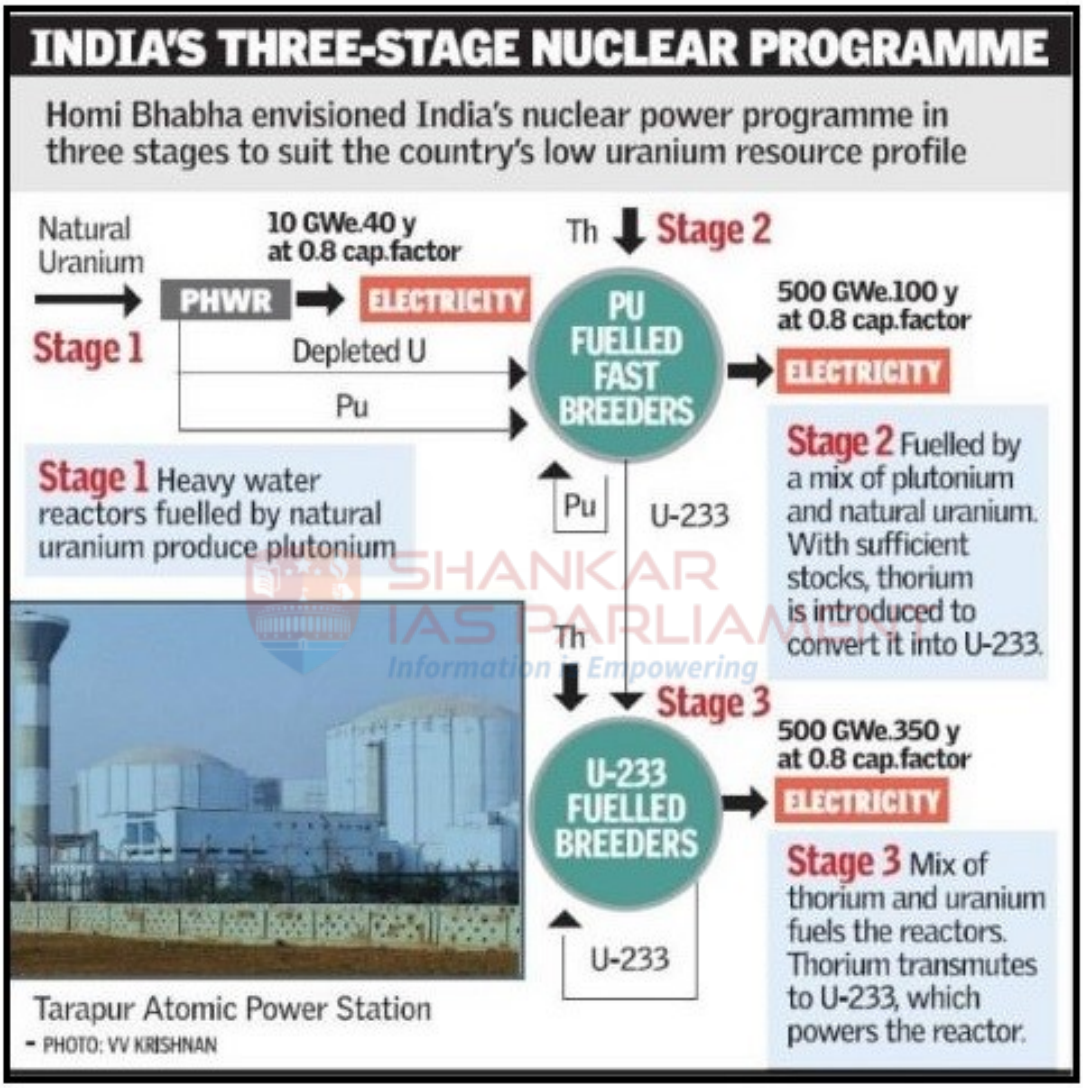
Answer : c

Fast Breeder Reactor (FBRs)

Recently 'core loading' process began at the Kalpakkam Fast Breeder reactor which marks a critical milestone in the country's 3-stage nuclear power programme.

- Fast Breeder Reactor (FBRs) are a type of nuclear reactor which can create more fissile material (fuel) than they consume.
- This is achieved by converting fertile material into fissile material through a process called nuclear transmutation.
- **India's nuclear power program** – Is a three-stage plan designed to utilize the country's thorium reserves for generating electricity.
- The second stage, which recently achieved a milestone with the core loading of the Kalpakkam FBR, plays a crucial role in creating more fuel for the third stage.
- India has adopted a "closed fuel cycle" approach.
- **Closed Fuel Cycle Approach** – It involves the reprocessing of spent fuel to separate the useful plutonium (Pu) 239 and Uranium (U) 233 isotopes from U238 and Thorium (Th) 232.
- ***Core loading*** is the process of placing nuclear fuel assemblies inside the core of a nuclear reactor.
- The 3 Stages of India's Nuclear Power Program:
- **Stage 1** – Setting up Pressurized Heavy Water Reactors (PHWRs) that use natural uranium as fuel. (Currently operational)
- **Stage 2 (Current Stage)** – Introduce Fast Breeder Reactors (FBRs) like the Kalpakkam FBR.
- FBRs use Pu239 (extracted from spent fuel of PHWRs) to generate electricity.
- Surround the reactor core with a fertile material blanket (U238).
- Fast neutrons from the core convert U238 in the blanket to more Pu239, breeding new fuel.
- **Stage 3 (Future Stage)** – Utilize Thorium (abundant in India) for power generation.
- Thorium itself is not fissile, but can be converted to fissile Uranium-233 (U233) in FBRs.

- **Significance of the FBR –** The successful operation of the FBR marks a critical step towards achieving the third stage.
- By breeding Pu239, FBRs create more fuel for future reactors, including those that will eventually use thorium.
- They are crucial for India's long-term energy security, especially in harnessing thorium resources effectively.
- **Thorium reserves in India** — Is found in coastal and inland placer sands on the beaches of Kerala, Tamil Nadu, Odisha, Andhra Pradesh, Maharashtra, and Gujarat.
- It is also found in the inland riverine sands of Jharkhand and West Bengal.
- A ***placer deposit*** is a natural concentration of heavier minerals created by the action of gravity on moving particles.



2) Kasarkod Tonka, an important nesting site for Olive ridley turtle, is located in?

a. Kerala
b. Odisha
c. Karnataka
d. Tamil Nadu

Answer : c

Kasarkod Tonka

Recently 700 eggs of sea turtles were destroyed by feral dogs in Kasarkod Tonka, Karnataka.

- Kasarkod Tonka is one of the important nesting sites for the sea turtle including olive ridley turtle located in the Uttara Kannada district of Karnataka.
- In Tonka, there are 36 plus nesting sites, of which seven have been destroyed by stray dogs.
- Dogs are natural predators of the turtle eggs that are laid on the beaches.
- Kasarkod Beach has received Blue Flag certification.

3) Consider the following statements:

1. Refrigerants such as hydrofluorocarbons (HFCs) are short-lived climate pollutants (SLCPs).
2. Hydrochlorofluorocarbons (HCFCs) are both ozone depleting substances (ODS) and powerful greenhouse gases.
3. Kigali Amendment to the Montreal Protocol aims to reduce consumption of hydrofluorocarbons (HFCs) by 80% by 2047.

How many of the statements given above are correct?

a. Only one
b. Only two
c. All Three
d. None of the above

Answer : c

Refrigerants & Montreal Protocol

Recently an American citizen faced serious legal consequences for his involvement in illegally importing and selling of Refrigerants such as hydrofluorocarbons (HFCs) and a form of hydrochlorofluorocarbons.

- Refrigerants are gases that cool appliances, like refrigerators and air conditioners, by absorbing heat and transferring it to a cooler environment.
- Refrigerants includes hydrofluorocarbons (HFCs) and a form of hydrochlorofluorocarbons (HCFCs), known as HCFC 22.
- HFCs and HCFCs became mainstream after emerging as an alternative to chlorofluorocarbons (CFCs) in the 1990s.
- HFCs, unlike CFCs and HCFCs, have zero ozone-depleting potential (ODP), gradually became the most prominent refrigerant.
- Refrigerants are released into the atmosphere by damaged appliances or car ACs.
- 90% of refrigerant emissions are estimated to occur when equipments reache their end of life and are improperly disposed of.
- (HFCs) are short-lived climate pollutants (SLCPs).
- Hydrochlorofluorocarbons (HCFCs) are both ozone depleting substances (ODS) and powerful greenhouse gases.
- **Montreal Protocol** – Is an international treaty designed to protect the ozone layer by phasing out the production and consumption of ozone-depleting substances (ODS).
- It was adopted on September 16, 1987 and has since been ratified by nearly every country in the world.
- *Under the Montreal Protocol, countries were to phase out CFCs by 1996, and HCFCs by 2030*.
- One significant amendment to the Montreal Protocol is the Kigali Amendment, adopted on October 15, 2016, in Kigali, Rwanda.
- ***Kigali Amendment*** to the Montreal Protocol aims to reduce consumption of hydrofluorocarbons (HFCs) by 80% by 2047.

4) Consider the following pairs

Places	*Relevance*

1. Catalhoyuk – Neolithic site.
2. Nandankanan – Zoological Park in Odisha.
3. Raghanesda – One of the largest solar parks in India.

How many of the pair(s) given above is/are correctly matched?

a. Only one
b. Only two
c. All Three
d. None of the above

Answer : c

- **Çatalhoyuk** – Is a ***Neolithic*** site located in ***Turkiye*** (Turkey).
- Recently the 'oldest bread' in the world was discovered in this site.
- It was declared a ***UNESCO World Heritage Site*** in 2012.
- **Nandankanan Zoological Park (NZP)** - Nandankanan is the first zoo in the World to breed White tiger and Melanistic tiger.
- It is located in ***Odisha***, India.
- It is the ***only conservation breeding centre of Indian Pangolins*** in the world.
- First zoo in India to become a member of the World Association of Zoos and Aquariums (WAZA).
- **Raghanesda Solar Power Station** – It is one of the largest power stations located in Gujarat.
- The power generated by the Raghanesda Solar Power Station will be supplied to Gujarat Urja Vikas Nigam Limited (GUVNL) for 25 years.

5) Consider the following statements with respect to Nematodes

1. They are single celled organisms with no digestive system.
2. Free-living nematodes are parasites that can be unhealthy for plant growth.
3. They are capable to survive only in black cotton soil.

How many of the statements given above are correct?

a. Only one
b. Only two
c. All Three
d. None of the above

Answer : d

Nematodes

Recently agricultural experts have stated that not all Nematodes are healthy to soils.

- Nematodes are ***multicellular***, wormlike animals that are different from most other organisms in the soil, such as bacteria and fungi, which are single celled.
- They are ***equipped with a digestive system*** and are transparent, making it easy for scientists to examine their feeding habits.
- ***They are highly capable of surviving in any environment***.
- Not all nematodes are good for plant growth.
- The 4 types of Nematodes in soils are
    1. Free-living nematodes
    2. Plant-parasitic nematodes
    3. Entomopathogenic nematodes

4. Slug-parasitic nematodes

- **Free-living nematodes** – Are ***non-parasites***. They tend to feed on almost anything in the soil, including fungi, bacteria and other nematodes.
- *Without free-living nematodes, soil is regarded as biologically dead and unhealthy for plant growth*.
- **Plant-parasitic nematodes** – They feed through a needle-like stylet, which they use as a syringe for obtaining food from the roots of plants.
- They have adapted their lifestyle from feeding on the outside of the root to inside it, where they are protected against the harsh soil environment.
- ***It can never be fully controlled***. However, researchers have developed ways to keep them from multiplying to damaging levels.
- These techniques include planting crops that are resistant to specific nematodes or rotating with crops that the nematodes do not like.
- **Entomopathogenic nematodes** – They act as biological control agents and are plant allies.
- They feed on pest insects such as larvae and pupae that are in contact with the soil, rather than on plants.
- Every farmer or food gardener should have entomopathogenic nematodes present in their soil because they help to keep insect numbers low.
- **Slug-parasitic nematodes** – It can be used as a biological control agent.