I)

A) National Mission on Nano Science and Technology is administered by ~~the~~ Ministry of Science and Technology and started in 2017 to promote R&D, investment and collaboration in Nano-science and technology.

B) Microbial fuel Cell is a futuristic energy technology where energy is generated by microbes activity on organic matter. It is a non-polluting form of energy generation.

c) PINACA is a missile system developed by DRDO for Indian defence System.

d) Chandrashekhar Venkatraman ~~is~~ was a Nobel prize winner of physics, who was of Indian Origin.

e) Satish Dhawan Space Centre is located on Coast of Odisha, is a satellite launching facility named after Satish Dhawan former director/Head of ISRO.

f) VSAT :- It is a space-communication technology that uses Synthetic Aperture transponder to communicate with earth base stations.

g) SWAYAM :- Ministry of Human Resources Development, technology platform to promote Online open schooling from class - IX to higher education level. Also called - MOOC

h) Dark-matter :- Concept of Physics, that states that ~~earth~~ universe is 95% dark-matter and 5% visible matter. Large Hadron Collider Project of France & Switzerland is studying it.

i) Amniocentesis :-

j) Asbestosis :- It is a lung-disease caused due to ~~inhalation~~ inhalation of asbestos in asbestos industry.

k) Environment Planning Coordination Organisation established in 1981, it is the apex ~~policy planning agency~~ of Government of M.P.

l) Carbon-Index :- It is a international environment index, that measures the Carbon content of atmosphere and its various sources.

m) Wildlife Board of India, established under Protection of wildlife against Cruelty, Act. It is a Statutory body. PM is the

chairman of this board.

Cartagena Protocol :- It is under United Nations Convention on Biological Diversity - 1992 and it regulates movement of LMOs among countries.

c) National Coral Reef Research Center :- It is present in Gujarat, direct Control of Government of India.

III) 300 words Questions:-

A) India is an Environment responsible Country who attended the first UN Conference on Environment in 1972. Since then India has promulgated Ordinace and Acts for Conservation of Environment.

Types of Act

i) Wildlife Protection Act - 1972 for protection of wildlife, Project Tiger, Project Elephant etc. are under it.

ii) Water (Prevention of Pollution Act) :- Central Pollution Control Board function under

3. Forest protection Act – 1980 :– Conservation of forest are under it and all afforestation drive are under it

4.) Air (Prevention of Pollution Act) :– Air Quality Index and SAFAR index are used under it

5. Environment Protection Act :– 1986.
The Act was enacted in light of Bhopal Gas tragedy of Dec, 1984

6. Biodiversity Conservation Act – 2002 :–
National, State, Districts Boards are established under it, for conservation of the Biodiversity.

7 Wetland Rules of Government of India :–
For Conservation of ecological character of natural and artificial lake
E.g. Bhoj – Jal of Bhopal.

Thus Government of India and state Governments have implemented various Act and policies to promote holistic development of the Environment

As a result India today has highest population of tiger, Asian Rhinoceros in the world.

India has a tree and forest Cover of 24%, with the afforestation target of 5 million hectare (annually) under Green India mission.

India is the only big country in the world to be able to follow Aichi targets under the government's Biodiversity Conservation drive.

India has more than 30 wetlands under Ramsar Conventions with Bhoj-Tal of Bhopal being included.

India has adhered to its INDC goal of Paris Agreement of 40% of power/energy needs from non-fossil fuel sources and 2.5 Giga-tone of CO_2 sequestration.

Q) In the light of increasing energy demand it is expected that Indias energy requirements get double by 2050?

However to comply with Paris Agreement (2015) and SDG-targets 2030 majority of those energy demand has to be fullfilled by the non-fossil fuel sources.

Nuclear energy is the energy produced by Nuclear fission of heavy elements (atoms like Uranium-235 and Plutonium). Energy is produced as heat is harnessed by steam turbines.

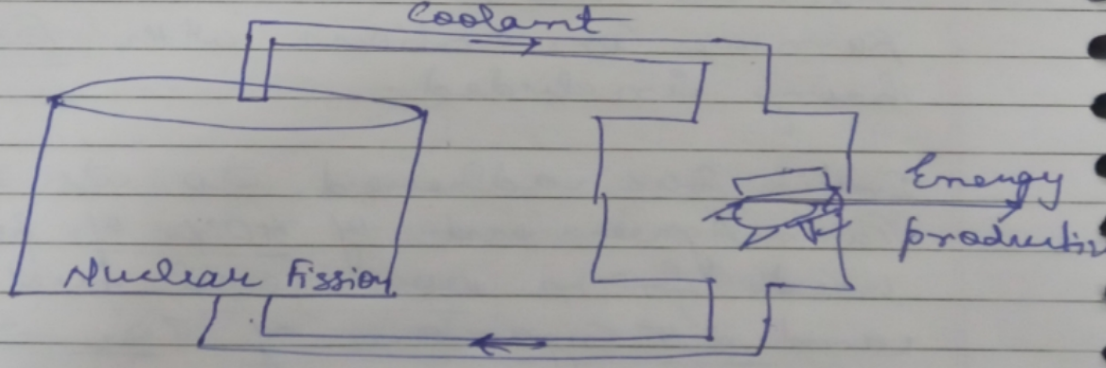

fig:- A-nuclear reactor

Essentiality of Nuclear reactors. (Advantages)

1) These sources of energy are less Carbon Intensive, less Environmental pollution causing.

2) Help in achieving in INDC targets of Paris Agreements – 2030.

3) Rising demand of Economically Resurgent India and intermittency of renewable sources of energy.

Nuclear plants of India (Some Examples)

↳ Kalpakkam Plant – Chennai
Kundankulam Plant – Tamil Nadu
Narora plant – U.P.
Rawat bhata – Rajasthan.
Kakrapara – Gujarat.

Dangers of Nuclear Power

1. The effects of Nuclear reactor failure can be Catastrophic e.g. Fukushima Incident (2011).

2. Developed Nations are phasing out its use. E.g. Paris and Germany.

3. Radioactive waste will affect the Environment for longer time. E.g. Chernobyl incident.

4. Requires lot of security. (Critical Infrastructure of India).

5 Prone to attacks by Neighbours like Pakistan

The Energy need for Government of India and Nation is going to increase. The Nuclear Energy is going to play a crucial part.

However alternatives like clean coal technology, wind-solar hybrid plants and ITER (fusion-reactors) should be considered for future requirements to meet 2030 SDG targets by India

D) ~~Got~~ Biotechnology refers to the scientific branch which tinkers with the biological and genetic traits of organisms for providing development solution for Government of India.

Indian Government has a Biotechnology Mission under BIRAC, department of Biotechnology to promote the R&D, Collaborative research in Biotechnology

Application of Biotechnology

Agriculture :- The technology provides resistance to the plants against pest and diseases. E.g. Bt Brinjal, Bt Cotton.

It increases the nutritive features of food. E.g. Golden rice (Vitamin-A source)

Medicine :- The preparation of Bio-pharmaceuticals by Indian pharmacy through Bio-technology is assisted by World Bank.

Space :- The use of Chlorella algae to produce food, Oxygen and water in a Bio-technology effort.

International trade :- UNCBD has a Cartagena protocol specifically dedicated to Living Modified Organism.

Genetic Engineering :- CRISPR-Cas 9 is a genetic tool to create designer babies is a Bio-technological marvel.

Achievements of Biotechnology

1. Developing drought resistant varieties of crops and high-yield varieties. Bt-Cotton is pest resistant.
2. Increase in agricultural yield of the agriculture.
3. Sustainance of Astronauts on International Space Stations.
4. India's Bio-pharmaceutical mission is aimed at reducing Anti-Microbial resistance.
5. Development of a responsible trading regime under Cartagena Protocol.
6. Food fortification

The achievement of Bio-technology is holistic and yet to be realised in India. Therefore we need Capital, human, Scientific resources to develop our Bio-technological capabilities.

2) 100 words questions.

A) International Space Station is a joint project of 5 nations U.S., U.K., Canada, Russia and Japan. It is a Low-Earth Orbit space structure. It is the largest thing ever put by humans in the space.

Benefits :- ISS is a research station on human health in space to launch futuristic Inter-stellar space missions.

It is also an Earth Observatory.
China and India is planning their manned space missions too.
E.g. Gaganyaan of India.

B) Indian remote Sensing System involves the Geostationary, Geosynchronous and Polar orbit satellites connected with the base stations on Earth to observe and monitor the weather, mineral resource pool, agricultural land use, forests, wetland and urban land use.

Indian Remote Sensing System has developed variety of satellites like Cartosat series, INSAT series, Edusat, Resource satellite and recently launched EOS satellite by India.

It has developed Indigenous technological Capacity like NAVIC (positioning system), SAARC satellite (foreign diplomacy) and GAGAN and BHUVAN satellite interface for ~~land~~ and air navigation and land use monitoring.

c) Artificial Intelligence is the ability of Cognitive learning by Machines through methods of Machine learning

Its Application

1. Face unlock in mobiles.
2. Smart parking in Cars.
3. Smart lighting in homes, CCTV security cameras.
4. Google lens, Bixby.

Future Application

1. Autonomous Car driving.
2. Autonomous Smart Metering
3. Robotics.

D Gene engineering is the addition, subtraction or alteration in genetic composition of an organism to impart genetic qualities

E.g. CRISPR-Cas 9 technology has recently led to production of designer babies in china

Useful in treating Diseases.

There are various genetic diseases like

- Klinefelter Syndrom (sex-chromose)
- Down Syndrom (~~dd~~ autosomal disease)
- Haemophilia (autosomal disease)

These disease are not curable by medicines today. These are chronic diseases as well. Gene engineering could edit those genes to cure disease.

E. Nano technology is the use of Nano-materials (1-100 nm) to be implemented in industry, agriculture or in daily

Nanotechnology as major technology of 21st century because :-

1) It changes the physical and chemical property of material.

At Nano-scale Gold is a reactive element.

2) It can cure disease like Cancer by targeted delivery of medicines.

3) Carbon filter of water are based on this Nano-technology.

4) Heart valves of graphene are being tried out for artificial heart.

5) Nano-sensors in agriculture is important in precision farming.

6) Digital Signature under IT Act - 2000 is a technique to attest electronic document by an originator.

It involves a public key and a private key in order to certify and attest an electronic document.

Main features

1. Authentication of documents
2. Its is identifier of originator

3. It is in electronic form.
4. Promote Digitalisation of Economy & society.

6.) 3D printing is an additive technology where a machine copies the electronic design in physical dimensions

Advantages
1. Less polluting, less waste generation
2. It is an additive technology
3. It is used in aerodynamic designs of auto-components.
4. Less Energy intensive.

11) Wetlands are any water-body, that have presence of unique flora and fauna diversity attached to it, preferably endemic to it

These can be marsh, mangroves or pond or lake. E.g. Chilika lake (Odisha) Sunderbans (West Bengal).

Ramsar Convention - 1971 based on Ramsar (Iran) is a wetland protection Conven It gives recognition to wetlands of International Importance

Radio-active pollution:- It is the harmful effects of radiation cause by the decayin radioactive material.

Side-effects

1) Mutation of genes in humans.
2) Loss of life.
3) Inheritance of defective genes by future generation.

K) Biodiversity hotspots are those regions where diverse and endemic flora & fauna are found.

E.g. Western Ghats of India
↳ Lion-tailed Macaque

Indo-Myanmar Belt
↳ Pygmy Hog
↳ Asian Rhinoceros
↳ Red Panda.

These regions are important for bio-diversity conservation.