GS SCORE
GS MAINS TEST SERIES 2014

TEST - 7

Science & Environment

Time Allowed: 3 hr. *Max. Marks: 250*

Instruction to Candidates

- There are 25 questions.
- All questions are compulsory.
- The number of marks carried by a question/part is indicated against it.
- Answers must be written in the medium arthorized in the Admission Certificate which must be stated clearly on the cover of this Question -cum-Answer (Q€A) Booklet in the space provided. No marks will be given for answers written in medium other than the authorized one.
- Word limit in questions, if specified, should be adhered to.

Any page or portion of the page left blank in the Question-cum-Answer Booklet must be clearly struck off.

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Date 18 oct 2014

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2. *Invigilator Signature* _____

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Q 1. "Space research in India is moving towards the goal of reducing digital divide". Elaborate the steps taken recently and its implication? (200 Words)

Ans→ The recent steps taken are :-

- Successful launch of GSLV-MK II that has potential to put heavier communication satellites in Geo-synchronous orbit.
- Development of GSLV MK III in finishing stages.
- progress on IRNSS (Indian Regional Navigation Satellite System) going well and expected to finish by 2016.
- High technological Capabilities in Remote sensing Satellite & launch and operations. This along with Communication satellites has been used to develop Village Resource Centres (VRCs) wherein a good Combination of Remote Sensing and Communication Capabilities is used.

All these steps have implications as following :-

- Communication Satellite Capabilities will lead to further spread of mobile and Telecommunication Capabilities in the Country.

- Navigation Satellites will provide enhanced space and time navigation capabilities for fleet management, citizen uses, military usage etc.
- VRCs are used in villages for Tele-education, Tele-medicine etc.
- Remote Sensing Satellites help in better weather forecasting and Resource mapping. For instance, cyclone prediction has improved due to these capabilities.

Therefore space Research has helped all sections of society and helps in reducing digital divide.

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Q 2. India has been declared Polio free. Whereas India has not been able to handle the issue of TB; suggest some of the urgent measures required for eradication of TB? (200 Words)

Ans → India has been able to Completely eliminate infection of Polio due to wild polio virus. This was possible due to steps like —

- Increased Community and Citizen mobilisation and awareness
- High institutional (national, International and local) support towards eradication.
- Political will
- High surveillance of disease

etc.

W.R.T. TB India still carries one of the highest TB infection rates in the world (25% of Global TB burden). This has been due to factors like :-

- Low health and nutrition status of people in general.
- Poor health infrastructure.
- Difficulties in diagnosis and cure due to nature of disease that requires long-term medication
- Development of disease resistance (MDR, XDR etc.)
- Lack of political will to take up the disease.

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Some measures that should be taken up :-

- Surveillance capabilities should be enhanced to keep a track of disease burden. Currently not even enact number of infected people is available.
- provide more resources to health sector so that existing technologies like Xpert etc could be used.
- Need to invest in R&D for development of newer drugs esp. w.r.t. MDR and XDR TB. In this regard open-source-drug Research should be promoted.
- Contact screening of existing patients should be taken up so that TB infection in under-5 children can be fought.
- Need for citizen awareness & education so that early and proper diagnosis and treatment is done.

Cont screen

Q 3. What do you understand by stealth aircraft? What is the significance of stealth technology in modern warfare? Discuss India's attempt in developing stealth technology. (200 Words)

Ans→ A Stealth aircraft is one that is able to circumvent & escape the Radar and other detection methods. This involves modifications like :-

- Design of aircraft so that SONAR waves are not reflected back
- Special paints that absorb SONAR waves
- minimum heat signature to avoid infrared detection.

etc.

The Significance of stealth in modern warfare cannot be overemphasized as :-

- It provides surprise element in the event of hostility and thereby advantage.
- Most Countries have Conventional defense Capabilities e.g. Radars, fighter planes etc and detection could lead to engagement.
- This technology is esp. important for Submarines and frigates whose very survival depends on preventing detection.
- The advantage can be gauged from Capabilities that US possesses like B-2 bombers which is beyond the

radar capacities of the most country in world and thereby can attack in any country without any fear of engagement.

India's attempts :-

- India has developed stealth capabilities w.r.t. submarines (e.g. - Arihant) and frigates like Kolkata-class.
- is undertaking development of fifth generation fighter plane with Russia which has enhanced stealth capacities.

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Q4. What is Ballistic Missile Defence? Why does India need BMD? Discuss the status of BMD programme of India. (200 Words)

Ans → Ballistic missile Defense (BMD) means protection from Ballistic missiles by developing capabilities to eliminate the missile in exo = environment or in the atmosphere through a missile.

India needs BMD because
- it provides enhanced protection from incoming Ballistic missiles.
- Countries like US, Russia and China have ICBMs which can attack anywhere in world.
- provides deterrence to enemy countries.
- ICBMs are the primary vehicles for carrying nuclear warheads and therefore BMD capabilities are needed to protect economic, industrial and political centres from attack.

India's status :-
- India has successfully tested mid-air collisions w.r.t. Ballistic missiles. These tests are in

advanced stages. The BMD has still not been inducted in armed forces though.

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Q5. Explain the mechanism of drug regulations in India. What are the recent developments in this field? Why should move towards generic medicines? (200 Words)

Ans → Drugs & regulation mechanism in India involves :-

- Drugs and Cosmetics Act w.r.t. drug development and testing etc.
- Indian patents Act w.r.t. providing patents.
- NPPA (National pharmaceuticals Pricing Authority) that declares NLEM (National List of Essential medicines) whose prices are regulated.

- Recent developments in the field
- New Rules for drug testing in the Country were released that seek to make drug testing more ethical by making informed consent from patients mandatory.
- Drugs Price Control order, 2013 was released that controlls prices of "essential medicines".
- Compulsory licensing provision was used w.r.t. Bayer's Nexavar.

Generic medicines need to be regulated because :-

- Currently the so-called branded generics are sold in the market at 5-10 times higher price than the unbranded generics of similar therapeutic qualities due to nexus between Companies, doctors and marketing Companies.
- There is a danger that foreign MNCs are trying to capture the generics field to capture market and reduce competition.
- to promote quality in this field
- to promote investment in R&D

Q6. What is Green Tobacco Sickness? Discuss its causes, symptoms and prevalence in India. (200 Words)

Ans →

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Q7. What do you mean by patent? What are the benefits of a patent? Formulate a strategy to increase patent registration in India. (200 Words)

Ans→ A patent implies protection provided to an innovative products which is superior in quality to the existing ones. It is usually done for a period of 20 years.

patent has following benefits :-

- It seeks to provide incentive to researchers and developers of innovations by providing their products protection from copying etc so that they can derive financial benefits from the innovation.
- This leads to greater scientific and R&D progress in the country.

Patents have been low in number from India due to low R&D Capabilities. This can be increased as follows :-

- bringing in a culture of Research in the education system by higher investments and development of better institutions. Currently there is high burleaucratic interference.

- Evolving better mechanisms to incentivize private sector to undertake R&D. Currently about 80% of funding w.r.t. R&D is from the government whereas in developed Countries it is only about 10%.
- Better Regulation of foreign firms undertaking R&D in India which end up registering the innovation as developed in their home Countries. e.g. Nokia Case where Finland was shown as source of software origin.
- Development of manufacturing sector which provides good support to R&D.

Q8. Why was the Middle East respiratory syndrome corona virus (MERS-CoV) in news recently? Explain what risks does it pose to India and critically evaluate the Indian prepration to contorl it in case of a major outbreak? (200 Words)

Ans→ MERS-CoV was recently in News w.r.t. Infection and deaths reported in Saudi Arabia due to this disease. Its host is believed to be Camels. This disease causes respiratory problems and has high fatality rate. It spreads through air.

Risks posed to India :-

Due to high economic, trade and people-to-people contact with middle east there are chances that this disease may spread to India.

- There are also millions of Indian Emigrant workers in the region who could be infected with the disease.
- India has high population density which would make it tough to control the disease.

Indian preparations :-

- The Saudi health system is quite developed. Even then there were many cases in which people esp. health workers contracted disease from hospitals. Indian health system is

Comparison is quite weak esp. outside the metros. Of spread once, it would be very tough to control the disease. In this regard many hospitals have been kept on stand-by for any patient showing symptoms of flu.

- Contact screening is undertaken on major airports.
- Labs have been identified for diagnosis of disease.

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Q9. Critically assess cancer as a threat to public health security in India. (200 Words)

Ans ⇒ India carries one of the highest burden of cancer in the world. This is due to

- Second highest smoking rates in the world and highest chewing tobacco-rate in the world
- poor quality of air in the cities as shown by recent WHO survey.
- Changing lifestyles in the country leading to sedentary living and lack of exercises.
- Lack of awareness among citizens w.r.t. causes and symptoms making it tough to make early diagnosis.
- poor quality of healthcare in general.
- Government policies that have indirectly promoted tobacco-usage due to low taxes. Similarly, the subsidies for diesel which produces carcinogenic products.

Government has taken following steps :-

- public health infrastructure is focused

through NRHM and other programmes.
- National Tobacco Control Organisation is taking steps to minimize tobacco usage.
- Government is taking up steps to decrease tobacco use e.g. pictorial warning, tax policies etc.
- Awareness Campaigns for citizens are taken up e.g. billboards on metro etc.

The impact of these policies is still to be seen and India continues to carry a high cancer burden.

Further following steps can be taken:-
- Bringing prices of tobacco products to WHO recommended levels.
- Develop Capabilities in public sector to deal with the disease esp in non-metro areas.
- Running Campaigns and programmes to bring about life-style changes esp. in youth.

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Q10. Discuss the applications of robotics in ocean research and rescue missions. (200-Words)

Ans→ Applications of robotics in ocean Research

→ - Robots can go to much lower depths in the oceans and thereby can map and survey the ocean floor.
- There is a renewed interest in making use of ocean resources eg poly metallic nodules, poly-metallic sulphides. This provide great scope for robots.
- Robots can undertake experiments inside the ocean to help find concentration and qualities of minerals present.

Rescue :-

- Due to very high pressure in depths of oceans, robots are ideally suited to undertake rescue missions. This was seen recently w.r.t. Bluefin-21 that was used to search for MH-370.

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- Robots can stay in the ocean for long and continuously look for the search items using various sensors.

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Q11. Explain the significance of forensic audit? (200 Words)

Ans → Forensic Audit means using various principles of Accounting and auditing to find out if any wrongdoing in financial matters has been there. It is undertaken for firms where some mismanagement of funds is suspected e.g. recently w.r.t. several public sector banks.

It is significant as :-

- it generally uses a third-party auditor for doing audit so the results are not suspected,
- All the data and information related to accounts is provided
- This helps to establish the status of financial health of a firm
- provides a measure of managerial and financial practices that had been followed.
- Helps to correct wrongdoing doing, if any.
- of no problems are found it

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promote trust and confidence in the firm.

Q12. Critically evaluate Indian efforts to combat climate change. (200 Words)

Ans → India has taken up actions w.r.t. both Adaptation and mitigation.

Adaptation

- National mission on Sustainable agriculture.
- National Sustainable Habitat mission
- Focus on developing forecasting capabilities w.r.t. natural disasters like floods, cyclones etc.

mitigation

- RPO (Renewable Purchase obligation), RECs etc. mandatory for electricity buyers.
- NAPCC and SAPCC (National & State Action Plan on climate change) has many components that seek to promote low-carbon emissions eg. National mission on enhanced energy efficiency etc.
- promotion is given to renewable energy eg. solar, wind etc.

Actual implementation impact :-

- The states have not acted upon the SAPCC.
- Forecasting and resilience capacities w.r.t. freak natural events like flash flood etc. remains low e.g. seen in Kashmir.
- Agriculture still remains one of the major green house gas emitter with significant resource usage esp. water.
- The capacity of community remains low in implementation of various programmes due to low awareness and socio-economic capacity.

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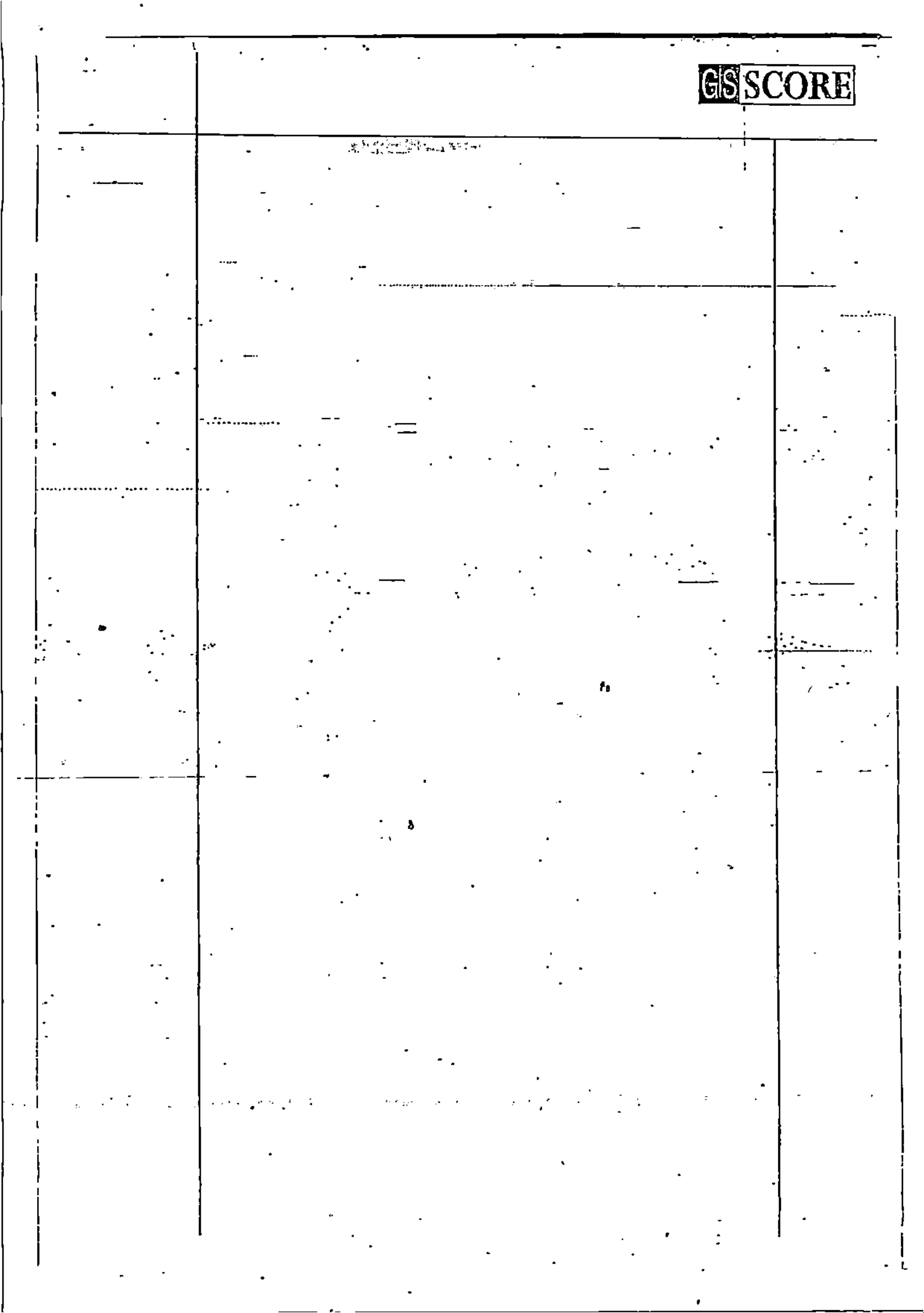
Q13. What do you mean by bio-remediation? Discuss the importance of bio-remediation in India's effort towards sustainable development. (200 Words)

Ans ⇒ Bio-Remediation means using biological agents to cleanse the environment of harmful products like Arsenic, mercury, oil spills etc.

Bio-remediation has following importance in sustainable development :-

- several harmful chemicals like Arsenic, lead etc can be removed from water, air using naturally occuring products like sunflower etc. These have very low or no negative impacts on environment as compared to artificial ones.
- Bio-Remediation can play a major role w.r.t. Photochemical smog through absorption of NO_2 and unsaturated hydrocarbons.
- It can play important role to remove harmful products like Uranium etc in case of industrial disasters as seen in Bhopal.



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Q14. What do you mean by solid waste management? Discuss the challenges of solid waste management in India. Bring out some success stories. (200 Words)

Ans ⇒ Solid waste management means sound and sustainable disposal of solid wastes produced by communities due to consumption of various resources. This could be of many types - e.g. municipal waste, electronic waste, biodegradable, non-biodegradable waste. This involves sorting, processing, recycling of wastes.

Challenges in India

- There is a very low level of waste segregation in India due to which all types of waste is treated alike leading to inefficient waste management.
- Lack of formal sector in the waste management due to which informal sector operates using low technologies, low resource, poor safety measures etc.
- Shortage of land sites for use of dumping sites.
- Lack of usage of innovative technologies for using waste in an economical way.

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- Low government regulations e.g. w.r.t. electronic waste where companies are not made to accept back the old products.

Success stories

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Q15. Discuss the major threats to wildlife conservation in India. Explain measures taken by the government and different agencies in conserving wildlife in India. (200 Words)

Ans ⇒ major threats to wildlife in India

- Forest degradation and fragmentation
- Hunting and Killing for various body parts
- Increasing population leading to man-animal conflicts
- climate change
- Threat from invasive species

measures taken by government

- Dedicating specific areas like National Parks etc. within which no involvement of humans in allowed.
- Running programmes like Project Tiger, Project Rhino etc.
- Use of latest technologies like GIS, GPS etc. to track and map the presence of animals.
- International Collaborations e.g. Saving of various Man and Animal

Biosphere reserves.

- Restriction of mining and other industrial activities in and around Biodiversity hotspots like western Ghats.
- Relocation of species like Tiger from Forests to places where they have become extinct.
- Regulating International trade in animal parts through Customs and border surveillance etc.

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Q16. What are the reasons for declining birds' population? Discuss the steps taken by GOI and global institutions to safeguard migratory and domestic species of birds. (200 Words)

Ans → Reasons for declining Birds' population

- Hunting and poaching
- Declining forests and other traditional habitats
- increased interactions with humans due to increased population growth of humans.
- Impact of various chemicals like Diclofenac that led to fall in Vulture populations.
- Impact of microwave and other Telecommunication and magnetic signals that interfere with birds' movements
- climate change

Steps taken by GoI and global institutions :-

- w.r.t. Domestic Species.
- Harmful chemical like DDT, diclofenac that caused harm to these birds have been banned.
- Efforts are made to control hunting and poaching of these birds.

- Habitat protection is focused esp for terrestrial birds e.g. Great Indian Bustard.
- Reproduction Centres are run to increase population of birds.
- Communities are involved in protection e.g. in Rajasthan.

Migratory Birds →

- mapping of routes of birds is done to understand better their routes and take action if seen any deviation.
- local Communities are motivated and involved in Conservation of these species e.g. by encouraging them to stop hunting etc.
- The main migratory Centres are focussed by protection of traditional wetlands and forests.

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Ramu

Q17. What are the reasons of wetland loss in India and steps need to be taken to manage the wetlands? Discuss some of the initiatives taken by courts in this regard. (200 Words)

Ans> Reasons for wetland loss

- Increased encroachment due to increase in population and high property prices
- Lack of government regulation and in some cases their implementation.
- There seems to be a lack of acknowledgement of importance of wetlands by both government & citizens and communities
- climate change
- Illegal mining

etc.

Steps that need to be taken up

- Planning and zoning of Urban spaces and then strict implementation of various regulations to prevent encroachment.
- Regulate mining esp. sand mining
- Educating communities about benefits of wetlands like flood control, recreational values, biodiversity hotspots etc.
- implement Ramsar Convention provisions.

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Initiatives by Courts -

- S.C. banned Construction activities in the floodplains in Uttaranchal.

Q18. Environmental governance introduced by international bodies aims at improving the quality of human living within the carrying capacity of supporting ecosystems. Elaborate with respect to role played by UN in sustainable development. (200 Words)

Ans→ Global Environmental Governance seeks to achieve three goals
- protection of ecosystems and biodiversity
- Economic and equitable progress of Communities
- Sustainable use of ecosystem services

These goals are reconciled through approaches such that quality of life is improved but within carrying capacity of ecosystems. In this regard many initiatives have been taken under UN :-
- Nagoya protocol that seeks to ensure equitable & fair usage of biodiversity
- MAB (Man and Animal Biosphere) Programme that seeks to harmonise ecosystems and humans.
- Working towards developing SDGs in post-2015 period.
- Evolving various Conventions like

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Ramsar Convention for protection of wetlands etc:

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Q19. Environmental degradation has a major negative impact on welfare of women. Elaborate. (200 Words)

Ans→ Environmental degradation impacts women in a major way as :-

- Women are often the main role players in cooking, collecting firewoods etc and a degraded environment means more time and efforts and even lower nutritional security.
- In event of any major environmental hazard women suffer the most
- The nutritional Conditions of women are impacted severely ; if environment degrades, due to decreased sources of food. Due to highly inequitable distribution of food within the family space, they suffer the most.
- Decreased economic opportunities for women
- Environmental degradation leads to increased prevalence of diseases like Dengue etc. and due to lower access of nutrition, health services for women they suffer the most.

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Q20. Discuss the challenges faced by institutional bodies in nation states during the implementation of International laws related to environmental protection. (200 Words)

Ans→ Following challenges are faced :-

- There may be low Consensus w.r.t given laws within the Country due to top-down @ nature of international laws. In most Cases Eg. UNFCC Carbon reduction targets. This leads to delayed ratification of these laws by the respective legislatures.
- Varying Institutional Capabilities in Countries. Esp the developing Countries lack resources and Capacity to implement international laws e.g. laws regulating poaching have been there for decades but many African Countries unable to implement these laws.
- Federal nature of the polities in many Countries and esp. when the issue Concerns the jurisdiction of States.
- Cross-Country nature of many

problems. e.g. Migration of birds and Animals. This would require Coordination between states which is many times not forthcoming.

- Lack of adoption of given law by all the countries creating situation whereby the issue is legal in some countries and illegal in others.

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Q21. E-waste mining in India belongs to an unorganized sector. What are the hazards related to it and how concept of extended producers responsibility can help in controlling the menace related to it in India. (200 Words)

Ans

Hazards related to E-waste handling

- E-waste is majorly handled by the unorganized sector in India which lacks resources and technologies for doing it efficiently.
- E-waste contains many harmful chemicals like mercury, lead etc that cause human and environmental damage.
- Inefficient recycling leads to many components being damaged.
- leads to greater waste generation since recycling is inefficient.
- Labour protection and security is low in absence of Government regulations.

Concept of Extended producers responsibility implies that the original manufacturer of the Electronic Component takes up responsibility for recycle of the waste generated due to

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the equipment this can help as :-

- would bring in better technology to recycle the product in much more efficient manner.
- Harmful chemicals generated in recycling can be handled much more carefully.
- This companies would have better knowledge of their product and thereby recycle better.
- Customers would know the place where to dispose.

Q22- In the light of successful 'Mars Orbiter Mission', critically evaluate the ISRO's capabilities for cutting edge, outer space exploration missions. Also, sketch the bottlenecks in its path to become one of top 3 space research agencies in the world after NASA and European Space Agency. (200 Words)

Ans →

ISRO's Capabilities :-

- It is still using PSLV which does not have adequate thrust for carrying higher payloads.
- In MOM ISRO demonstrated its Capabilities for launch & operation of an interplanetary mission, its Command and Control, Communication Capabilities involving interplanetary travel, auto-motive Capabilities and high precision w.r.t change of orbits i.e. from earth-centric to halo-centric and finally to mars-centric orbit.

Bottlenecks

- Still lack a really powerful launch vehicle and thereby need to develop GSLV mk III at earliest.
- The electronic components are still not locally available
- resource and funding constraint.

- Capacity lacking in indigenous Communication Capabilities w.r.t. interplanetary space. In this mission NASA facilities were used.

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Q23. Critically evaluate the 'Namami Gange' project in the light of various Ganga Cleaning Projects taken up by Indian Government and other government bodies so far. How this program has to be different in terms of both policy and execution, to be-successful? (200 Words)

Ans → 'Namami Gange' programme seeks to clean Ganga. There have been many projects taken up to cleanse Ganga since 1980s. Most of these programmes had following deficiencies :-

- were infrastructure and civil-engineering solutions led focussing on creating sewage processing infrastructure.
- The industries that were creating pollution were not controlled.
- Non-point source of pollution were not controlled eg. agriculture.
- The capacity of infrastructure created was inadequate and often funds were not there to keep sewage plants running.
- Ecological flows were not focussed.

'Namami Gange' programme seems to be adopting the same infrastructure and top-down

approach.

Following changes should be brought in :-

- Ecological flows should be focussed and maintained.
- Community should be involved in planning and implemention. e.g. The planned site-development would not be possible without local participation.
- locally suited solutions should be adopted.
- polluting industries should be strictly monitored.
- Agriculture policy should be in sync with the overall objective.

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Q24. Bt Brinjal was a technology triumph but a commercial failure. Discuss (200 Words)

Ans ⇒ Bt brinjal was a technological triumph as :-

- It provided enhanced pest protection by making use of Cry1Ac gene from Bt in the soil. This led to a reduced requirement of pesticides and thereby lowers costs of production.
- It demonstrated no toxicity for human consumption as the Bt gene is activated only in alkaline medium whereas stomach is acidic. Also, it gets destroyed during heating.
- It promised high economic returns for farmers.

But Bt Brinjal failed to be commercial success :-

- most countries declined it permission to be grown due to doubts over its long term toxic effects.
- It could have significant damage to local biodiversity

esp to other Brinjal crops.

- Food crops of transgenic nature are nowhere consumed directly and are mostly used as fed only e.g. Corn etc.

→ - public had considerable doubt over its toxicity and thereby its commercial success doubtful.

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Q25. Discuss contributions of any two of the following scientists: (200 Words)

(a) Dr M. S. Swaminatham

(b) Hargobind Khurana

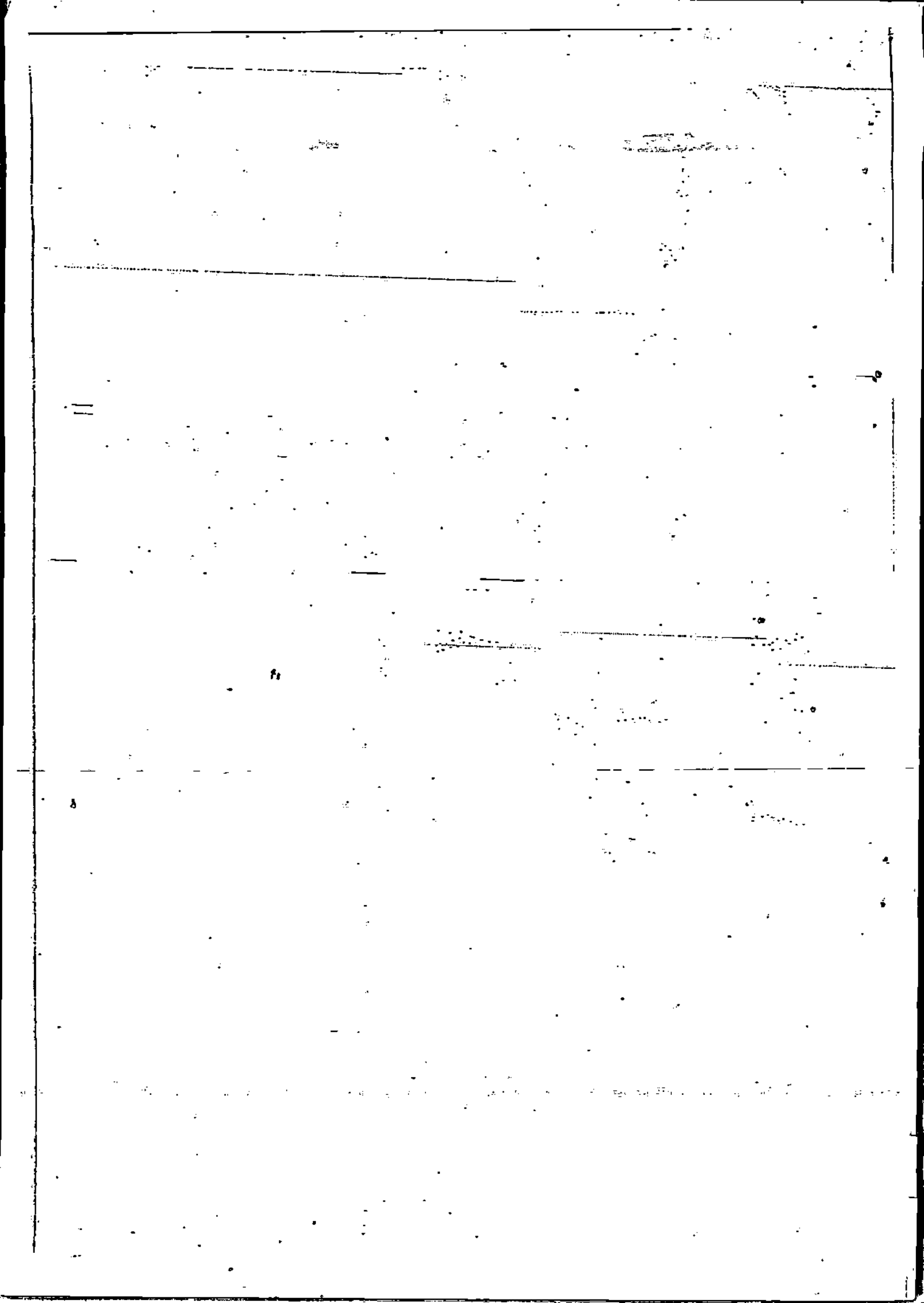
(c) J. C. Bose

(d) S S Bhatnagar

(e) Birbal Shahani

Ans → (a) M.S. Swaminathan

- played important role in bringing Green Revolution to India by developing HYV seeds of wheat and rice.
- also played important role in development of overall agriculture policies (e.g. National Farmer Policy 2006).

(b) Hargobind Khurana

- worked to identify the double strand structure of DNA and RNA.