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 (QCA) 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 18/10/2014

Signature

1. *Invigilator Signature* _____

2. *Invigilator Signature* _____

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)

Space Research in developing countries like India has socio-economic objectives of reducing poverty, bridging the digital divide and enhancing the capacity of citizens

ISRO has taken various steps in this regard:

i) IRNSS: Indian Regional Navigation satellite system, India based GPS which would aid navigation disaster management & better resource planning. Therefore major beneficiaries would be agricultural community in rural India

ii) Edu sat: The satellite has been launched with the mission to provide education to all parts of country, Thus bridging education divide.

iii) INSAT series: The INSAT communication satellites have unveiled the telecommunication

revolution, thereby benefitting millions of India, bridging digital divide. Eg: Digital India Mission. The recent cryogenic test on GSLV, further enhances indegenous capabilities of ISRO to launch such satellites.

iv) RISAT: Resource Imaging Satellite system, that would help in prediction of weather all 24X7 even in presence of clouds.. Eg: cyclone Phailin prediction.

v) At last our Mars orbiter mission research which would benefit people indirectly, as it would inculcate quest for research among youngster, thereby propelling research industries in India.

Thus as ISRO chairman has aptly said "the space research in India has provide benefit of ₹3 with ~~₹0~~ ₹1 spending.

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)

India has been declared polio free by WHO on Jan' 2014, which highlights preparedness of health officials, massive implementation with adequate monitoring, door to door campaign and awareness generation among the citizens.

That kind of enthusiasm seems to be lacking in case of TB; also with arrival of MDR-TB the problems has been further compounded.

India being the biggest TB burden country of the world especially child TB, is trying to address the problem through its RNTCP (Revised National TB Control Programme) and DOTS therapy.

However certain urgent steps are required for eradication.

1) holistic monitoring of TB case right from the birth of child, through modern technologies.

ii) enhancing implementation measures via regulation on drugs of TB to curb MDR-TB & follow Chennai Declaration.

iii) community based awareness programme about TB and MDR-TB. The campaign of "Balgam Bhai" need to be further stepped up.

iv) better training of health officials especially at the cutting edge level for proper drug delivery mechanism and ensurement of completion of course by patient

v) At last contact tracing familial based approach of targetting rather individual based targetting should be adopted.

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)

Stealth technology is non-detectability of an object by various radars, surveillance systems etc.

It is achieved by stealth designing, absorptive materials, irregular reflections of waves and other means

The significance of stealth technology is non-detectability of aircraft thereby capability to cause immense damage to enemy side, reducing man-material loss, and easy winning of war with minimum collateral loss. They are useful in both conventional and sub-conventional warfare like against Naxalism, extremism etc.

India's has attempted to develop stealth technology for its modern aircraft.

~~The HAL and BEL is working in designing new materials~~

The DRDO is researching on developing new kind of metals ~~like~~ and alloys like titanium based to avoid detection.

The BEL is working on absorbtive technologies to avoid electronic surveillance on aircraft especially the radar one.

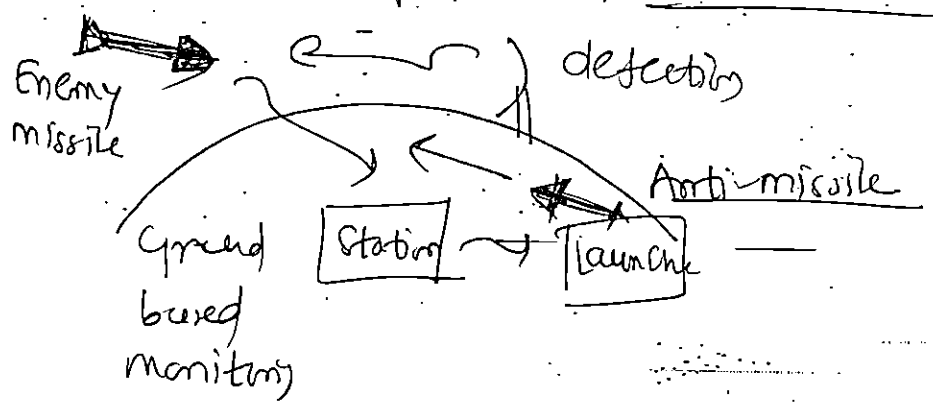
The undetectability in case of SONAR system is also ~~to~~ been working out

However developed countries like US are well ahead in such technologies and drone operation in Afghanistan & ~~op~~ killing of Bin Laden in pakistan without being able to detect highlights their prominence.

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

Ballistic Missile Defence system is the umbrella based defence system that would protect Indian subcontinent from all types of enemy missile including ICBM.

= through development of Anti-Missiles



To avoid hostility, to maintain territorial integrity and sovereignty, peaceful development, creating of effective deterrence system for enemy and maintain "balance of power" India need BMD system.

The concern of China and pakistan still remains large, as China has acquired ICBM and pakistan will acquired in future.

The status of BMD in India, is under development stage.

The capability to destroy short range missile has already been achieved through "Astra Missile" & AWACS system, but to deal with ICBM Prithvi Based missile system has been developed.

Also indigenous Agni Missile - V could be ~~add in~~ added in future in BMD system.

The nuclear triad of air, land and sea has already been completed that too are capable to ~~be part b~~ become part of BMD.

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)

The drug regulation in India is highly fissiparous with multiple state Regulatory Agencies are involved in drug regulation..

The maintenance of quality and adequate supply at national level is being done by Drug General of India.

The pricing regulation of drugs especially of NLEM ~~drugs~~ is being done by NPPA (National Pharmaceutical Pricing Authority).

In recent decades India's pharma sector has turned into multi billion dollar industries, expanding its horizon in the world, attracting significant amount of FDI, thereby becoming a major global players.

However certain issues has cropped up which includes

quality of drugs (closing of Ranbaxy lab); issue of IPR (Nexavar-Glivec case), capturing of Indian companies by Global MNC's (Sun pharma acquisition of Ranbaxy), pricing issue and excessive profit (NPPA regulation).

~~Issues~~ =

India being a developing country with high disease burden, poor health delivery system and low public expenditure on health (1.3% of GDP) can't bear the high price burden of medicines.

The generic medicine could provide solution in terms of low cost drug, large availability of drugs and better delivery of drugs. They are becoming as a huge export carrier for the country and playing global responsibilities of delivering drugs to poor regions.

That's why India should cautiously move towards generic based medicine

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

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)

Patent is a part of Intellectual Property Rights, that ensures exclusive rights of individual or organization towards his development for specific period of time.

The patent holder could sell those rights or transfer those rights but for limited period (in Indian case it is 20 years) thereafter it will being put into public domain.

The benefits of a patent is:

i) helping patent holder to maximize gain through his 'fruits of efforts'

ii) publicity of ~~the~~ idea will ensure further development in the field.

iii) increase morale & motivation of patent holder to pursue further research thereby benefitting society at large.

iv) At last curbing unsolicited use, exploitation by commercial interests.

The patent filing in India is still being one of the lowest in the world (5000 per year).

~~compel~~ To increase the patent filing in India:

i) we have to create a ~~cult~~ research based culture in our universities through incentives & awareness, PPP model. Eg: INSPIRE scheme of GoI

ii) ease in filing of patents with minimizing of red tape and administrative delays. This could be possible through overhauling of Patent system, better training to personnel

iii) formulating a National IPR policy that would clear ambiguity in current patent system especially after supreme court judgement.

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)

Middle East Respiratory syndrome Corona virus (MERS-CoV) is a fatal H1 series viral diseases.

It was originated in Middle East Asia, possibly transmitted from animal-human (zoonotic diseases), high fatality rates,

The symptoms are similar to cold flu influenza, therefore very difficult to separate.

It poses risk to Global Health especially to countries like India:

i) high spread rate and with poor health care system in India, it would bring havoc

ii) with large immigrant population, it would have become difficult to monitor the disease.

iii) tropical climate that favours zonotic diseases like malaria dengue, MERS (CoV).

~~iv) low preparedness~~

Therefore Indian government has started to deal with MERS in holistic manner:

i) ~~highly~~ setting up of check points at the air port and monitoring of immigrants especially from Middle East

ii) creation of special unit in ~~multinational~~ multinationality hospitals to deal with epidemic

iii) awareness through print, electronic and social media

iv) vaccination programme especially in high risk areas

However they seem to be inadequate, as limited hospital, are covered, health professionals are not adequately trained with regard to safety and weak primary health care systems like drinking water & sanitation.

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

Cancer has emerged as a major public threat especially due to rise of communicable and 'non-communicable diseases' (NCD)

The changing lifestyle pattern with rising alcohol consumption, rising pollution due to environment degradation, ineffective health care delivery system with late identification of disease has increase the mortality due to cancer in India.

The costly radio based therapy have confined the treatment to higher class with major public is facing the brunt of poor public health system.

Therefore GoI has formulated a multi-pronged strategy of prevention & curative therapy

towards cancer.

The rising taxation on tobacco product with increasing awareness campaign have created mass wave against consumption.

Secondly curative technique has been improved through NRHM and setting up of AIIMS like institution under PMSSY.

Also, in 12th FYP a special focus on NCD has been put in place with adequate transfer of fund and creation of health structure towards this cause.

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

Robotics as a branch of using robots for wider applications includes ocean research and rescue missions.

~~The~~ In ocean research robotics could help in exploration of resource, ~~monitoring of~~ assist humans in exploiting those resource, monitoring of disaster and vagaries of climate change like Tsunami, cyclone etc.

Sagar Ratna ship is involved in ~~ocean~~ exploration for India, marine resource

Recently drones has been utilized ~~for~~ by US and China for monitoring climate change in oceans.

Additionally robotics could help in search and rescue operations during disasters. The drones

could supply essential ~~[illegible]~~ items and they could assess the devastation, guide the forces to rescue the victims.

The Netra drone (DRDO) has been put to service during Uttarkhand flood disaster for the scene.

Nevertheless they require constant monitoring, adequate communication ~~[illegible]~~ infrastructure system and power backup which need to be address in future for wider applications.

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

"Forensic audit" is examination of accounts of firms or organisation to reveal serious economic offences (SEO).

Because of complexities of details, larger interconnections across the world, global repercussions, this are performed by specialized agencies.

In India it has been entrusted to SFIO (Serious Fraud Investigation Offices) like ED, Revenue Intelligence, CBI etc.

Its significance lies in

i) unearthing black money and detecting the cases of money laundering

ii) holistic auditing to explore multi institutional ~~pate~~ connections and larger network of illegality

iii) countering financial threats, especially to countries like India

in globalized environment

iv) at last in prevention of terrorist activities that would hamper security of the nation.

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

India being third largest emitter of Green House Gas with second largest world population and 7.4% of biodiversity is on vagaries of large impact of climate change.

So in its committment to international effort of UNFCCC, India has formulated a National Action plan on Climate Change (NAPCC) with 8 missions to combat climate change

The plan has include, sustainable use of resource, equality and mutual benefit, conservation of resource and promotion to renewable energy.

This will reduce carbon-use intensity of economy by 20% by 2020. Also even after 2030, the India's per capita CO_2 emission will

remain below world average.

However recent occurrence of floods in Uttarkhand & Jammu and Kashmir, regularity in cyclone landfall in eastern coast (Phailin, Hudhud) and extremities of monsoon have highlighted the need for urgent step.

The missions are no good unless they are properly implemented on the ground.

At the same India approach towards climate policy of vision should be changed toward proactive participation. There calls for mobilization of more resource towards renewable energy conservation of forest, controlling increasing urbanization and greater awareness among the public.

As ultimately a public response could thwart the ~~that~~ climate change

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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)

Bio remediation is technique of treating wasteland, environmentally polluted area ~~and other~~ through means of biological agents.

They would help in restoring environment capability and 'homeostatis' mechanism of ~~the~~ the degraded area.

This will ensure sustainable development.

India ~~have~~ ~~has~~ will largely benefit from bioremediation techniques. The wasteland and fallow land treatment, the menace of oil spill, biodiversity conservation efforts this would prove as game changer.

India ~~have~~ has been utilizing pseudomonas coil zapper in Bombay High to reduce the effect of oil spill in sea

Further ICAR, DRDO has been conducting research on various bacteria that could be utilized in agriculture sector.

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)

Solid waste management is the systematic process of identification ~~of waste~~, segregation, ~~of waste~~, treatment and proper disposal of solid organic and inorganic wastes.

The rapid rise in population and large urbanisation have created the wider challenge of solid waste management in India. It involves:

i) ~~identification of wa~~ no proper identification of waste which hampers segregation thereby impacting ~~eff~~ post recycling of waste

ii) Treatment facilities are inadequate with only 30% of urban waste is being processed.

iii) The disposal mechanism is not up to the mark and

filth, dirt lying across the street is common visible sight.

iv) A proper linkage has ~~waste~~ not ~~to~~ been developed in generation of WtE (Waste to Energy) through a well defined mechanism, and public participation

However there are two success example which could be emulated:

i) Allapuzzha public partnership model of waste management in Kerela. It is based on setting up of local biogas plants and linking it with household wastage mechanism. Thereby reducing waste burden & providing cheap energy - methane gas.

ii) Gurgaon e-waste management society: The residential ~~society~~ societies has taken initiative of disposal of e-waste through creation of collection point and ensuring 'take back' mechanism ~~&~~ compliance by companies.

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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)

India ~~being~~ is a world biodiversity hotspot region with presence of 7.4% species in 1.7% of land area.

The biodiversity especially wildlife has been threatened due to:

i) habitat fragmentation that has taken place due to rise in urbanization, industrialization and population.

ii) exploitation of wildlife for skin, teeth, tusk by poachers.
Eg: Rhino killing - horn
elephant killing - tusk.

iii) Coextinction due to removal of keystone species on which wildlife has depend.

iv) Invasion of alien species especially in western ghats have threatened endemic mammals frogs & birds.

The government has taken two pronged strategy for wildlife conservation

i) ~~Conse~~ Holistic approach

ii) Individual / specific approach

In holistic approach all endangered species / threatened species are listed under wild life protection Act (1972). They have been protected under National parks, wildlife sanctuaries, Biosphere reserves in India. The act has been monitored by National Board of wildlife.

To save individual species certain project has been started;

i) Project Tiger to save tiger and to increase their population

ii) project Elephant to minimize death, area based conservation, ~~habitat~~ approach

iii) project Hangul to address fragmentation, ensuring proper breeding environment

~~Proje~~

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)

The bird's population in overall world is declining in sync with biodiversity loss. The reasons are:

i) wider climate change that has shrink the habitat, affected feed of birds & route of migratory birds

ii) rapid urbanization that have affected the stay of birds. The home sparrow is the biggest victim.

iii) exploitation of bird through meat consumption and usage in industrial products. Eg: migratory bird in Nagaland

The steps taken at international level is

i) Conservation of Biological Diversity (CBD) to conserve

ii) ~~International Con~~ and sustainable utilization of biodiversity resources.

ii) International Convention on ~~Migratio~~ Migratory Bird species that ensure safe passage to migratory birds across member countries

iii) IUCN Red List that highlights the extent of threat to bird species -

The GoI along with civil society has taken the following steps:

i) Bombay Natural History society is promoting awareness and participating in conserving efforts for birds.

ii) various birds treatment hospital has been opened across the country with help of civil society

iii) ~~International~~ projects like International Bird Watch, project sparrow are being ~~carried~~ implemented with citizen participation

iv Being member of various treaties India is ensuring safe passage to migratory birds through radio collaring ~~mon~~ tracking and community awareness.

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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)

Wetlands has been recognised as one of the highest productive area in the ecosystem. India due to larger coastline 7500km has abundant in wetlands

They are recently in decline due to:

i) encroachment due to ~~incessant~~ rapid ~~urbanis~~ urbanization with increasing demand for land.

ii) vagaries of climate change that have increased the sea level thereby submerged the larger wetland areas.

iii) Inadequate conservation effort and weak implementation of laws.

The recent J&K floods has occurred due to encroachment of Sri Nagar lake thereby reducing the water absorbtive capacity of the land.

The steps taken by GoI in pursuance with Ramsar Convention include:

separation of wetland areas, through erection of bunds, ~~ensuring adequate~~ maintenance of habitat to ensure bird breeding and conservation of mangroves of West Bengal, Sunderbans.

The further steps need to be taken is controlling unplanned urbanization, reducing exploitation of wetland species, adequate satellite based monitoring, resource mapping through GIS and awareness generation among the public at large.

Recently Supreme Court has ordered to conduct the ~~pre~~ survey to determine the status of wetlands & order the GoI to formulate a National policy in this regard.

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)

UN has ~~play~~ been playing a prominent role in international environmental governance system.

Through Earth summit ~~has~~ in 1992 it has defined the structure of environmental governance by starting UNFCCC Convention for climate change and CBD for biodiversity conservation sustainable use and equal benefit sharing.

~~They~~ Along with UN MDG goals and recent persual for sustainable development goals (SDG) has been aimed at improving the quality of human living by reducing poverty and universality health care and education

Through Paris Communique in 2015 an agreement has to be reached for new binding convention by 2020 with creation of adequate monitoring mechanism.

Additionally in principles of UNFCCC to ensure CBDR, a Green Environment Fund with $100 bn has been under creation that would transfer fund & technology to developing countries.

Also through REDD+ mechanism needs of LDC countries are also been addressed & governance capabilities has been increased for mitigation & adaptation of climate change

Thus UN is playing ~~role~~ its role proactively and now it is responsibility of individual nations to develop ~~[illegible]~~ a kind of "future that we want".

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

Environmental degradation impacts the people disproportionately with marginalized section of society like women faced the major burden.

The WHO reports highlights high impact of indoor pollution on women of developing countries who still relies on traditional fuel of biomass. The respiratory diseases are more higher in women than men.

Due to higher malnutrition and lack of adequate sanitation facilities, women faces higher mortality in case of larger environmental degradation like during epidemic, disasters.

Further degradation weakens the women's capability to mitigate and adapt to climate change.

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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)

International laws on environment protection remains inadequate to this day it due to major challenges faced by institutional bodies in nation states:

i) International laws doesn't take into account nation individuality and diversity thereby leading to weak acceptance by implementing agencies

ii) The goals are not clearly defined. for eg: CBD calls for sustainable use of resources and not specify how to achieve that

iii) Institutional bodies are not properly manned and adequate funds has not been provided. Eg: State Biodiversity Boards are constantly lacking in funds

iv) Adequate autonomy and independence has not been

provided. Frequent interference by government is common. Eg:- Case of appointment of ~~board~~ ~~bo~~ members of National Board of wildlife.

iv) At international level, the monitoring mechanism is weak and also compliance norms are not much that strict, because of voluntary nature of agreements.

Thus institutional bodies faces structural, procedural, behavioural, environmental challenges in implementation of environment laws.

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)

E-waste is day by day ~~growing~~ becoming a environmental hazard for the country. At present 2-3 millions of e-waste is generated annually.

Despite of it formal manufacturing sector production, the e-waste mining remain largely as unorganized sector phenomenon. Only 10% of waste has been formally disposed.

This has exposed the informal workers to hazardous ~~heavy~~ elements like mercury, beryllium, cadmium etc.

Improper disposal technique and burning of e-waste for extraction of metal has become the major source of air pollution and land pollution. It has caused various carcinogenic diseases.

The slow accumulation of e-waste in food chain due to bio-magnification and bio accumulation have further aggravate the crisis.

Thus There is need for its shifting towards formal sector and imposing of extended producer responsibility for collection, recycling and disposal of e-waste in safe and secure environment.

The formal sector are much more competent in management of e-waste.

However inspite of GoI regulation of e-waste only 30% of companies ~~have~~ ~~offering this~~ are fulfilling its responsibilities.

Therefore effective monitoring with imposition of penalties on non-compliance on companies is the need of hour.

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)

The success of 'Mars Orbiter Mission' as Asia first Mars ~~spa~~ flight have put the ISRO in top space agencies of the world.

Through this ISRO highlighted is cutting edge, cost effective (₹450 crore) ~~technologies~~ and outer space technologies.

The capabilities of ISRO could be highlighted from success of PSLV and winning global contracts for ~~spa~~ satellite sending, missions through Antrix Corporation.

Recently Canada has sended satellite through PSLV.

The ISRO has now become the ~~rev~~ revenue earner for the country at the same time it is fulfilling social responsibility by sending satellite ~~at low~~ of

LDC and developing countries.

Nevertheless it has still being faced with major bottlenecks:

i) lack of fund: Still only 0.07% of GDP has been allocated for space research which has limited ISRO capabilities

ii) dual barrier of manufacturing of components and launching the satellite. It is happening due to lack of private sector participation in space unlike US.

iii) trained personnel is in short supply that would undertake global space research, also problem of 'brain-drain' is there

iv) At last lack of technological inputs ~~like~~ from other countries like cryogenic engine has been denied to India from very long time, recently has been developed.

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)

'Namami Gange' project has been recently announced with budget of ~2200 crore to ~~rejuvenate~~ rejuvenate Ganga to its pristine state.

Since the starting of Ganga Action Plan (GAP) in 1985 various projects has been undertaken to reduce waste disposal in Ganges maintenance of environmental flows and sustainable use of water resource.

Hence their failure has lead to setting up of National Ganga River Basin Authority in 2008 under chairmanship of prime minister which have adopted 'basin wide' approach in conservation of Ganga by participation of UP, Uttarakhand, Bihar states.

Even though the project remains unsuccessful & pollution remains high in Ganga water, prompting supreme Court to call for formulation of well defined policy for Ganga.

∴ Namami Gange adopts a basin wide approach. It will offer construction of dams at regular intervals to proper utilize of resource; beautification of Ghats of Ganga, strict norms for waste disposal in Ganga (70% in overall ~~[illegible]~~ pollutants) and contributions of NRIs need to be sought through NRI for Ganga project

It is different ~~from~~ in execution from its previous counterpart in terms of wider participation of people in through civil society, PRIs, ~~[illegible]~~. A massive awareness campaign would be unveiled and PPP based conservation project. That substantiate idea of minimum govt. maximum governance

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

Bt Brinjal technology being developed by Monsanto Corporation is a technology triumph as it

i) increases the productivity of crops

ii) made it drought resistant and pest resistant

iii) consumes less water, less fertilizer & pesticides.

It has got approval from GEAC, but put in moratorium by GoI in field trials.. ~~and further commercialisation~~

Thus it has become a commercial failure as benefits are not yet accrued to the society.

The environmental concerns of bio-pollution, impact on bio diversity and health problems largely remains, which are yet to be verified

Also opposition from civil society, farmer organizations and Technical Expert Committee (TEC) report of supreme court further delayed the research.

However recently GOI has shown some enthusiasm in putting a regulatory frame work at place and allowing field trials, that will in long term address increase food security for India

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

1) Dr MS Swaminathan, He has been called father of "Green Revolution" in India for ~~A~~ his cutting edge research in HYV seeds.

- he ~~at present~~ is a prominent agricultural scientist who has been awarded with padma vibhushan

: at present under his chairmanship MS Swaminathan Research foundation is playing prominent role!

i) development of seed technology
ii) new irrigation technique
iv) sustainable development of agriculture
v) attracting youth towards agriculture

3) JC Bose : J.C Bose is the prominent physicist of pre-independent India.

He has been credited with invention of radio waves prior to marconi, which has unfortunately not been recognized..

He has invented Crescograph that studies material in plant and he was the first person to able to prove that plant has life.

His other contributions include radio telecommunication, biological sciences, space wave propagation etc

~~He also plays~~ He has yet to be awarded Bharat Ratna.