1. How are lacunas in Solid waste management responsible for underground water pollution? What are ill effects of underground water pollution?

Introduction:

Solid waste management is collection, transportation, and disposal of garbage, sewage and other waste products. It is the process of treating solid wastes and offers variety of solutions for recycling items that don't belong to trash. It is about how garbage can be used as a valuable resource.
Annually 43 million of solid waste is generated in India, making urban India third largest garbage generator in world. So far Indian performance in handling this garbage efficiently, has been dismal.

Main Body:

Lacuna's in the management leads to severe water problems in following ways:

- Inefficient segregation at source results into dangerous wastes like medical wastes, radioactive wastes ending up in landfills leading to accumulation of toxic metals which magnifies and pollutes groundwater.
- Untreated garbage is dumped in landfills which are not properly constructed and sealed causing leaching of toxic elements into the aquifers.
- Mass dumping in the grounds without proper techniques leads to pressure on the underground water and thus water reach increases.

Ill-effects of underground water pollution are:

- Public health:

Underground water if contaminated poses a serious threat to health and life of the citizens. Leaching of toxic elements in water may cause diseases like Minamata, Itai-itai due to mercury and arsenic poisoning, respectively, Children are the worst victims of polluted underground water.

- Agriculture:
  Ground water is an important source of irrigation for agriculture. Polluted water results into degradation and salinization of soil thereby reducing productivity and even making the land barren. Also, contaminated water may induce certain diseases in the crops leading to harvest losses and it may lead to accumulation of chemicals at each trophic level.
- Deposition of plastic makes hinders the percolation water resulting into depletion of water in aquifers. The groundwater in india has already reduced from 3000 cubic meter to 1200 cubic meter per person in last 50 years, which puts India into water stressed category.
- Polluted water also deteriorate infrastructure like drain pipes, storage tanks etc. Industries may have to set up water purifying plant which would incur additional cost.

Way forward:

- Effective implementation of Solid Waste Management Rules 2016 is the need of the hour.
- MoUD's programme of promoting compost-from-waste must be upscaled.
- Information, education and communication campaigns must be held in order to generate awareness among the masses.
- Ideas like waste to energy, mineral extraction from waste etc. Needs to be adopted practically.

It is high time that we focus on solid waste management system in the country. What is required is political will and commitment alongwith active participation from public to achieve this.

Best answer: Ankita

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Best answer: Chandler Bing

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2. India being an agrarian country is suffering from Agricultural pollution. How is agriculture responsible for degradation of land, air and water? What measures can be taken to reduce it?

<u>SYNOPSIS:</u>

Agricultural pollution refers to biotic and abiotic byproducts of farming practices that result in contamination or degradation of the environment and surrounding ecosystems, and/or cause injury to humans and their economic interests.

<u>EFFECT ON LAND:</u>

Intensive and unscientific farming practices (conventional tillage and excess application of chemical fertilisers) lead to

- destruction of soil structure, loss of soil organic matter, soil biodiversity and soil health;

- exposed soils and landscapes, surface sealing, decreased water infiltration, increased runoff and soil erosion leading to desertification
- disruption of many important soil-mediated ecosystem functions; and
- loss in productivity, resilience and eventual abandonment of land

In developing countries, the combination of all these elements is a major driver of food and nutrition insecurity and a host of other related challenges, such as poverty reduction, effective adaptation to climate change, and sustainable and equitable development.

EFFECT ON WATER:

Contamination by both organic (farm runoff of fertilizer) and inorganic (pesticides, fertilizers etc) can cause leaching, eutrophication, heavy metal contamination (hg, cd, ar) etc. can cause both morbidity and mortality of water organisms and humans in particular leading to severe disturbances in food chains, bio diversity etc, turbidity due to sedimentation, manure spreading, bioaccumulation in many fish species, siltation of water habitat etc.

WHO report says that the average use of fertilizers on average in India is 3.5 times more than the world average.

EFFECT OF AIR POLLUTION:

Agricultural air pollution comes mainly in the form of ammonia, which enters the air as a gas from heavily fertilized fields and livestock waste. It then combines with pollutants from combustion mainly nitrogen oxides and sulfates from vehicles, power plants and industrial processes to create tiny solid particles, or aerosols Combined with GHG'S emission from livestock(FAO estimates it to be around 14.5%), pollution from agricultural waste burning seen in many villages across northern India can cause various problems like global warming, acid rains, climate change in the long term causing various diseases to humans.

According to the Centers for Disease Control (CDC), children raised in communities near factory farms are more likely to develop asthma or bronchitis.

MEASURES TO DECREASE AGRICULTURAL POLLUTION:

- Nutrient management- applying appropriate fertilizer and use of bio manures.
- Conservation tillage
- Use of farm buffers- planting of legumes, shrubs, trees across fields can prevent both soil erosion and surface water runoff.
- Livestock waste management like composting, solid liquid waste separation.
- Use of GMO's like enviro-pig to improve digestive efficiency of animals etc
- Encourage usage of bio pesticides and bio control agents.
- Various policy initiatives like NMSA, PKVY, RKVY , IWDP along with following and formulating policy on judicial pronouncements(both SC and NGT) like prevention of straw burning and use of satellite based monitoring will further ease the menace of agricultural pollution.

BEST ANSWER: NANA

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3. What is photo pollution? What are the negative impacts of photo pollution on environment and humans? How can it be checked?

Definition

Light pollution, also known as photo pollution, is the presence of anthropogenic light in the night environment. It is exacerbated by excessive, misdirected or obtrusive uses of light, but even carefully used light fundamentally alters natural conditions. As a major side-effect of urbanization, it is blamed for compromising health, disrupting ecosystems and spoiling aesthetic environments.

Types

- Light trespass
- Over-illumination
- Glare
- Light clutter
- Sky glow

Impact

1. At the very least it causes discomfort to eyes due to its brightness.
2. It may also lead to prenatal disorders, cardiovascular disorders, allergies etc
3. It disturbs the sleep cycle of body and circadian rhythm.
4. It may obstruct astronomical research.
5. Energy waste, Lighting is responsible for one-fourth of all electricity consumption worldwide, consequent CO2 pollution.
6. Nocturnal mammals, experience a decline in reproduction and a difficulty foraging for food.
7. Many species of birds migrate and or hunt at night. They depend upon the dark and the stars to find their way. Their sensitivity to dim star-light makes them extremely vulnerable to bright city lights.
8. Female sea turtles like to nest on remote and dark beaches. Naturally, coastal cities and their haze of light pollution make the beaches brighter and discourage nesting.

Measures

Reducing light pollution implies many things, such as reducing sky glow, reducing glare, reducing light trespass, and reducing clutter. The method for best reducing light pollution, therefore, depends on exactly what the problem is in any given instance. Possible solutions include:

Utilizing light sources of minimum intensity necessary to accomplish the light's purpose.

Turning lights off using a timer or occupancy sensor or manually when not needed.

Improving lighting fixtures, so that they direct their light more accurately towards where it is needed, and with fewer side effects.

Adjusting the type of lights used, so that the light waves emitted are those that are less likely to cause severe light pollution problems. Mercury, metal halide and above all first generation of blue-light LED road luminaires are much more pollutant than sodium lamps: Earth atmosphere scatters and transmits blue light better than yellow or red light. It is a common experience observing "glare" and "fog" around and below LED road luminaires as soon as air humidity increases, while orange sodium lamp luminaires are less prone to show this phenomenon.

Evaluating existing lighting plans, and re-designing some or all of the plans depending on whether existing light is actually needed.

There is a global dark sky movement to fight photo pollution which promotes dark sky preserves. They are protected areas like national parks with zero light policy.

More and more people should participate in efforts like WWF's earth hour, shutting down lights for an hour.

Best Answer: Redeemer911

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5. Tropical cyclones claim many lives around the world. What makes tropical cyclones to deadly? What are its mitigative measures.

Introduction:

A tropical cyclone is a rapidly rotating storm system characterized by a low-pressure center, a closed low-level atmospheric circulation, strong winds, and a spiral arrangement of thunderstorms that produce heavy rain. Depending on its location and strength, a tropical cyclone is referred to by names such as hurricane , typhoon, tropical storm, cyclonic storm, tropical depression, and simply cyclone.

The latest incident of Hurricane Harvey hitting the east coast USA is said to have damaged more than 185,000 homes and ticking. India sees landfall of these cyclones every year- Cyclone Vardah(2016), Phailin in Odisha (2013) and Hudhud in Andhra Pradesh (2014).

What makes tropical cyclones deadly?

- Within sea it destroys ships, oil rigs falling into its way.
- Heavy downpour on landfall.
- Rapid movement of air. Wind speed more than 120 km/hr
- Strom surges
- Unpredictable nature adds to its deadliness.
- Further given the fact that in India coastal regions are heavily populated by poor people mainly fishing communities the vulnerability of human population further increases.

Mitigative measures:

- Cyclone zone mapping and going for plan development.
- Forecasting along with proper warning systems. Efficient satellite tracking of cyclones. Early warning system to initiate mitigation measures with as much lead time as possible
- Training of National disaster response force and the civil society to help eachother in a well-coordinated evacuation effort.
- Awareness generation.
- Plenty of Shelters for the displaced population and availability of the basic needs such as food, water and sanitation.
- Structural interventions- structures which are able to withstand high wind speed of cyclones should be built in coastal areas.
- Plantation of mangroves.
- Checking illegal construction nearby coasts.
- Implementation of Sendai framework which calls for community participation so as to avoid risks in the wake of a disaster.

Conclusion:

Tropical cyclone being a natural disaster cannot be prevented however proper steps as mentioned above can go a long way to reducing its deadliness.

Best answer: Akhil Pareek

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6. The hazards associated with earthquakes get aggravated by a number of factors. Can you enumerate these factors? Also discuss the measures to mitigate earthquakes.

SYNOPSIS:

Few natural disasters can match the destructive powers of an earthquake. In addition to causing widespread havoc, severe casualties and destroy country's infrastructure UNDP report says between 2005-2015 around 7% of world's GDP has been lost due to earthquakes, which can be further aggravated due to the following factors.

a)Geographic factors:

- **Location**: an earthquake that hits in a populated area is more likely to do damage than one that hits an unpopulated area or the middle of the ocean.
- **Magnitude**:. The more energy in an earthquake, the more destructive it can be.
- **Depth**. In general, deeper earthquakes are less damaging because their energy dissipates before it reaches the surface. The recent Nepal earthquake is an example of a shallow quake causing devastation.
- **Distance from the epicenter**: The epicenter is the point at the surface right above where the earthquake originates and is usually the place where the earthquake's intensity is the greatest.
- **Local geologic conditions**: The nature of the ground at the surface of an earthquake can have a profound influence on the level of damage. Loose, sandy, soggy soil, like in Mexico City, can cause liquefaction and cause widespread damage.
- **Secondary effects**: Earthquakes can trigger landslides, fires, floods or tsunamis.

b) Anthropogenic factors:

- **Architecture**: Even the strongest buildings may not survive a bad earthquake, but architecture plays a huge role in what and who survives a quake. The January 2010 Haiti earthquake, for example, was made far worseby poor construction, weak cement and unenforced building codes

- The absence of warning systems and lack of public awareness on earthquake risks.
- Location of settlements in seismic areas and size of the population
- Dense concentration of building with high occupancy.

MITIGATION:

The Sendai framework for disaster risk reduction places priority on locally available solutions and revised building codes .The UNSIDR report says that mitigation can be appropriately addressed by following the these practices

- Installation of AEWS(Advanced early warning systems)
- Hazard mapping by identifying seismic zones and vulnerability atlas

- There is a need to constitute a core group to establish a strategy and plan of action – there is a need to revise building codes and adopt seismic retrofitting
- Getting communities involved in the process of disaster mitigation through education and awareness. Networking of local NGOs working in the area of disaster management.
- Supporting R&D in various aspects of disaster mitigation, preparedness and prevention and post-disaster management.
- Evolving educational curricula in architecture and engineering institutions and technical training in polytechnics and schools to include disaster related topics.

Ultimately the capacity to manage disaster risks depends on good governance and the best way to do it is to involve and empower citizens and build partnerships with civil society and the private sector.

BEST ANSWER: REDEEMER 911

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7. Floods have devastated major portions of Eastern India. Discuss various types of floods along with their preventive and mitigative measures.

What do you mean by "Flood"?

It is a *temporary inundation of large regions* as a result of an increase in reservoir, or of rivers, flooding their banks because of heavy rains, high winds, cyclones, storm surge along coast, tsunami, melting snow or dam bursts.

Types of Floods

Flash floods:

It is defined as floods which occur within six hours of the beginning of heavy rainfall , and are usually associated with cloud bursts, storms and cyclones requiring rapid localized warning and immediate response if damage is to be mitigated. In case of flash floods, warning for timely evacuation may not always be possible.

River floods:

Such floods are caused by precipitation over large catchment areas. These floods normally build up slowly or seasonally and may continue for days or weeks as compared to flash floods.

Coastal floods:

Some floods are associated with the cyclonic activities like hurricanes, tropical cyclone etc. Catastrophic flooding is often aggravated by wind-induced storm surges along the coast.

Causes of Flood:

Excessive rainfall in river catchments or concentration of runoff from the tributaries and river carrying flows in excess of their capacities

Back movement of water in tributaries at their confluence with the main river

Synchronization of flood peaks of the main rivers and tributaries

Landslides causing obstruction to flow and change in the river course

 Poor natural drainage

Cyclone and very intense rainfall

Intense rainfall when river is flowing full

Approach to Flood Management/Prevention

Structural Measures: Attempts to Modify Flood

(a) Dams and Reservoirs

(b) Embankment

(c) Drainage Improvements

(d) Channel Improvements

(e) Diversion of Flood Waters

(f) Using Natural Detention Basin

Non- Structural Measures: Attempts to modify susceptibility of Flood

(a) Flood plain zoning: – It aims to regulate the developments in the flood plains, so that it is compatible with Flood Risk. It recognises the basic fact that the flood plains are essentially the domain of the river, and as such all developmental activities must be compatible with the flood risk involved

(b) Flood forecasting :- Involves observing and collecting hydrological and meteorological data, transmission and then processing the data with a view to work out the likely level to be achieved at a particular site, i.e. to give advance warning

(c) Flood Proofing:- It is essentially a combination of structural change and emergency action without evacuation. A programme of the flood proofing provides the raised platforms for flood shelter for men and cattle and raising the public utility installations above flood levels.

(d) Attempts to modify loss burden by way of Disaster relief, Flood fighting, Flood insurance

Main Mitigation Strategies for Flood Disaster Management

Mapping of flood prone areas is a primary step involved in reducing the risk of the region.

Historical records give the indication of flood inundation areas and the period of occurrence and the extent of the coverage.

The basic map is combined with other maps and data to form a complete image of the flood-plain.

Warning can be issued looking into the earlier marked heights of the water levels in case of potential threat. In the coastal areas, the tide levels and land characteristics will determine areas liable to inundation.

Flood hazard mapping will give the proper indication of water flow during floods.

Best Answer: NKY

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8. GaN was in news recently. What is GaN? Why has it evoked interest? What are its applications? Discuss.

Introduction:

Gallium nitride (GaN) is a semiconductor commonly used in light-emitting diodes since the 1990s. The compound is a very hard material that has a Wurtzite crystal structure. Its wide band gap of 3.4 eV affords it special properties for applications in optoelectronic, high-power and high-frequency devices.

It has evoked interest because of following attributes:

- lower on resistance giving lower conductance losses
- faster devices yielding less switching losses
- less capacitance resulting in less losses when charging and discharging devices
- less power needed to drive the circuit
- smaller devices taking up less space on the printed circuit board. GaN transistors can withstand higher electric fields, which in turn, increases power density and makes the device smaller.
- lower cost

Applications of GaN:

- Its sensitivity to ionizing radiation is low (like other group III nitrides), making it a suitable material for solar cell arrays for satellites.

- Military and space applications could also benefit as devices have shown stability in radiation environments.
- Because GaN transistors can operate at much higher temperatures and work at much higher voltages than gallium arsenide (GaAs) transistors, they make ideal power amplifiers at microwave frequencies.
- GaN semiconductor devices are already in use in LEDs and power amplifiers for 4G radio base stations, and now GaN-based transistors are becoming a key enabling technology in power electronics products like adapters, power supplies, and solar inverters. GaN is used to manufacture light-emitting diodes (LEDs) with colors that can go from red to ultra-violet.
- GaN-based electronics (not pure GaN) has the potential to drastically cut energy consumption, not only in consumer applications but even for power transmission utilities. Their transistors have much less resistance as compared to silicon-based transistors. This allows for much higher energy efficiency, and orders-of-magnitude faster switching frequency. This has huge implications not only for energy usage of power electronics systems, but their physical size and stability.
- GaN nanotubes are proposed for applications in nanoscale electronics, optoelectronics and biochemical-sensing applications.

Conclusion:

Of course, the unique properties of GaN holds potential to transform various sectors including power, defence, aerospace, medical etc. However, certain challenges like its high cost and its dust being irritant to skin, eyes and lungs needs to be overcome before the scientific community move forward.

Best answer: Nana

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9. Science infrastructure sharing to enable opening out of scientific resources to other universities and the industry is a much needed policy to enhance academy-industry collaboration. Do you agree? Substantiate. Also examine the benefits of such policy.

SYNOPSIS:

The national science policy formulated in 2013 envisages 2010-2020 as a decade of innovation, in order to fulfill this vision it is not only necessary to invest in R&D but also make sure that this investment is used prudently and judiciously.

SCIENCE INFRASTRUCTURE SHARING POLICY: One of the glaring lapses in our scientific endeavors is the lack of coordination between institutions and the industry academia disconnect, this policy aims to bridge the gap in that direction.

The idea of such a policy is to see that infrastructure granted to academic institutions, Government labs can be shareable, accessible and sustainable to the industry. A web portal is being envisaged to implement the policy. In a website, anybody can book a slot and put in a request to access instruments in different labs. One example of such infrastructure sharing is the EU-funded PAERIP project to share resources between Europe and Africa. PAERIP created the first-ever inventory of research infrastructure in the two continents.

BENEFITS:

- Prevents redundancy of infrastructure of labs
- Prevents duplication of efforts in labs for eg: IICT, NCL, IDL (PSU) can coordinate the efforts together.
- Prioritize allocation of funds to some other purposes rather than spending on equipment which can be costly.
- Industry – academia interlink can help in skill development, employment opportunities, research focused on market demands, helps in scalability.
- Acts as a source of revenue to the labs which are often starved for funds and have to depend on Government grants for the same. Eg: JNCASR under the aegis of Dr.CNR Rao in Bangalore is already implementing a plan in this mode.
- Prevents tricky IPR issues if all the bodies are working together on the same projects.
- Can lead India into an era of industry led innovation which has so far remained minimal.

Since it's a policy, not a law, the challenge lies in implementation. There is a need to make people aware of the idea contained in the policy and let them see the value for themselves.

BEST ANSWER: AKS

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10. What is hyper loop transportation? Who are the major players in this technology? Does it have a potential in India? Examine.

Introduction

Hyperloop is a mode of passenger and freight transportation that propels a pod like vehicle in reduced pressure tubes at speeds greater than that of airlines.

The science and technology involved

1. Near vacuum tubes-to cut down air resistance and boost speed of vehicle.
2. Magnetic levitating/Air bearing-To overcome physical friction.
3. Linear Electric induction motors-to accelerate/decelerate the vehicle in forward direction to attain desired speed.
4. Compressor-To shift high pressure generated in front of train to its rear to get higher speed.

Main Body

The concept of the Hyperloop was popularized by Elon Musk, founder and CEO of spaceX.Major players involved in this technology are Hyperloop one and Hyperloop transportation technologies.

Indian tink tank NITI aayog is viewing Hyperloop has future mode of transportation.Some pilots are already in the works likepod-taxi pilot, with Metrino-PRT. Hyperloop has capacity to revolutionize Indian mode of transport because

1. It will reduce the time of travel at the same time enhancing the connectivity.
2. It will share the burden of freight and passengers with overburdened railways and airways.
3. It is comparatively cheaper than other high speed/bullet trains.
4. It can be build underground and above ground on columns and hence is flexible to diverse Indian Topography.
5. If coupled with green energy it will become more energy efficient mode of travel.

Challenges

1. The cost of the hyperloop is expected to run into billions of dollars which is another issue for financial reasons and will be difficult without subsidies.
2. Not a single Hyperloop prototype has been tested worldwide, thus its safety is unproven.
3. Large travelling crowd in India whereas each capsule can accommodate only a few people.
4. Health concerns, High acceleration can produce nausea, straining of muscles etc.
5. At the same time it has some unresolved issues associated with it like security in case of terror attacks and other malfunctions in system,etc.

Conclusion

Rapid and increased connectivity is the demand of time and with its caliber and wisdom in fields of science and technology coupled with holistic research and development, India can become a pioneer in developing Hyperloop transport system with its knowledge and engineering skills.

Best Answer: NKY

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11. What is Big Data? The Indian Government is now seen to be taking steps towards incorporating Big Data in policy making. Do you think it is a right decision? Substantiate. Also examine the associated threats of incorporating Big Data.

What is Big Data?

Big data refers to the handling of massive volume of data that is difficult to process using conventional database and software techniques. It is a term used to describe the collection, processing and availability of huge volumes of streaming data in real-time.

Steps being taken by government:

- Digital India and Smart City mission: will involve large scale digitisation, electronic collection of data from residents and processing and common standards for interoperability.
- Tackling tax evasion: The Income Tax Department has signed a contract with L & T Infotech Ltd for implementation of Project Insight. The project is based on an integrated platform that will use data mining, big data and analytics to identify tax evaders using social media platforms and Permanent Account Numbers (PAN) in a non-intrusive way, rather than the traditional way of conducting random income tax raids.
- Last year, Comptroller and Auditor General (CAG) launched Centre for Data Management and Analytics (CDMA) to synthesise and integrate relevant data for the auditing process. It aims to exploit the data-rich environment in the union and state governments to build capacity in the Indian audit and accounts department.
- Twitter Samwad:The government has teamed up with Twitter so that citizens get real-time news feeds of decisions and announcements made by the government. Through this, it is possible for the government to connect over a large audience.
- Geospatial Analytics: The Economic Survey shows that the use of geospatial analytics has begun.

Incorporating Big Data in policy making is a right decision or not?

An analysis of possible applications and threats would help find an answer.

Application of big data in Indian governance:

- For Business- Can help in identifying more efficient ways of doing business, help analyze data immediately and make quick decisions based on the learnings, by knowing the trends of customer needs and satisfaction through analytics one can create products according to the wants of customers, its analysis can provide a better understanding of current market conditions etc.

- Offering tailored healthcare- With human genome mapping and Big Data tools almost everyone can have their genes mapped as part of their medical record and thus developing drugs expressly tailored to treat the specific causes.
- Making our cities smarter- To help them deal with the consequences of their fast expansion, an increasing number of smart cities are indeed leveraging Big Data tools for the benefit of their citizens and the environment solving traffic problems, checking GHGs emissions.
- In governance- Quality data, if analysed at the right time, can be critical for programmatic decision-making, efficient delivery of schemes, and proactive policy revisions. Data driven governance aims to improve the last-mile linkage of individuals to schemes and empower communities and service providers through data collection, analysis, and improvisation.

Concerns with big data:

- Privacy concerns. Collection of data can be intrusive in nature.
- Security threat: If the data from a source such as Aadhar is got into the wrong hands, it can be misused. A leak from the company that handles the data, an external cyberattack etc. can cause this misuse.
- Lack of reliable data: Incomplete conversion of old data into big data format.
- Decision making will change from one based on experience, wisdom, and intuition to one driven by data. In case of incorrect, incomplete data policy made may be flawed.
- One of the biggest challenges in implementing these futuristic projects is the dearth of talented data scientists in India. According to a survey India will face a demand-supply gap of 2 lakh data analytics professionals by 2020.

Conclusion:

Big Data can enhance the government's ability to serve its citizens and address major national challenges involving the economy, healthcare, job creation, natural disasters, and terrorism. It is time to formulate a comprehensive Big Data programme across Central and state government ministries/departments with help from industry, academic and research institutions. Big Data can have a big impact only if used on a massive scale—with safeguards—by governments for the delivery of public goods and services.

Best answer: Yatdal

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Best answer: NKY

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12. What is Artificial Intelligence (AI)? Who are currently the big players in the field of AI? How big is the potential of AI? Discuss.

Artificial intelligence (AI) is an area of computer science that emphasizes the creation of intelligent machines that work and reacts like humans.

Some of the activities computers with artificial intelligence are designed for include:

- Speech recognition
- Learning
- Planning
- Problem solving

MAJOR PLAYERS IN THE FIELD:

- Google- with their subsidiary Google brain- products assistant, Google home etc.
- Facebook Inc. with their subsidiary FAIR- products chat bots, deep search.
- IBM- products such as WATSON, DEEP BLUE(chess playing systems)
- APPLE- products like SIRI(personal assistant in iphone)
- MICROSOFT- with their search engine Cortana.
- Others like Baidu, OpenAI(crowd funding platform) are the major players.

POTENTIAL OF ARTIFICIAL INTELLIGENCE:

- Forbes magazine in its report stated that AI has the potential to increase economic growth rates by a weighted average of 1.7% across all industries through 2035.
- Accenture Research found that the Information and Communication industry has the greatest potential for economic growth from AI. Integrating AI into legacy information and communications systems will deliver significant cost, time and process-related savings quickly.
- Personalized learning programs and automating mundane, routine tasks to free up colleges, universities, and trade school instructors to teach new learning frameworks will accelerate profitability in the education
- Based on the proliferation of Industrial Internet of Things (IIoT) devices and the networks and terabytes of data they generate, Accenture predicts AI will contribute an additional $3.76T GVA to manufacturing by 2035. Supply chain management, forecasting, inventory optimization and production scheduling are all areas AI can make immediate contributions to this industry's profits and long-term economic policies.
- Accenture finds that AI's immediate impact on profitability is improving individual efficiency and productivity. The economies of the U.S. and Finland are projected to see the greatest economic gains from AI through 2035

Thus if used optimally and ethically adoption of AI into our daily lives can improve our lives positively and significantly and usher in a new technological revolution.

BEST ANSWER : REDEEMER 911

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13. What are gravitational waves? From where do they come from? Explain. In this light, discuss about the LISA.

Gravitational Waves

Gravitational waves are 'ripples' in the fabric of space-time caused by some of the most violent and energetic processes in the Universe. Gravitational waves were first theorized by Albert Einstein in his general theory of relativity about interaction between spacetime and matter

They are created during super massive black hole mergers, collisions or massive accelerating objects such as neutron stars or black holes orbiting each other would disrupt space-time in such a way that 'waves' of distorted space would radiate from the source, these ripples would travel at the speed of light through the Universe, carrying with them information about their origins, the nature of gravity.

Gravitational waves are a powerful new probe of the Universe that uses gravity instead of light to take measure of dynamical astrophysical phenomena. Studying gravitational waves gives enormous potential for discovering the parts of the universe that are invisible by other means, such as black holes as they are weakly affected by electromagnetic radiation

Laser Interferometer Space Antenna (LISA)

It is a joint effort by the European Space Agency (ESA) and NASA.

It consists of three spacecraft arranged in an equilateral triangle flying along the earth in a heliocentric orbit. The distance between the satellites is measured to find a passing gravitational wave.

Currently, gravitational waves are difficult to detect as unlike other radiations, they can pass unhindered by the intervening mass.LISA will aid scientists in overcoming this difficulty.

Scientific goals of LISA

1)Galactic compact binaries

2)Extreme mass ration inspires

3)Gravitational wave background

4)Fundamental black hole physics

LISA Pathfinder

A test mission of the LISA called LISA Pathfinder was launched by the ESA. Its objective was to test the feasibility of current equipment in measuring gravitational waves. The findings were that the current equipment were 5 times better than in its design condition.

Conclusion

Gravitational waves are vital in expanding our understanding about the universe. The LISA project aims to overcome previous difficulties encountered in measuring gravitational waves. The findings of the LISA Pathfinder are an indication that the research is headed in the right direction.

Best Answer: Redeemer911

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14. What's a proxy war? Has it affected India? Examine

Introduction:

After the end of WW2, major super powers didn't involve in any major confrontation but engaged in proxy war which is supporting non-state actors to confront each other than state getting directly involved.

Body:

India has been hugely affected by the proxy war backed by Pakistan state actors on its soil and also outside.

Kashmir is the battle ground for proxy war in India

- Radicalization: Local youths are radicalized and pushed to take up arms.
- Training: Youths are trained in terror camps across borders and sent back to wage war against the state.
- Militants: Militants are infiltrated into country to attack critical installations.
- Separatists: Certain groups are given arms and finance support to create constant unrest in the valley.
- Organized crimes: Smuggling of arms, ammunitions, drugs to wag proxy war through local networks.
- Intellectuals: Intellectuals are funded to protect rioters, demonize defense forces and protests against state.

Afghan has been another proxy war ground between India and Pakistan:

- Attack: On Indian workers sent on construction mission and good will missions.
- Militants: Sending militants to target innocent civilians to not accept Indian courtesies.
- Mission: Attacks on Indian Embassy and consulates in Afghanistan.

Conclusion:

Even after three full scale wars, Pakistan still wants to inflict thousand cuts on India. Our security forces have been successful in pushing back infiltrators and warding of major attacks but still lot needs to be done on ground level to finish off this proxy war.

Best Answer: NKY

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15. India's space program needs techno-military orientation. Do you agree? Critically examine.

Introduction:

With launch of GSAT-7, India officially placed its first military satellite on orbit and after successful launch of Agni-V, India acquired capabilities to take down enemy satellites in low earth orbits. This has given start for military space program which is a priority for us now.

Body:

Need for Techno-military orientation:

- Secure communication lines: Secure, unbreakable and encrypted communication lines are required for security forces.
- Neighborhood: China is already ahead with military space program which puts our security at risk.
- Global position: Change is global realities and developments require us to develop our own.
- Wartime: During conflicts, foreign support will cease like during Kargil war.
- Missiles: Advanced weapons need satellite support to reach the target.
- Frequency interference: Due to high civilian satellites, separate frequency is needed for forces and support in region like Kashmir.

Effects of militarizing the space:

- Outer space conflicts: Conflicts on land will spread to outer space.
- Militarization: Outer space will lead to weapons storage and militarization.
- Competition: It will lead to competition and all major countries will start competing with each other.

Conclusion:

With ever growing demand for energy, this program looks for exploiting space resources to meet our needs. But with the level of poverty and scarcity of resources, this plan must be well thought off before execution.

Best Answer: Redeemer911

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16. Examine the need to review India's National Security Cyber Policy 2013 in light of the emerging cyber security challenges.

Introduction:

The National Cyber Security Policy, 2013 aims to protect and monitor Information and strengthen the country's defense against cyber-attacks. The mandate of this document was to ensure a resilient and secure cyberspace for government, businesses and citizens.

Need to review the policy:

- In India, there has been a surge of approximately 350% in cybercrime cases registered under the Information Technology (IT) Act, 2000 from the year of 2011 to 2014, a recent ASSOCHAM-PwC joint study said today.
- In the last two years, digitization and the cyber threat landscape has undergone a radical change not only in India but globally. The cyber space now occupies a key position in national security.

In recent years, large scale cyber threats that includes attacks through virus like Stuxnet, the emergence of hacker networks, and the militarisation of cyber space have become a cause of concern.

- As the country is experiencing a digital revolution, the impact of this transformation makes it imperative for financial service players to revisit their cyber security resilience. The number of incidents occurring in banking systems has increased in the last five years. In

the month of October 2016, an ATM card hack hit Indian banks, affecting around 3.2 million debit cards.
- With an increase in the usage of ICT in critical infrastructure, attackers can gain control of vital systems such as nuclear plants, railways, transportation or hospitals that can subsequently lead to dire consequences such as power failures, water pollution or floods, disruption of transportation systems and loss of life, noted the study.
- There is no national security architecture today that can assess the nature of cyber threats and respond to them effectively. India's civilian institutions have their own firefighting agencies, and the armed forces have their own insulated platforms to counter cyber-attacks. Currently all institutions work in silos.

What needs to be done?

- The highly skilled IT workforce, which India has, needs to be harnessed by the government for strategic use. Skilled law enforcement personnel are the need of the hour, considering the highly technical and advanced nature of cybercrime being reported.
- India needs to build its offensive cyber capabilities.
- To deal with the growing cyber threats we require an overarching national cyber strategy to prioritise the objectives in an evolving environment, achieve synergy between different institutions and work in coordination to deal with different threats.
- There is a need to establish a centralized repository for cybersecurity standards, best practices and guidelines, which can be used by law enforcement agency for preventing and investigating cybercrime
- A dedicated national governing unit may be established in India, which will be the central agency for all state government cybercrime agencies to coordinate, integrate and share information related to cybercrime.
- Cybercrime awareness shall be introduced in academics in the early stages of education as a mandate for all the state and central, and public and private schools, adds the study.
- Spread awareness on cybercrime prevention since the cybercriminals are constantly inventing new ways to attack and are in search of potential victims.

Conclusion:

A fully operational cyber command is the need of the hour, given that India's digital capabilities lag significantly behind regional and global players.

Best answer: Redeemer911

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17. India has the disadvantage of being situated in close proximity to what is being described as the epicentre of global terrorism. In the light of this statement, examine the challenges to India's internal security.

Introduction:

India's geographical location is the main disadvantage it can have among others especially being close to the "cradle of terrorism" is posing several problems to its dream of super power status. It is also affecting the internal security apparatus.

Body:

Challenges to our internal security:

- Terrorism: Terrorist attacks on important centers like Delhi, Mumbai, Coimbatore, Bangalore etc.
- Radicalization: Spreading doctored news and videos to radicalize youth minds.
- Extortion: Seeking protection money and underworld activities. Ex: D company.
- Organized crime: Human trafficking, Smuggling etc.
- Kashmir Unrest: Kashmir unrest leading to damaging the economy of state.
- Fake Indian Currency: Smuggling fake Indian currency to weaken economy.
- Communal riots: Destroying secular fabric of country Ex: Godhra riots.
- Drugs Smuggling: Destroying youth's future by making them addicted to drugs.
- Local militancy: Creating local militant organization like SIMI, IM etc.
- Refugees: Inflow of refugees leads to conflict with localities and start of violence.

Conclusion:

India has border with golden crescent and golden triangle, the location cannot be altered but the security challenges can be prevented by using technology and strengthening the security forces. Inclusive development should be the focus as it will help solve many problems.

Best Answer: Nana

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18. A nation with India's maritime assets, challenges and opportunities urgently needs to conceive a National Maritime Strategy, which will create synergies and draw maximum advantage from the maritime sector. Elucidate.

Introduction:

Recent development in Indian Ocean region had given a call for need in national maritime strategy and naval force has lived up to its expectations with new National Maritime strategy for ensuring secure seas.

Body:

Need for National Maritime strategy:

1. Maritime Assets:

- Oil and gas installations: We have huge installations for our energy needs and securing them is very important.
- Ports, harbors, dockyards: Vital installations for maritime trade.
- Fishing: Largest population is dependent on fishing and we are leading exporter of sea products.

1. Challenges:

- Robbery and piracy: Protecting movement of commercial ships from piracy and robbery in ocean.
- Rescue: Rescue operations of Indian citizens stranded abroad or on seas.
- Terrorism: preventing infiltration of terrorists and militants through open borders.

1. Opportunities:

- Marine explorations: Hydrocarbon explorations for increasing demands.
- Mineral mining: Sea bed mining for energy security and precious metals.
- Port led development: Projects like Sagarmala, revival of old spice route to enhance port led development.

Conclusion:

Any country aspiring to be a super power should control its waters. The reason British could conquer entire world was because of its Maritime powers. So if India wants to be a super power it should develop a Maritime strategy to defend its open borders and protect its interests.

Best Answer: Redeemer911

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19. The sheer interconnectedness of the system gives rise to legitimate concerns regarding the nature and structure of the systems of response, particularly with regard the purported fragmentation of the India's federal arrangements. Examine in light of India's federal set up and its internal security preparedness.

Introduction:

India follows a federal setup when it comes to internal security. With Law and order under State's jurisdiction and national and external security coming under centre's jurisdiction. Under Article 355 of the Indian constitution, the ultimate responsibility for security lies with the centre.

Challenges:

- Dependence of States on central forces.
- Poor capability of States due to vacancies in police, police reforms suggested by Supreme court in Prakash Singh case not yet implemented, lack of modernization etc.
- Lack of coordination between central and state forces due to political differences.
- Centralised intelligence gathering machinery is missing- NATGRID is yet to become a full-fledged database.
- Non-involvement of state in tackling security challenges- AFSPA
- Lack of coordination among states- Naxalites
- Politicisation of matters

Thus, whether it is in the handling of the Mumbai attacks, or in the case of disturbances in Jammu and Kashmir, or the blockade of Manipur by the NSCN (IM) or the lack of coordination between the central paramilitary forces and the state police in naxal areas, the federal nature of the Indian polity has resulted into tensions.

Way forward:

- Co-ordination mechanisms for Intergovernmental relations across all three tiers of government agencies is needed.
- Rethinking the notion of law and order, and public order.
- Rearranging centre-state relations.
- Strengthening the institutional mechanisms such as creation of new institutions such as a National Counterterrorism Centre and reform of existing ones such as the Indian Police Service.

Conclusion:

Given the challenges to national security ranging from the proxy-war in Jammu and Kashmir, left-wing extremism, insurgencies in the North-East, terrorism by new groups like the Indian Mujahideen and counter-radical organizations, the political parties at the Centre and in States rise above their political differences to cooperate with each other in tackling these serious challenges. A national security doctrine is the need of the hour.