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GENERAL STUDIES (TEST CODE : 1064)

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Medium Eng./Hindi	English	Registration Number	13129
Center	02	Date	19/6/2018

INDEX TABLE			INSTRUCTIONS
Q. No.	Maximum Marks	Marks Obtained	
1	10		1. Do furnish the appropriate details in the answer sheet (viz. Name, Registration Number and Test Code). उत्तर पुस्तिका में सूचनाएं भरना आवश्यक है (नाम, प्रश्न-पत्र कोड, विद्यार्थी क्रमांक आदि)। 2. There are TWENTY questions printed in ENGLISH & HINDI इसमें बीस प्रश्न हैं अंग्रेजी और हिन्दी में छपे हैं। 3. All questions are compulsory. सभी प्रश्न अनिवार्य हैं। 4. The number of marks carried by a question/part is indicated against it. प्रत्येक प्रश्न/भाग के अंक उसके सामने दिए गए हैं। 5. Answers must be written in the medium authorized 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. प्रश्नों के उत्तर उसी माध्यम में लिखे जाने चाहिए जिसका उल्लेख आपके प्रवेश पत्र में किया गया है और उस माध्यम का स्पष्ट उल्लेख प्रश्न-सह-उत्तर (क्यूसीए) पुस्तिका के मुख्य पृष्ठ पर अंकित निर्दिष्ट स्थान पर किया जाना चाहिए। उल्लिखित माध्यम के अतिरिक्त अन्य किसी माध्यम में लिए गए उत्तर पर कोई अंक नहीं मिलेंगे। 6. Word limit in questions, if specified, should be adhered to. प्रश्नों में शब्द सीमा, जहाँ विनिर्दिष्ट है, का अनुसरण किया जाना चाहिए। 7. Any page or portion of the page left blank in the Question-Cum-Answer Booklet must be clearly struck off. उत्तर पुस्तिका में खाली छोड़ा हुआ पृष्ठ या उसके अंश को स्पष्ट रूप से काटा जाना चाहिए।
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Total Marks Obtained:			
Remarks:			

75, 3rd Floor, Old Rajinder Nagar Market, Near Axis Bank, New Delhi – 110060

103, 1st Floor, B/1-2, Ansal Building, Behind UCO Bank, Dr. Mukherjee Nagar, Delhi – 110009

EVALUATION INDICATORS

1. Alignment Competence
2. Context Competence
3. Content Competence
4. Language Competence
5. Introduction Competence
6. Structure - Presentation Competence
7. Conclusion Competence

Overall Macro Comments / feedback / suggestions on Answer Booklet:

1.

2.

3.

4.

5.

6.

All the Best

1. Highlight the characteristics and applications of Cyber Physical systems. Also, enumerate the various objectives of the Cyber Physical Systems programme recently launched by the government. (150 words) 10

साइबर भौतिक प्रणालियों (साइबर फिजिकल सिस्टम) की विशेषताओं और अनुप्रयोगों पर प्रकाश डालिए। साथ ही, हाल ही में सरकार द्वारा आरंभ किए गए साइबर भौतिक प्रणाली कार्यक्रम के विभिन्न उद्देश्यों को सूचीबद्ध कीजिए।

Cyber physical systems refer to system where data from the physical world is captured via sensors, transformed digitally by processing and the output generated is used to achieve goals in a more efficient way.

For example - Smart Air conditions detecting presence of user close to home via GPS and automatically switching on ~~so~~ to keep ambient temperature when the user reaches home.

Characteristics

1. Usage of data capturing devices such as temperature, pressure, position, velocity sensors
2. Internet based communication protocols
3. Processing and output for 'intelligent action'

Applications

1. Industrial production (eg robotics in automobile assembly line)
2. Pollution control (eg- Ganga pollution monitoring, air pollution alerts)
3. Home appliances
4. Defence and aerospace
5. Medical applications (eg pacemakers, diagnostics)
6. Agriculture (eg- 'smart irrigation')

Objectives of Cyber Physical Systems Programme

1. Indigenous promotion of R&D
2. Creation of skilled personnel
3. Common protocols for communication
4. Safety of systems.

CPS are the bedrock of 4th Industrial Revolution.

2. Explaining the rationale behind Geographical Indication (GI) protection, highlight the issues in harnessing the potential commercial benefits of GI in India. (150 words) 10

भौगोलिक संकेतक (GI) के संरक्षण के पीछे अंतर्निहित तर्कों की व्याख्या करते हुए, भारत में GI के संभावित वाणिज्यिक लाभों के दोहन में संबंधित मुद्दों और चिंताओं पर प्रकाश डालिए।

Geographical Indication protection as provided under the legal framework of GI Good Act 1999 has the following rationale -

- ① Ensure that natural, agricultural or manufactured products having special characteristics of in a particular region leading to superior quality are recognized
- ② Collective licensing of producers association leading to better incomes
- ③ Protect and promote cultural

Heritage - For eg - Pochampally Ikat (Telangana),
Gobindabhog rice (Bengal^{West}), Nagpur orange (Maharashtra)
Timpoti laddu (A.P.).

Issues in Harnessing potential

1. Counterfeit production by false labelling by competitors eg - Fake Darjeeling Tea.
2. Quality control of GI Goods
3. Lack of awareness
4. Disputes over GI tag between states. Eg - Basmati rice controversy, Rosagulla between Odisha and West Bengal
5. Law enforcement and penalties for misuse.

GI tags offer a unique Intellectual Property protection system for the benefit of both producers and consumers.

3. What do you understand by Free Space Optical Communication (FSOC) Technology? Critically explain its potential in connecting rural and remote areas in India.

(150 words) 10

फ्री स्पेस ऑप्टिकल कम्युनिकेशन (FSOC) प्रौद्योगिकी से आप क्या समझते हैं? भारत में ग्रामीण और दूरस्थ क्षेत्रों को जोड़ने में इसकी क्षमताओं की आलोचनात्मक व्याख्या कीजिए।

Free Space Optical Communication is a method of data transfer and internet connectivity without an optical fibre through free space developed by XLabs of Alphabet.

It is being deployed for connecting rural and remote areas in Andhra Pradesh.

Benefits

1. Low cost in connecting remote areas where fibre connection might be prohibitively expensive.

2. High speed connectivity
3. Immune to magnetic disturbances

Technological issues

1. Weather attenuation and interference
2. Difficulty in product maintenance
in case alignment receiver and
transmitter is damaged preventing
data transfer,

Fsoc has tremendous potential
in ensuring the overarching
objective of "Digital India" —
Knowledge based society for
prosperity of all.

4. What are Orphan Drugs? Examine the significance of putting in place a policy framework for such drugs in a developing country such as India.

(150 words) 10

ऑर्फन ड्रग्स क्या हैं? भारत जैसे एक विकासशील देश में ऐसी दवाओं हेतु एक नीतिगत ढांचा स्थापित करने के महत्व का परीक्षण कीजिए।

Orphan drugs refer to those pharmaceutical developments which treat rare diseases because of which the economic returns on development and production is extremely low or non-existent.

Low population and/or paying capacity dents possible realizable revenue leading to their neglect.

This has a very severe consequence on those affected by such diseases which may be life threatening / lead to lifelong disability.

Significance of Policy Framework

1. Ensure right to health for all
2. ~~E~~ Promote economic returns to incentivize R&D and production of pharma companies
3. Their development may lead to new discoveries having positive spillovers
4. Better understanding of pharmacokinetics, genomics, etc in the process

Such a policy to prevent market failure is in keeping with the objective of the welfare state enshrined constitutionally in India.

5. Highlight the factors that give advantage in attracting talent to a particular country. In this context, what steps should the government take to turn "brain drain" into "brain gain" in India? **(150 words) 10**
उन कारकों पर प्रकाश डालिए जो किसी विशेष देश को प्रतिभा को आकर्षित करने में बहुत प्रदान करते हैं। इस संदर्भ में, भारत में "ब्रेन ड्रेन" (प्रतिभा पलायन) को "ब्रेन गेन" (प्रतिभा लाभ) में परिवर्तित करने के लिए सरकार को क्या कदम उठाने चाहिए।

Attracting global talent is a key objective in a knowledge based society.

Factors incentivizing talent attraction

1. Adequate funding for projects and research
2. Sufficient remuneration
3. Robust research ecosystem of mentors, labs, technology, etc.
4. Protection of intellectual property so developed
5. Industry-academia linkages
6. Promotion of entrepreneurship.

Steps taken by Government

1. VAIJA scheme
2. INSPIRE Faculty scheme
3. Ramanujan Scholarship Fellowship
4. Ramalingaswamy Fellowship in biotechnology

Q.

Suggested Measures & Way Forward

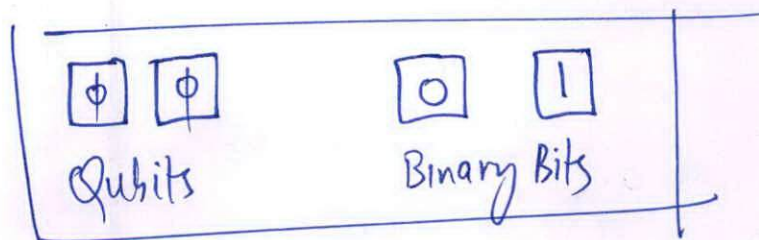
1. Strengthening CSIR labs
2. Incentivize private R&D (low in India vis-a-vis international benchmarks)
3. Regulating publishing journals for quality and ethical conduct
4. Strengthen IPR Policy 2016 & its implementation
5. Promote women specially in STEM via schemes.
6. World Class Universities.

6. What are quantum computers? Discuss their potential in solving problems that are too complex for today's classical computers. (150 words) 10

क्वांटम कंप्यूटर क्या हैं? उन समस्याओं को हल करने में इनकी क्षमता पर चर्चा कीजिए जो वर्तमान के क्लासिकल कंप्यूटरों के लिए अत्यधिक जटिल हैं।

Quantum computers are devices which store and process information in qubits using the principle of superposition of 0 and 1 instead of binary digits used by regular computers.

Thus, the state of information in quantum computers is probabilistic and rather than deterministic



Potential

1. Prime factorization time will reduce tremendously leading to breakthrough in decryption having major impact on digital security
2. Defence purposes eg- Lockheed Martin planes using Quantum computer mainframes
3. Complex climate change modelling and prediction
4. Faster processing of certain categories of codes

Quantum Computing is an emerging field with various implications for the future of computing in the 21st Century.

7. Discuss the obstacles in women's access to science education in India and also suggest remedial measures to overcome these obstacles.

(150 words) 10

भारत में विज्ञान की शिक्षा तक महिलाओं की पहुँच के मार्ग में आने वाली बाधाओं पर चर्चा कीजिए और इन बाधाओं को दूर करने के लिए उपचारात्मक उपाय भी सुझाइए।

Low Women participation in Science education is due to various factors which impedes growth of science as well as harms women.

(Obstacles)

1. Social factors - stereotypes about women taking up non-science streams in class 11th and 12th.
2. Difficulties in workplace eg- breaks due to maternity stalls career progression making it difficult for re-integration.
3. Patriarchy in science research ecosystem.

4. Unequal pay and promotion for women in science vis-a-vis their male counterparts
5. Gender gap in higher education system affecting science in particular.

Suggested Remedial Measures

1. Schemes such as KIRAN by DST, Ministry of Science for promoting women researchers
2. Gender perspective in school textbooks to promote science
3. Promotion of Women Scientists via media and communication to celebrate their achievements
Eg. Marie Curie
4. Preventing patriarchy at workplace via strict enforcement of laws

8. With the help of examples from various fields discuss the achievements and limitations of India's performance in indigenisation and development of new technology. Also, comment on the significance of MSME sector in achieving indigenisation of technology. (150 words) 10

विभिन्न क्षेत्रों के उदाहरणों की सहायता से, नई प्रौद्योगिकी के स्वदेशीकरण एवं विकास में भारत के प्रदर्शन संबंधी उपलब्धियों और सीमाओं पर चर्चा कीजिए। साथ ही, प्रौद्योगिकी के स्वदेशीकरण को प्राप्त करने में MSME क्षेत्र के महत्व पर टिप्पणी कीजिए।

India has had a long history of
innovation in new technology in
various spheres.

Achievements in various fields

1. Pharmaceuticals - Bharat Biotech developing JENVAC, ROTAVIRUS and Typhoid vaccine,
2. Indigenous Space - ISRO's Indigenous cryogenic upper stage engine.
3. Agriculture - ICARs Pusa Arhar, Delhi University's GM Mustard.
4. Healthcare - Soham device for newborn

deafness detection

Limitations

1. Major defence systems still not indigenized eg- aircraft thruster in HAL Tejes.
2. Low global outreach and commercialization
3. Less original breakthroughs in certain fields such as biologics with focus on biosimilars in India such as by Biocon.

Significance of MSMEs in Indigenization

1. Promote grassroots innovation
2. Commercial return to innovators via entrepreneurship eg- Bellatrix Aerospace.
3. Potential to grow into large global firms
4. Helping in production via ancillarization.

Greater funding and robust IP protection with ease of doing business may help further in indigenization.

9. India needs to collaborate and participate in international scientific projects in order to place itself as a major player in cutting edge research. Discuss in the light of ongoing global mega science projects. **(150 words) 10**
- कटिंग एज रिसर्च में स्वयं को एक प्रमुख प्रतिभागी के रूप में स्थापित करने हेतु भारत को अंतर्राष्ट्रीय वैज्ञानिक परियोजनाओं (इंटरनेशनल साइंटिफिक प्रोजेक्ट्स) में सहयोग करने और भाग लेने की आवश्यकता है। वर्तमान में वैश्विक स्तर पर जारी मेगा साइंस प्रोजेक्ट्स के आलोक में चर्चा कीजिए।

Modern science is often a collective endeavour, spanning across institutions and researchers across continents.

Ongoing global Mega Science Projects and Role of India

1. Large Hadron Collider at CERN for particle physics - India a member; contribution in detectors
2. International Thermonuclear Fusion Project for fusion energy - Indian Skilled personnel in research

providing valuable inputs

3. LIGO project for gravitational waves detection - One of the 3 ~~at~~ centres to be built in India
4. Copernicus Programme of ESA with Indian satellites enriching earth observation while benefiting from European sentinel satellites
5. Indian participation in developing regulatory framework in International Telecommunication Union for development of 5G standards in telecommunication

Mega science projects ~~not~~ both benefit small researcher driven efforts ~~and~~ and are in turn benefitted from them. Both must together promote the goal of science for development.

10. What is Mitochondrial Replacement Therapy? Discuss its potential in reducing genetic disorders. Also, list various issues around its use in fertility medicine. (150 words) 10

माइटोकॉन्ड्रियल रिप्लेसमेंट थेरेपी क्या है? आनुवांशिक विकारों को कम करने में इसकी क्षमता पर चर्चा कीजिए। साथ ही, फर्टिलिटी मेडिसिन (प्रजनन चिकित्सा) में इसके उपयोग से जुड़े विभिन्न मुद्दों को सूचीबद्ध कीजिए।

Mitochondrial Replacement Therapy
or 'Three Parent Babies' refers
to use of transplantation of
mitochondrial DNA from a woman
to replace a deficient one
with nuclear DNA being contributed
only by the father and the mother.

Since m-DNA is passed down only
from the mother, its defect can
lead to various disorders.

Mitochondria helps in cellular
Adenosine Triphosphate (ATP) production

the unit of energy exchange in cellular biology.

Issues with MRT

1. Unintended consequences and gene pool contamination
2. Religious concerns
3. Ethical concerns over designer babies and disability removal via scientific eugenics.
4. Low empirical baseline data about long term efficacy of the technology.

These concerns must be debated in a robust and objective manner to help those who may suffer from genetic diseases to

11. The rapid diffusion of Artificial Intelligence begets unique opportunities and challenges for India. Discuss. What can be done to address these challenges? (250 words) 15

आर्टिफिशियल इंटेलिजेंस (कृत्रिम बुद्धिमत्ता) का तीव्र प्रसार, भारत के लिए विशिष्ट अवसर और चुनौतियां उत्पन्न करता है। चर्चा कीजिए। इन चुनौतियों का समाधान करने के लिए क्या किया जा सकता है?

Artificial Intelligence refers to any system sufficiently advanced in decision making so as to mimic human intelligence in achieving desirable outcomes.

For example - IBM's Dr. Watson computer in prescription of most appropriate treatment course in certain oncology cases.

Opportunities for India

1. Enhance productivity of labour

in agriculture, manufacturing and services

2. Redeployment of personnel from repetitive tasks to innovative roles
3. Growth of economy in general and certain sectors such as ICT, Robotics, etc in particular given strong Indian software skills.
4. Enhance national security e.g. - CCTV facial recognition
5. ~~Pr~~ Improved governance e.g. - ~~Andhra~~ crime hotspots identification
6. Inclusiveness e.g. - disability friendly website access

Challenges

1. Low skill levels may lead to

Unemployment given low achievement outcomes in education. Foreign- WB Report suggests 69% jobs in India under threat of AI.

2. Increasing inequality in society
3. Threats from countries making advances in AI eg- Cyber warfare using AI by China
4. Digital divide may increase

Way Forward

According to Kamakoti Committee following measures may be used -

1. Data protection, exchange and integration centre
2. N-AIM Mission worth ₹1200 crore over 5 years
3. Centres of Excellence & Test Beds
4. AI Grand Challenges
5. Skilled Personnel Creation

6. Tax Incentives

7. Common Standards.

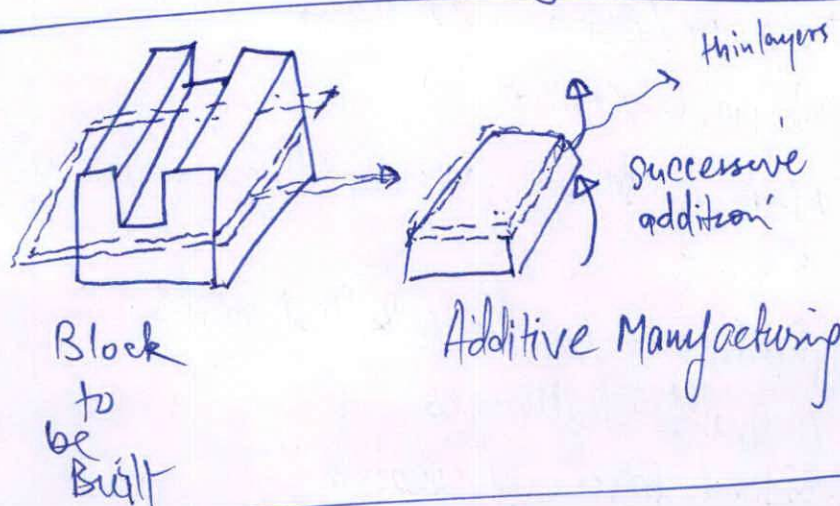
AI is the future engine of global growth for India.

12. Briefly explain the concept of Additive Manufacturing as well as its advantages and challenges in comparison with conventional manufacturing methods. Also, comment on its potential in terms of revolutionising organ replacement in humans. (250 words) 15

ऐडिटिव मैन्युफैक्चरिंग (योजक विनिर्माण) की अवधारणा की संक्षेप में व्याख्या कीजिए, साथ ही परंपरागत विनिर्माण विधियों की तुलना में इसके लाभों और चुनौतियों को भी बताइए। साथ ही, मनुष्यों में अंग प्रतिस्थापन में क्रान्तिकारी परिवर्तन लाने के संदर्भ में इसकी क्षमता पर टिप्पणी कीजिए।

Additive Manufacturing or 3-D printing refers to a production process where extremely thin layers of cross-section are layered successively on top to build final product.

Traditional manufacturing uses either removal or moulding.



Advantages

1. High customizability
2. Precision manufacturing
3. Diversified material ink to produce biological systems (e.g. Biopink)
4. Small production equipment (3D printer)

Challenges

1. Cost per unit is high
2. High mass production time
3. Unethical use risk increases e.g. - 3D printing of guns
4. Skillset in modelling is scarce

Organ Replacement Potential

Using Bioink & tissues and organs can be grown leading to following benefits -

- ① Original stem cell from recipient makes rejection and auto-immune attack risk low
- ② Scarcity of donors and quality of organs is tackled effectively
- ③ Unethical practises in organ donation overcome
- ④ Better outcomes eg skin grafting of same texture and colour

Additive Manufacturing promises to be a potential revolution cutting across various spheres.

13. What is the Human Genome Project-write (HGP-write) and how is it different from the earlier Human Genome Project (HGP)? In this context, also critically explain the potential benefits of the HGP projects for healthcare activities in India. (250 words) 15

ह्यूमन जीनोम प्रोजेक्ट-राइट (HGP-write) (मानव जीनोम परियोजना-राइट) क्या है और यह पूर्ववर्ती ह्यूमन जीनोम प्रोजेक्ट (HGP) से किस प्रकार भिन्न है? इस संदर्भ में, भारत में स्वास्थ्य देखभाल गतिविधियों के लिए HGP के संभावित लाभों की आलोचनात्मक व्याख्या भी कीजिए।

Human Genome Project-write is an initiative to ~~as~~ build from scratch an entire of human DNA base pair code consisting of 3 billion base pairs (A-T-C-G) and 20,000 genes.

Unlike HGP which was only meant to decode existing code (Read) HGP-write will involve building on even leading to better understanding of human genomics.

Potential Benefits for India

1. Understand mechanism of various diseases, specially genetically transferred such as haemophilia affecting India's tribal population.
2. Develop ~~drugs~~ individualized drugs and delivery systems for precision medicine.
3. Better outcomes in possible gene editing such as using CRISPR-Cas 9 in the future for treatment.
4. Spillover effects in understanding gene-protein translation mechanism.

which is utilized in other domains as well (such as agro-biotech) .

5. Identify common vulnerabilities in South Asian population vis-a-vis other regions for targeted public health policies . eg- explain why Indians suffer more from Cardiovascular Diseases even after taking into account lifestyle and nutritional control factors .

Human Genomics research will help tremendously in achieving the goals of National Health Policy 2017 to ensure health for all .

14. Comment upon the need for encouraging participation of private players in the space sector in India. Can it be argued that furthering India's achievements in the space sector requires a comprehensive space law?

(250 words) 15

भारत में अंतरिक्ष क्षेत्र में निजी प्रतिभागियों की भागीदारी को प्रोत्साहित करने की आवश्यकता पर टिप्पणी कीजिए। क्या यह तर्क दिया जा सकता है कि अंतरिक्ष क्षेत्र में भारत की उपलब्धियों को आगे बढ़ाने के लिए एक व्यापक अंतरिक्ष कानून की आवश्यकता है?

Private sector participation in space is crucial for a more robust and broad based Indian space programme.

Need for Private Participation

- ① Develop new technologies under private initiative. eg- American firm SpaceX developing landing re-usable rocket Falcon series.
- ② Enable ISRO to focus on core research while outsourcing

repetitive production to private players.

- ③ Build a more proficient ecosystem of space researchers under private ~~dept.~~ employment which may be tapped by the public sector
- ④ Promote growth and employment via space & industry
- ⑤ Space being a global market can help in augmenting forex reserves and global soft power using private sector.

Need for Space Activities Bill, 2017

Currently only 2 regulations -

Remote Sensing Data Rules and Satellite Communication Rules provide framework

for regulation which is insufficient.
The proposed law has the following-

- ① Licensing for space companies
- ② Registration of all space based objects
- ③ Regulations on space standards
(eg- to prevent space pollution such as Kessler ~~sp~~ Effect)
- ④ Penalty of ~~2 crore~~ 3 year jail or
₹1 crore or both for violation.

Thus, the bill may help in growth of space via private participation in keeping with the principles of UN Committee on Peaceful uses of outer space.

15. Water shortage in India has been sought to be addressed through various policy and technological interventions. Explain. Also, examine the benefits of desalination technology and the costs associated with it. **(250 words)** 15
भारत में विभिन्न नीतिगत और तकनीकी उपायों के माध्यम से जल की कमी की समस्या का समाधान करने के प्रयास किए जाते रहे हैं। व्याख्या कीजिए। साथ ही, विलवणीकरण प्रौद्योगिकी के लाभों एवं इससे संबद्ध लागतों का परीक्षण कीजिए।

A recent report by NITI Aayog suggested that nearly 600 million Indians are under severe to extreme water stress and over 2 lakh die annually due to lack of access to safe and sufficient water.

This requires both policy & technological interventions

Technological Interventions

- ① Micro and drip irrigation
- ② Desalination

- ③ Water efficient technology such as CO_2 Brayton cycle in water intensive thermal power plants ~~and~~
- ④ Cloud seeding via AgCl and Salting

Policy Interventions

- ① Water Regulatory Framework Bill
- ② Amendment to Easement Act for regulating groundwater use
- ③ National Water Policy priority use
- ④ Promoting Water User Association
- ⑤ True cost pricing of water
- ⑥ Polluter pays principle for polluting Industry
- ⑦ STP/ETP & cluster approach under schemes such as Namami Gange

Desalination refers to water extraction for human purposes from sea water having excessive salts.

Benefits

1. Inexhaustible resource (97% water in oceans)
2. Serves coastal populations where most of human settlement by population resides
3. Counters water diversion from other areas preventing water conflicts

Costs

1. ~~more~~ Expensive technology
2. Damage to ocean ecology
3. Remote and inland area supply still a concern

Indian collaboration with Israel may help India in addressing water stress.

16. Originally devised as a distributed ledger technology for Bitcoin, Blockchain offers a wide range of applications across sectors, especially banking and finance. Discuss. (250 words) 15

मूलतः बिटकॉइन के लिए एक डिस्ट्रीब्यूटेड लेजर टेक्नोलॉजी के रूप में प्रकल्पित (इजाद), ब्लॉकचेन विविध क्षेत्रों, विशेष रूप से बैंकिंग और वित्त में विभिन्न प्रकार के अनुप्रयोग प्रस्तुत करती है। चर्चा कीजिए।

Blockchain refers to distributed ledger authenticated and verified by users via solving mathematical problems and their chronological placement in a sequence ("chain").

Bitcoin which ~~was~~ is the first and most popular cryptocurrency was its first wide application, the ledger being net coins in a wallet as assets with transfers leading to counterpart debit and credit.

However, the technology ~~has~~ is increasingly being adopted in other spheres such as -

- ① Online transfer of cross border payment in international trade such as recently used by ICICI Bank
- ② Stock Exchanges eliminating need of single clearing system
- ③ Sovereign currency e.g. Petro by Venezuela backed by oil
- ④ Blockchain voting and verification
- ⑤ Blockchain contracts enforcement
- ⑥ Land and Asset Registry systems

based on blockchain

The While private cryptocurrencies have proven to be controversial the underlying technology has great potential in various spheres and is increasingly being adopted.

17. What do you understand by TRIPS plus provisions being advocated by developed countries outside the WTO based TRIPS agreement? Do you think India should show some flexibility and incorporate certain TRIPS plus provisions in its IPR regime? **(250 words) 15**

विकसित देशों द्वारा WTO आधारित ट्रिप्स (TRIPS) समझौते से बाहर अनुशंसित किए जा रहे ट्रिप्स-प्लस प्रावधानों से आप क्या समझते हैं? क्या आपके विचार से भारत को कुछ लचीलापन दिखाना चाहिए एवं अपनी IPR व्यवस्था में कुछ ट्रिप्स-प्लस प्रावधानों का समावेश करना चाहिए?

TRIPS Plus provisions refer to one of the "New Agendas" being promoted by developed countries in international trade negotiations.

Provisions

1. Protection of clinical trial data to prevent its access for development of generics

and biosimilars

- ② Extended Patents beyond the 20 year period to incorporate the time spent in patent examination and granting of patent.

India has concerns over these as

- ① Clinical trials data is essential for domestic pharmaceutical industry based on generics & biosimilars
- ② Extended patents are against public health goals in a developing country like India.

However, certain ~~the~~ TRIPs plus provisions regarding extension may be adopted as long as public health goals are not compromised.

It may also help in promoting domestic investment in Research acting as a greater incentive for indigenization and higher value addition.

Better enforcement of IPR Policy 2016 must form the bedrock of actions in International trade negotiations in ~~the~~ the realm of Intellectual property.

18. What do you understand by Digital therapeutics? Discuss the opportunities & challenges of Digital Therapeutics specifically in context of preventing lifestyle diseases in India. (250 words) 15

डिजिटल थेराप्यूटिक्स (चिकित्सा शास्त्र) से आप क्या समझते हैं? विशेष रूप से, भारत में जीवनशैली से संबंधित रोगों की रोकथाम के संदर्भ में डिजिटल थेराप्यूटिक्स के अवसरों एवं चुनौतियों पर चर्चा कीजिए।

Digital therapeutics or digicenticals refer to devices and integrated systems using ICT to capture and process data to enable users to achieve desirable health goals.

They rely on the principles of Cognitive Behavioural Therapy.

For example - Fitbit watch monitoring steps taken, heart rate, etc.

Opportunities

- ① Can help prevent obesity - the major cause of 4 NCD i.e. CVD, Diabetes, Oncology & Stroke
- ② Monitor better nutritional intake
- ③ Alert doctors about stress triggers / hypertension beyond recommended range so that early action is taken
- ④ Help in dealing with mental health challenges
- ⑤ Cessation of addictive substances such as smoking, alcohol and narcotics

Challenges

- ① Such devices are expensive preventing widespread adoption
- ② Efficacy of certain devices is not verified by independent third party Randomized controlled trials.
- ③ Awareness and adoption levels are low in India
- ④ Basic digital ecosystem such as Health Data Security, e-health record common standards etc is lacking.

Digital is a nascent industry with great scope for future progress and expansion provided challenges are overcome.

19. The efforts to improve science and R&D in India need to go beyond questions of expenditure. Comment. (250 words) 15

भारत में विज्ञान तथा R&D को उन्नत बनाने के प्रयासों को व्यय के प्रश्नों से परे जाने की आवश्यकता है। टिप्पणी कीजिए।

India spends nearly 0.69% of its GDP on R&D which is low relative countries such as South Korea (4%) and America (2%)

However, science and R&D has several other bottlenecks as identified in Science Technology and Innovation Policy 2013 such as-

- (i) Quality of primary, secondary and tertiary education with poor outcomes eg- ASER Report mentions 25% class III students can

read class II text

- ② Rote learning rather than innovation and curiosity about natural systems
- ③ Gender gap in science stream
- ④ Missing industry academia linkages
- ⑤ Low per capita researchers in India (~230 per Million)
- ⑥ Lack of focus on tackling grassroots challenges in most research institutions
- ⑦ Cultural systems and values which prohibit scientific temper and rationalism

- ⑧ Missing science educators for explaining science to the masses.
- ⑨ Low private participation in R&D.

Way Forward

- ① Atal Innovation Mission
 - ↳ Tinkering Labs
 - ↳ Incubation Centres
- ② KIRAN scheme women in science
- ③ NIDHI scheme for innovation based entrepreneurship
- ④ VASRA scheme for attracting global talent
- ⑤ Moocs such as SWAYAM for quality reference material for students

Technology based on scientific progress is the most important factor for development of a prosperous nation.

20. Adopting a mission mode approach for developing energy storage systems will be crucial for realizing India's electric mobility ambitions as well as achieving our renewable energy targets. Analyze. (250 words) 15

भारत की इलेक्ट्रिक मोबिलिटी महत्वाकांक्षाओं को साकार करने एवं साथ ही हमारे नवीकरणीय ऊर्जा लक्ष्यों को प्राप्त करने के लिए, ऊर्जा भंडारण प्रणालियों (एनर्जी स्टोरेज सिस्टम्स) का विकास करने हेतु एक मिशन मोड दृष्टिकोण को अपनाना महत्वपूर्ण होगा। विश्लेषण कीजिए।

Battery technology is emerging
as the most crucial factor
in 2 major industries —

① Electric Mobility

Target: All electric fleet by 2030

- > Faster charging of cars
- > Enhanced range
- > Low lifecycle maintenance
- > Stable power output

② Renewable Energy

- > Store solar and wind

production which is intermittent
in nature

~~Target: Achieving 175GW of renewables by 2022
is crucially dependant on battery.~~

It also has major applications in
Consumer electronics such as Smartphones.

Thus, a mission mode approach
with fixed targets and
milestones, required funding
and sources as well as skilled personnel development is
needed so that India may emerge
as a leader in this sphere.

This

Therefore India must ~~must~~ invest
in battery technology such as
Graphene Based technology and
ISRO's licensing of Li-ion for
mass production by private sector
participation.