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GENERAL STUDIES (Test Code : 300)

Name of Candidate	Gaurav Agrawal	Registration No.	1684
Schedule		Module	
Place	Jaipur	Time		Date	22-Oct-13
Classroom		Distance Learning	✓	Classroom & Distance Learning	

INDEX TABLE

Q. No.	Maximum Marks	Marks Obtained
1.(a)	20	
1.(b)	20	
1.(c)	20	
2.(a)	20	
2.(b)	20	
2.(c)	20	
3.(a)	15	
3.(b)	15	
3.(c)	15	
3.(d)	15	
4.(a)	15	
4.(b)	15	
4.(c)	15	
4.(d)	15	
5.(a)	10	
5.(b)	10	
5.(c)	10	
6.(a)	10	
6.(b)	10	
6.(c)	10	
7.	30	
8.	10	

Total Marks Obtained 116

Remarks:

Signature of Examiner

EVALUATION INDICATORS

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

INSTRUCTIONS

1. Do furnish the appropriate details in the answer sheet (viz. Name, ID Number and Test Code).
2. Candidates should attempt answer to the part/sub-part of a question strictly within the pre-defined space. Any attempt outside the pre-defined space shall not be evaluated.
3. The candidate need not write anything in his/her answer that derogates the dignity of an individual or an organization.
4. Candidates should attempt all questions strictly in accordance with the instruction given under each question.
5. The candidate should respect the instructions, given be the invigilator.

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Overall Macro comments / feedback / suggestions on Answer Booklet:

1. → Before starting the Ans, Introduce theme/ essence of Qn in the first para

2.

→ Many of you Don't have Conclusion. Conclusion is Must. [Brief Summary of entire disc^n]

3.

4.

→ Maintain the words limitation, Don't elaborate un-necessarily.

5.

All The Best

1. *Answer any two in about 250 words each.* 2 x 20 = 40

(a) "Armies of cloned despots are the last thing we need to worry about". Examine the ethical debates surrounding the therapeutic use of stem cells derived from human clones in the light of this statement.

• Stem cell therapy is one of the most revolutionary discovery of our age. It has immense potential. Its supporters argue:

- It can save thousands of human lives. Babies born with even the most serious genetic disorders can be cured and lead healthy lives.
- It can be used to correct organic malfunctions / accident injuries and what not. Thus it will enrich human life.
- It will expand the frontiers of science which will lead to future benefits.

• At the same time, there are multiple ethical issues surrounding it:

1. Designer Babies: Parents can use it to filter out all the undesired traits in their babies and introduce the desired ones.
2. Interfere natural selection principle, reduce human genome biodiversity and threaten the entire human race: Everybody will want only desired traits. This

Before starting core points I introduce theme/essence & Ch is first para

will be against nature's principles of natural selection & survival of the fittest. As the human biodiversity shrinks, human race would be more prone to natural shocks.

3. Commercialisation: The race for designer babies will fuel greed and commercialisation. It would become very difficult to ensure ethical practices are followed.

4. Question of embryos: Presently the embryo stem cells are used as they can grow into any organ. But once used, the embryos (and other embryos not used) are discarded. These are human embryos. Don't they have any right to life? ~~They~~ Are they living beings? Isn't this murder?

5. Human rights of clones: The clones may be kept ~~for~~ as a "bank" for later use/donation of organs. But don't they have any rights?

6. Interference with God's work: Nature life is a God's work. This process interfers unnaturally against His will.

7. 3 parent Babies: The genetic material may

Don't write anything this margin (इस भाग में कुछ ना लिखें)

be taken from 3 parents. what's the status and relationship of child with all parents?

8. Patents & monopoly: Big MNCs can get patents & establish monopoly over the key genetic material. eg. Myriad over b-CRA gene.

SOME STEPS TO TACKLE THESE ISSUES

1. Use of pluripotent stem cells can eliminate the need of embryos & hence those issues.
2. Storing stem cells at embryo stage for bank can eliminate need of using clones as bank.
3. US supreme court decision on gene patenting / UK regulation on 3 parent babies can tackle such issues.

10½

You must conclude APS

After examining both side views take a stand in conclusion

1. **(b)** Nanotechnology is being considered as an answer to some of our greatest challenges. How it can help us to meet our aspirations in the following areas: i) Clean environment ii) Sustainable energy? 20

1. (c) Evaluate the current status of IPR in India. Suggest some steps, with particular reference to the situation in India, regarding IPR in the national policy making. 20

Introduce the topic

Indian IPR framework is comparable to international standards.

- WIPO & Marrakesh Treaty: India is a signatory to WIPO & infact our copyright laws for visually disabled were recently amended to anticipate the Marrakesh Treaty.
- TRIPS: Indian laws are TRIPS compliant. India is the leader of developing countries in IPR laws.
- Protection of Plant varieties Act: In agriculture, India implemented a sui generis legislation. This gives protection to international companies selling seeds as well as local communities for developing traditional knowledge based seeds.
- Nagoya Protocol: India has signed and implemented even the 3rd pillar which is access benefit sharing.
- Copyright Act: It was recently amended to extend copyrights to 70 years, benefit sharing with the artists etc.

ISSUES IN IPR FRAMEWORK IN INDIA

1. Novartis & Bayer judgement: Although

the judgements were against frivolous evergreening and artificially restricting the drug and are TRIPS compliant, yet it has caused anxiety among the international investors.

- Remedial step: Perhaps the govt. can come out with a clear set of guidelines on what constitutes evergreening / can lead to compulsory licensing. This will allay investor fears.

2. IPR issues in agriculture + GM crops:

- The issues here surround biopiracy by MNCs violating the principle where they should share the benefits of the local knowledge used with local community (PPV Bill & Nagoya Protocol).
- Then there is the issue of terminator seeds which pollute the gene pool of Indian crops. & lead to MNC monopoly.
- This + socio economic issues + unregulated nature of trials have forced the Supreme Court constituted Technical committee to recommend a moratorium on all field trials of GM crops till appropriate regulatory structures are put into place.

Qn is specifically asking suggestions w.r.t IPR - National policy making
- Suggest effective measures like
↳ Single window IPR-Admin
↳ Modernise IPR-Judiciary
↳ Training etc

- Remedial action: Regulatory structure should be put into place with adequate representation & empowerment of farming community.

3. IPR issues in private sector:
- eg. in IT sector, India still doesn't have the data secure status which harm outsourcing business.
- Remedial action: Necessary institutional mechanism should be put into place.

Qn 1/2

2. ***Answer any two in about 250 words each*** **2 x 20 = 40**

(a) "Development, impact of environmental degradation, climate change and disaster risk reduction are no longer separate issues". In the light of this statement, discuss the environmental challenges that India face, and the policy instruments and institutions to address them.

Envt. Degradation ↔ Development ↔ Disaster Management ↔ Climate Change

- Wrong development patterns ~~can~~ lead to environmental degradation. eg. the development around kedarnath, the hydel projects there, obstructing river flow, cutting trees.
- Wrong development and envt. degradation also accelerates climate change. eg. burning of coal to add CO_2.

- Envt. degradation and climate change together lead to increased severity of hazards. Wrong development converts it into massive disasters. eg. the Uttarakhand floods.
- Disasters push back development & cause more envt. degradation.

• Thus all these are intricately linked and it is not possible to address one while ignoring the others.

SOME CHALLENGES WE FACE

1) 5th IPCC Report, 2013 : It clearly says
- weak monsoon winds due to global warming
- longer monsoon as delayed retreat
- more moisture content, hence rainfall.

Thus monsoons will become erratic, with high variability, intense concentrated rains and droughts in other regions. This will be a threat to agriculture which is monsoon dependent; lead to increased disasters, affect poor more.

2) Glacier melting: This will increase floods, flash floods, soil erosion. Vast areas of Northern Plains would be affected.

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3) Increased frequency and severity of cyclones, droughts.

4) Loss of Tree cover : This will lead to more erosion (hence dam silting, increased floods, rivers breaching their courses). It will reduce rainfall and increase temperatures. This will ~~so~~ affect agriculture & industry.

5) Water Scarcity : Due to both increase in demand and supply mismanagement. Even ground water is fast receding now. The cause for this is faulty policies & misgovernance.

9

POLICY INSTRUMENTS & INSTITUTIONS

1. UNFCC, Sustainable development goals, Kyoto declaration, Montreal protocol, Convention on Biodiversity at international level.

2. National Plan on Climate Change with 8 sub plans to tackle issues such as energy efficiency, climate proof agriculture, water footprint, solar energy, Himalayan ecosystem, climate information network and afforestation.

3. National Disaster Management Act, 2005 to integrate development planning with disaster planning.

write specifically w.r.t India

Estd Many Institutions & policies w.r.t environmental challenges

Outline propelled

2. **(b)** How is Environmental Impact Assessment (EIA) a decision making as well as a project management tool? Discuss the major principles and processes involved and the major initiatives of the Government of India in EIA. 20

• EIA means taking the full environmental costs and benefits into account while deciding on the profitability of the project. It is done from the community's point of view.

EIA as decision making tool

- The various costs and benefits of the project may not be captured by the market determined prices. But they are real costs to the community.
- eg. cost of destruction of mangroves by coastal power plants such as Tata Mundra & Adani.
- Often in the private costs, the community has no say in decision making.
- In EIA, ideally community should be given a voice along with reputed and independent scientists and environmentalists. eg. Gadgil Panel recommendations on Western Ghats had this feature.
- Thus EIA can be an effective decision making tool for the community.

EIA as project management tool

- The EIA can come up with various technologies / processes to be implemented to reduce the envt. damage. These become a part of project management.
- The EIA can alter the scope and scale of the project, thus affecting mngmt.

MAJOR PRINCIPLES & PROCESSES OF EIA

- The idea is to fully capture the envtl. costs or value the services provided by the ecosystem. eg. ~~value~~ loss of forest is valued not only in terms of timber value, but also in terms of carbon capture; costs of increased erosion, lower rainfall, higher temperatures etc.
- EIA should only be done by independent & competent experts.
- Voice of community must always be heard.
- Loss of livelihoods must be accounted for.
- The discount rate used should be the social discount rate & not private rate.
- Interests of the future generations must be protected as well.
- Only sustainable development be allowed.

write Principles Process separately

Principles
↳ Accountability
↳ Credibility
↳ Flexibility

Process
→ Screening
→ Scooping
etc

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Major govt. Initiatives

- EIA made mandatory for all major projects. However, problem here is in implementation where pvt. companies ~~produce~~ employ incompetent & biased "experts"; bribe officials. Sponsors only prepare EIA reports.
- Public hearing / consent of gram sabhas must. But again most public hearings are farce.
- Govt. appointed many commissions like Shah commission on mining; Gadgil panel on W. Ghats.

9 1/2

2. **(c)** Discuss the role of the three major conventions that originated at the Rio Summit, 1992 in streamlining all the previous environmental efforts globally and analyze their outcomes till present. 20

Don't write anything this margin (इस भाग में कुछ ना लिखें)

3. *Answer any three in about 200 words each* *3 x 15 = 45*

(a) Innovation is the new mantra for Science and Technology policy in India. Comment.

SRISHTI

The new S&T policy, among other things such as increasing expenditure on R&D to 1% of GDP, increasing private sector R&D; lays great stress on innovation.

The reasons are not far to see:

1. Frugal Innovation : is the main emphasis i.e. cost effective techniques and management practices / business models. This is more suited to India because of following reasons.

2. Bottom of the pyramid : India has a large number of poor where the conventional market doesn't reach effectively. Frugal innovation can address their needs better because it would be more suited to local needs than giant MNC imported business models.

3. Spurring Entrepreneurship : Frugal innovation comes not from white coat lab workers, but from local talent who spot an opportunity & model in the local market.

Focus your Ans w.r.t R&D

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4) Promoting employment: These innovations are likely to use cost effective & labor intensive techniques and hence provide employment to the poor.

5) Lack of Resources: The traditional western model of R&D requires setting up of vast labs, sophisticated equipment, high paying jobs in science & professors. India really doesn't have the kind of resources needed for it.

6) Disconnect of traditional model from Indian needs: The traditional R&D model was developed in west and suited to their needs. It doesn't address the needs of vast majority of Indians.

Thus India rightly needs frugal innovation and hence the stress on it in the new policy.

6½

Suggest steps to improve further

3. **(b)** What is Terminator gene technology? What are the moral perplexities associated with it? 15

The terminator technology is altering the genes of the GM crops by MNCs
- such that the crops ~~do~~ from these seeds don't produce any further seeds.
- or even if they produce seeds, these seeds ~~can~~ have to be brought back to be treated with a special chemical to be able to germinate.

MORAL ISSUES ASSOCIATED

1. Rights of farmers : Even the adjacent fields not growing these GM crops get polluted due to cross-pollination. Thus those farmers suffer for no fault as their new seeds won't germinate without chemical treatment. This is disastrous for farmers as over 80% of the seeds in India are farm saved seeds.
2. Biopiracy : These MNCs often take the genetic material suited to local conditions from India. But they don't acknowledge our community rights and don't compensate also.

3. Farmer becomes dependent on MNCs: Because he has no seeds of his own so he has to go to these MNCs year after year. These MNCs then exploit the farmer by charging high prices using their monopoly.

4. As the experience of Bt-cotton shows, this technology becomes ineffective with time as the ball worm became resistant. So the companies will come with new versions, extending their monopoly.

8½

5. Safety issues: These companies often flout rules / bribe regulators to bypass safety trials. This is what led to Supreme Court appointed technical committee to recommend moratorium on all such field trials.

6. Farm suicides: Not only these seeds are expensive, but they also need expensive fertilisers, assured water etc. which increases the risk for the farmer. Hence higher suicides in Maharashtra, Andhra Pradesh.

7. Interference with God & Nature.

8. Affecting India's biodiversity.

Conclude your Ans

Don't write anything this margin (इस भाग में कुछ ना लिखें)

3. (c) Differentiate between Space-based Solar Power and current solar power systems. List out the benefits and hurdles in the implementation of space-based solar power systems. 15

SPACE BASED SOLAR SYSTEMS

- The idea is to ~~produce~~ convert solar energy into electricity in the space using satellites orbitting earth.
- Then the electricity can be beamed to earth using microwaves or laser.
- There will be a large receptor antenna on earth to receive this and process the energy.
- Wires can't be used to ~~beam~~ transfer. The antennae to be used would be massive

EARTH BASED SYSTEMS

- They use conventional silicon based wafers or solar cells to convert solar energy into electricity. This electricity can be directly fed into the grid since they are on the ground.

BENEFITS OF SOLAR ~~BA~~ SPACE SYSTEM

- They have much higher efficiencies compared to ground based systems.
- They don't suffer from atmospheric diffusion of sun light and hence

sunlight which falls on them is intense. [24/7]

- They can work for longer hours and don't suffer from "nights". Orbits can be so designed so as to minimise the time spent ~~on~~ in earth's shadow.
- They don't use the costly land so much. So issues such as project delays, land acquisition, rehabilitation, environment degradation are less.
- Position of the satellite can be changed to beam the energy "as per demand" to the areas which need it.

9

HURDLES

- Launching satellites ~~was~~ is costly.
- These satellites would need to have huge solar panels & antennae. Powerful rockets would have to be built.
- Beaming microwaves / lasers can lead to environmental / error concerns.
- Can be used to develop space weapons.
- Can be a big source of space debris
- Very costly, unproven technology.

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3. **(d)** Discuss the recent Spamhaus attacks and its effects. Suggest few steps for the prevention of such attacks. 15

4. *Answer any three in about 200 words each* *3 x 15 = 45*

(a) Loss of biodiversity is often cited as one of the fallouts of economic growth. However, there are arguments that it also leads to cultural degradation and destruction. This is indeed true in a narrow context. Explain.

Introduce properly

- Despite all the catchy slogans on sustainable growth, we are still far from it.
  - The power plants and industry complexes set up around the shore has led to massive destruction of corals, mangroves & marine ecosystem.
  - The water released from coastal nuclear plants destroys the marine animals.
  - Indiscriminate forest cutting, hunting, water body encroachment and unplanned development has led to extinction or near extinction of numerous species such as cheetah, Nilgiri Langur, Hangul
  - Even when 'sustainable development' mechanisms are put into place such as compensatory afforestation, the newly planted forests are often degraded & monoculture.
- At the same time, the growth has led to cultural degradation also.
  - There is loss of tribes, their cultures,

Don't write anything this margin (इस भाग में कुछ ना लिखें)

their handicrafts etc.

- The tribals are displaced to make way for new mines & steel plants.
- Our traditional handicrafts such as blue pottery, natural colors are losing out to machine made products.
- The tastes are changing to shun our original culture and ape the western culture.
- Thus folk dances & songs are getting lost whereas hip hop is becoming popular.

• However, one must not remain confined to such a narrow view only.

- Growth led change in tastes and mixing of culture is a natural process. Indian culture has never been stagnant & we are always assimilating
- Growth has given a chance to some of our traditional handicrafts to make an impact at global level.
- Growth has improved the life standards including those of many tribes. They can't be left in isolation.

Very good

9½

4. **(b)** "In the development of a national strategy on biodiversity, it is required to identify the priorities of biodiversity conservation and developmental needs of the society". Evaluate the statement in the context of newly adopted targets of CBD convention at Hyderabad. 15

• One of the major outcome of the Hyderabad CBD was that developed countries agreed to increase their funding and assistance to developing countries for biodiversity conservation.
- However, the developing countries were required to assess the current status, identify priorities and devise strategies & plans for biodiversity conservation in next few years.
• Thus a balance between biodiversity conservation & development needs to be found. In India, following steps have been taken for the same.
1. Western Ghats: The govt. appointed a panel under Madhav Gadgil first to suggest steps for sustainable development & biodiversity conservation in Ghats. However, it felt that its recommendations didn't strike a balance and tilted heavily against the developmental needs. So it appointed a new

panel under Kasturirangan which recommended protecting only 37% of the Ghats. The govt. accepted it as it felt it struck the right balance.

2. Threat to biodiversity from living Modified organisms: India is already a signatory to Basel convention regulating trade.
- A new BRAI is being setup to give approvals to GM crops keeping in mind their socio-economic & environmental impacts as well as under Cartagena Protocol.
- Supreme Court banned all GM field trials until properly regulated.

3. Other Sustainable Development measures:
- Protecting Himalayan Ecosystem is a part of National Mission on Climate Change
- Rs 50 / tonne of Coal tax has been levied.
- CAMPA funds have been created for use of forest land.
- EIAs have been made mandatory.
- many Sanctuaries, national parks & biosphere reserves have been notified.
- Forest Rights Act have given the forest tribes rights over forests.

• Thus various priorities have been identified and actions taken.

Asked to evaluate the statement w.r.t to CBD-hyd Outcomes
Use those outcomes properly

6½

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4. **(c)** Differentiate between Mega-diversity regions and Biodiversity Hotspots globally as well as in India. What are the major governmental provisions in India related to biodiversity? 15

Don't write anything this margin (इस भाग में कुछ ना लिखें)

4. **(d)** Discuss the meaning and importance of Food-print in the context of "Think. Eat. Save." 15

- Think - Eat - Save was the theme of the world Environment Day by UNEP this year.
- Globally ~ one-third of food produced is wasted (higher in India).
- This food has real environmental costs. Thus agriculture accounts for nearly 70% of fresh water usage, 25% of carbon emissions, 80% of deforestation globally.
- Food print is a concept evolved to estimate the resources used behind producing the food which we eat.
- This can be huge. For instance 1 litre of milk may take 1000 litres of water!

Importance of food print

- It enables us to measure our demand on earth's resources in a standard unit, even though we all eat different things.
- The food print, so obtained can help us in becoming aware of the problem and start thinking about saving food & hence precious resources.

- Food print also drives home clearly various inequalities present in the world at the moment. Thus it is well established that the food print of an average ~~Bharti~~ American is many times that of an average Indian. Or the food print of a wealthy Indian is many times that of a poor.

8

- Thus it lays bare highly insensitive & unethical claims that food prices are rising mainly because NREGA workers are eating more. Or at the global level, food prices are rising because Indians are eating more!

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5. *Answer any two in about 150 words each* *2 x 10 = 20*

(a) What is Cybersquatting? What are the options to combat cybersquatting in India?

- Cybersquatting means registering famous names, domains, trademarks, personality names on internet.
- It is done in bad faith. Mostly the aim of the squatter is to sell back the account to the real owner at a much higher price.
- It is widely done on social media sites where people create accounts for personalities, put up their photos & pose as if these are real accounts.
- They may use the ~~fan~~ likes/followers so generated to push some advertisements or carry out activity so as to defame the real personality. This puts pressure on him/her to buy back the account.

WAYS TO COMBAT CYBERSQUATTING

- IT Act protects the online identity

Don't write anything this margin (इस भाग में कुछ ना लिखें)

of a person. If someone creates a fake account, then it is a punishable action under the Act.

- Social media sites such as twitter and facebook themselves have anti-squatting policies these days. eg. concept of 'verified' accounts on twitter.

Suggest effective measures

4

5. **(b)** Explore the applications and opportunities of instrumental robotics in the field of agriculture. 10

5. (c) Trace the functioning and list out the applications of SARAL. 10

- SARAL or Satellite with ARgos and ALtika was launched by ISRO with French cooperation by PSLV.
- It has a sun synchronous orbit.
- It carries Altika or Ka band altimeter.
  - Altika is used to measure ocean topography.
  - Traditional satellites use radar signal to bounce off from ocean surface & use time elapsed to measure variation in ocean heights.
  - But due to presence of atmosphere, they have to apply correction.
  - Altika uses high frequency Ka band waves which eliminate the need for applying correction.
  - The lower wavelength of Ka band waves also means that the variations in ocean surface can now be studied with much greater accuracy.
  - However, a disadvantage is lowered performance in rain.

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write the applications systematically

- Argos will be used to process the data from ocean buoys.

other applications of SARAL

- climate change, ice change studies
- biodiversity conservation.
- Ocean studies
- disaster management.

4½

6. *Answer any two in about 150 words each* *2 x 10 = 20*

(a) Describe the factors responsible for the acidification of Arctic Ocean.

- The biggest factor is global warming.
  - Due to the global warming, Arctic ice sheets are melting.
  - Earlier all the water was below the ice and was not in contact with atmosphere.
  - So carbonic acid (H_2CO_3) concentration in Arctic was less.
  - Now due to melt, the water has come to surface and in contact with the atmosphere as well.

- This increases acidipcation.
- Further, there is evidence ~~that~~ in 5th IPCC Report that ocean temperatures have gone up.
  - at higher temperatures, more CO_2 combines with water to form ~~by~~ carbonic acid.
- Then due to an increase in CO_2 level in atmosphere itself (>400 ppm now) the rate of diffusion of CO_2 into oceans increases, hence acidification.
- Hurricanes, thunders, ~~st~~ cyclones are responsible for massive amount of carbon going into oceans.
- Increased ocean shipping and hydro carbon exploration in Arctic are also responsible.

Ocean acidipcation has many harmful effects including destruction of marine ecosystems such as coral reefs.

3

6. **(b)** What are the major recommendations of Gadgil committee? 10

- The Gadgil panel, led by Madhav Gadgil - a noted western Ghats environmentalist - was appointed by Govt. to suggest ways for sustainable development of ghats & democratic governance.
- But its report was opposed by all Ghats states & rejected by the govt.

RECOMMENDATIONS OF THE PANEL

- Entire western Ghats to be declared as Ecologically sensitive zone (ESZ).
  - part of ESZ would be ESZ 1, 2 & 3.
  - In ESZ 1, no new developmental activity to be allowed. Existing ones to be faded.
  - In ESZ 2, only eco-friendly activities such as minor tourism, grazing, small water management projects to be allowed.
  - In ESZ 3, wider activities can be allowed but not the heavily polluting ones such as mining, large dams.
- For the Ghats governance,
  - Western Ghat Ecological Authority to be setup at Ghats level having a

Don't write anything this margin (इस भाग में कुछ ना लिखें)

representation of all stakeholders, including local communities.

- State & district level authorities would be setup in each state & district.
- consent of the local communities is a must for any industrial activity.
- Development plans to be prepared bottom up.

This could have been a watershed moment in sustainable development in India.

6

6. **(c)** List out the major outcomes of the Doha climate change conference. 10

Don't write anything this margin (इस भाग में कुछ ना लिखें)

7. *Answer all six in about 50 words each* *6 x 5 = 30*

(a) Project BRAIN

- This is a project launched to understand the functioning of human brain.
- ~~Each~~ The activity of each neuron would be understood and mapped.
- Just like humans genome project decoded the functioning of human genes, this would decode human brain.
- It would have immense benefits.

2

7. **(b)** "Three-Parent" Baby 5

- Recently, in news in UK, as it allowed the technology.
- used to cure mitochondrial disease in children which they receive from mothers.
- the nucleus ~~and other cell~~ is taken from the 'genetic mother' who has defective mitochondria. mitochondria is taken from healthy mother whose nucleus is removed. The resulting cell is fused with the sperm from father.
- can save lakhs of children. but some ethical opposition has been raised.

3

Don't write anything this margin (इस भाग में कुछ ना लिखें)

7. (c) Rotavac 5

- Rotavac vaccine is to ~~prevent~~ protect children from Rotavirus which causes diarrhea which leads to lacs of children deaths annually in India
- totally indigenous vaccine.
- costs a fraction of the expensive imported vaccines.
- to be a part of the Universal Immunization Programme.

8

7. (d) Wankel 5

Don't write anything this margin (इस भाग में कुछ ना लिखें)

7. (e) Kirobo 5

7. (f) Carbon Aerogel 5

8. ***What are the achievements of the following Indians for which they were in news recently? Answer in 1-2 lines each:*** ***2 x 5 = 10***

(a) S. Venkata Mohan

8. **(b)** Anil Ananthaswamy 2

8. **(c)** Sugata Mitra 2

Don't write anything this margin (इस भाग में कुछ ना लिखें)

8. **(d)** Mahaveer Golechha 2

8. **(e)** Rangaswamy Srinivasan 2