



# VISION IAS

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14 JAN 2020  
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03

## GENERAL STUDIES (TEST CODE : 1403)

|                   |               |                     |            |
|-------------------|---------------|---------------------|------------|
| Name of Candidate | Vedika Bansal |                     |            |
| Medium Eng./Hindi | English       | Registration Number | 523359     |
| Center            | ORN           | Date                | 14/01/2020 |

### INDEX TABLE

| Q. No. | Maximum Marks | Marks Obtained |
|--------|---------------|----------------|
| 1      | 10            |                |
| 2      | 10            |                |
| 3      | 10            |                |
| 4      | 10            |                |
| 5      | 10            |                |
| 6      | 10            |                |
| 7      | 10            |                |
| 8      | 10            |                |
| 9      | 10            |                |
| 10     | 10            |                |
| 11     | 15            |                |
| 12     | 15            |                |
| 13     | 15            |                |
| 14     | 15            |                |
| 15     | 15            |                |
| 16     | 15            |                |
| 17     | 15            |                |
| 18     | 15            |                |
| 19     | 15            |                |
| 20     | 15            |                |

Total Marks Obtained:

Remarks:

### INSTRUCTIONS

- 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)।
- There are **TWENTY** questions printed in **ENGLISH & HINDI**  
इसमें बीस प्रश्न हैं अंग्रेजी और हिन्दी में छपे हैं।
- All questions are compulsory.**  
सभी प्रश्न अनिवार्य हैं।
- The number of marks carried by a question/part is indicated against it.  
प्रत्येक प्रश्न/भाग के अंक उसके सामने दिए गए हैं।
- 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।
- Word limit in questions, if specified, should be adhered to.  
प्रश्नों में शब्द सीमा, जहाँ विनिर्दिष्ट है, का अनुसरण किया जाना चाहिए।
- 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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## EVALUATION INDICATORS

1. Contextual Competence
2. Content Competence
3. Language Competence
4. Introduction Competence
5. Structure - Presentation Competence
6. Conclusion Competence

Overall Macro Comments / feedback / suggestions on Answer Booklet:

1.

2.

3.

4.

5.

6.

**All the Best**

1. Explain how the theory of Plate Tectonics helps in understanding the mechanism of volcanism. (150 words) 10

ब्याख्या कीजिए कि प्लेट विवर्तनिकी सिद्धांत ज्वालामुखी की क्रियाविधि को समझने में किस प्रकार सहायता करता है।

Volcano is a feature in the earth's crust where magma is squeezed onto the Earth's surface. Most volcanoes form at the boundaries of the Earth's tectonic plates.

Plate tectonics are huge slabs of the Earth's crust and upper mantle. These are constantly moving at a very slow rate. Volcanoes are most common in these geologically active boundaries.

The two types of plate boundaries that are most likely to produce mechanism of volcanism are:

(i) Divergent boundaries - Tectonic plates move apart from one another. Magma continuously moves up the mantle into the boundary, building new plate material.

Example: Mid-Atlantic Ridge - North American

and Eurasian plates are moving in opposite direction. The ridge forms continuous volcanic mountain range.

↳ African plate boundary home to volcanoes such as Mt. Kilimanjaro.

(ii) Convergent boundaries - plates move towards each other and collide. The collision forces denser plate to sink. As the denser plate subducts, pressure and temperature surrounding increases, which causes melting of plate and further volcano.

Example - volcanic arc in the Ring of Fire.

There are various hotspots of volcanoes that exists away from plate boundaries due to exceptionally hot areas fixed deep below earth's mantle. Thus, the study of plate tectonics provides inputs to mechanism of volcanism.

2. Discuss how technology can help India cope with disasters.

(150 words) 10

चर्चा कीजिए कि प्रौद्योगिकी भारत में आपदाओं से निपटने में कैसे सहायता कर सकती है।

Technology has provided immense potential to mankind to manage disasters. It is an indispensable tool to disaster risk assessment and reduction through use of maps, data, etc.

Types of technology to help cope:

(i) Geographical information system -

| PRE-DISASTER                                                                                                                                                                                                                     | DURING                                                                                                                                                                                          | POST DISASTER                                                                                                                                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• Build vulnerability maps and demarcate zones of hazard</li> <li>• Assess areas for providing shelter</li> <li>• Help in community preparedness by providing signs for safety</li> </ul> | <ul style="list-style-type: none"> <li>• Planning of rescue and evacuation (Example - used during landslide in Sikkim)</li> <li>• Assess if disaster can spread and provide warnings</li> </ul> | <ul style="list-style-type: none"> <li>• Assessment of loss for rehabilitation</li> <li>• Assess the damage to build back better.</li> </ul> |

(ii) Early warning systems - for each disaster can help in better preparedness and mitigation strategies. Example - accurate prediction of cyclone Phailin

in Odisha saved thousands of lives.

(iii) Wireless communication system and disaster proofing of telecommunications — will help to disseminate information quickly and timely and maintain connection

(iv) Remote sensors to help predict the disaster as well as to assess losses.

(v) Satellite radios to communicate and provide early warnings especially to fishermen in the coastal areas. The recent introduction of GEMINI will help to reduce disaster impact in the deep waters.

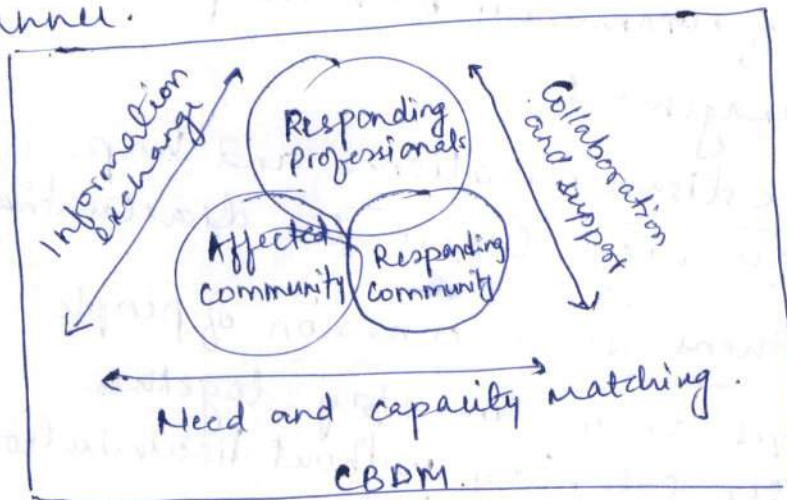
(vi) Internet and Social Media — global dissemination of information, crowdsourcing and donation for affected, maintain contact with closed ones. Example — Facebook feature of safety check.

Thus, technology provides evidence based planning and helps in all phases of disaster management — preparedness, prevention, mitigation, reconstruction.

3. Bring out the importance of community-based disaster management in India. (150 words) 10

भारत में समुदाय-आधारित आपदा प्रबंधन के महत्व को स्पष्ट कीजिए।

Community Based disaster management (CBDM) involves programs, interventions and policies designed by people in at-risk localities to handle disasters in an effective manner.



CBDM involves

- integrated approach
- decentrilised, bottom up and dynamic
- Multi-stakeholder participation (NGOs, SHGs, CBOs, etc)
- Inclusive, marginalised sections involved.
- Participation of local community

Importance -

- (i) First responder and last standee -  
The local community is the first to respond during disaster and stands till the end.
- (ii) Cost effective - as it mobilises resources and knowledge from within the community.
- (iii) Participatory - CBDM integrates traditional knowledge of community with the plans of disaster management.
- (iv) Improve disaster resilience and helps to prepare well before the disaster strikes.
- (v) Strengthens social cohesion of people and helps them to stay together during the calamity without discrimination.
- (vi) Post-disaster - CBDM approach helps to rehabilitate economically and psychologically.
- (vii) Reduce the impact as the disaster management force will arrive much later than the help from local people.

CBDM approach is the need of the hour and the Hyogo Framework also stresses the need to strengthen local community. Successful examples include the Kathmandu Earthquake Risk Mitigation Project.

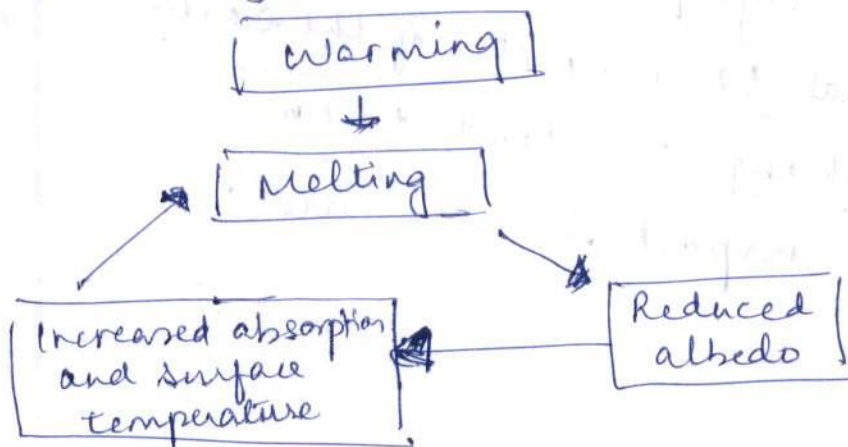
4. What is ice-albedo feedback and how is it related to climate change?

(150 words) 10

आइस-एल्बिडो फीडबैक क्या है और यह जलवायु परिवर्तन से किस प्रकार संबंधित है?

Ice-albedo feedback is a positive feedback process where a change in the area of glaciers, ice caps and sea-ice alters the albedo and surface temperature of the planet. It affects the global climate.

Ice is reflective and some of the energy received is reflected back to space. However, warming reduces the albedo and increases the absorption of solar energy.



Relation to climate change -

• Due to natural and anthropogenic causes, there has been rising menace

of climate change. Human development interventions has led to rise in greenhouse gases and the associated rise in temperature.

- The rise in temperature leads to accelerated melting of glaciers and ice caps. This leads to the eustatic rise of sea level and more land being exposed to warming.
- The increased absorption repeats the entire cycle, thus leading to overall rise in the earth's temperature.

Therefore, cryosphere can be said as the "natural thermometer of the earth" as any change can lead to an enormous impact in area and scale.

5. Why has there been an increase in the frequency of Glacial Lake Outburst Floods across the world? Highlight the measures, which can be taken to tackle these floods. (150 words) 10

विश्व भर में ग्लेशियल लेक आउटबर्स्ट फ्लड की आवृत्ति में वृद्धि क्यों हुई है? ऐसे बाढ़ से निपटने के लिए अपनाए जा सकने वाले उपायों को रेखांकित कीजिए।

Glacier Lake Outburst Floods (GLOFs)  
are a release of meltwater, moraines and  
ice-dammed lakes due to dam failure.  
They are a major concern in India, Bhutan,  
Tibet, Pakistan and Nepal.

Rising frequency of GLOFs -

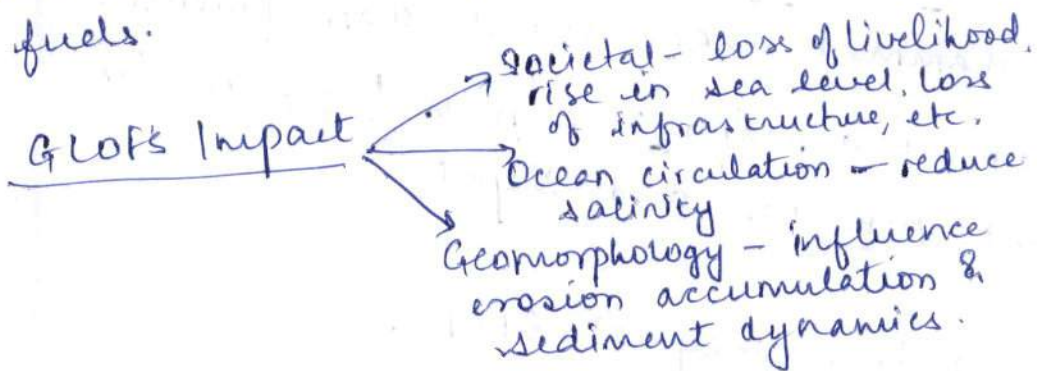
(i) Global warming - the accelerated rise  
in temperature has led to retreat of  
glaciers and fragmentation by increase  
in the number of glaciers.

(ii) Radiative balance is disturbed i.e.  
the amount received and emitted  
by earth has led to rapid melting

(iii) Anthropogenic causes - Human interventions  
like development projects, mass tourism,  
practice of slash and burn type of  
farming.

(iv) Increasing erratic and unpredictable monsoon rainfall pattern and increased climate variability

(v) Black Carbon - important factor of melting ice and reducing albedo. It is due to the incomplete combustion of fossil fuels.



Thus, various measures need to be adopted to control floods -

(i) Early warning systems to provide timely information

(ii) Mitigation measures - better community preparedness, vulnerability assessment, GLOFs hazard mapping, etc.

(iii) Preventive measures - dam remedial measures like check dams, open cuts, artificial dams, etc.

(iv) Remote sensing for accurate prediction

(v) More research for evidence based planning

(vi) Inter-agency coordination, like ISRO provides input via satellite imagery.

6. Give an account of the increasing frequency of cyclonic activity in the Arabian Sea region. (150 words) 10

अरब सागर क्षेत्र में चक्रवाती गतिविधि की बढ़ती आवृत्ति का विवरण प्रस्तुत कीजिए।

Arabian sea region is less prone to cyclones than Bay of Bengal due to the cooler sub-surface temperature. It witnesses one severe cyclone once in 4-5 years. However, there has been rise in frequency like 2019 faced cyclone kyarr and Maha.

Reasons for the rising frequency -

(i) Geographic location and global warming -

↳ Receives less freshwater from rivers than Bay of Bengal due to many east flowing rivers.

↳ Enclosed nature → more evaporation

↳ Rise in carbon dioxide emissions leading to more warming.

(ii) Aerosols - rise in aerosols has been more than ten-fold leading to accelerated temperatures.

(iii) Indian Ocean Dipole - is an irregular oscillation of warm temperatures in the

eastern Indian ocean. Positive IOD leads to warmer than temperatures in the Arabian sea region than Indonesian region. Arabian sea witnessed highest positive IOD in recent years.

(iv) wind shear or the change in the wind speed and direction - Arabian sea has witnessed strong vertical winds.

(v) El-Nino Modoki conditions have also led to cyclogenesis in the Arabian sea region.

Thus, there has been rise in frequency of cyclones in Arabian sea region. Earlier, it was limited to Orissa coast however, now the impact is spreading towards ~~Bijapur~~ <sup>Karnataka</sup> and Kerala as well.

7. Explain the phenomena of Sudden Stratospheric warming witnessed in recent years. How does it affect the ozone hole formation over Antarctica?

(150 words) 10

हाल के वर्षों में देखी गई आकस्मिक समतापमंडलीय तापन की परिघटना की व्याख्या कीजिए। यह अंटार्कटिका के ऊपर ओजोन छिद्र के निर्माण को किस प्रकार प्रभावित करता है?

Sudden stratospheric warming (SSW) is a phenomenon in which warming occurs high up in the stratosphere. It is a rare phenomenon in the <sup>Hemisphere</sup> Southern Pole whereas it occurs on a two year average in the Northern Hemisphere.

### Phenomenon of SSW

- It has led to a rise in more than  $40^{\circ}\text{C}$  in South Pole and may further lead to hot, dry winds and drought conditions in Australia.
- SSW is caused due to the weakening of the stratospheric polar <sup>vortex</sup> ~~winds~~ and associated westerly winds.
- In the Southern Hemisphere, when the southern ocean gets heated, there's difference of temperature in the southern Ocean and the South Pole. This leads

to movement of wave of air in the south pole. It gradually gets weakened.

- SSW may lead to wider impact when winds will move from southern ocean towards the equator.

### Affect of ozone hole formation in Antarctica

- As per NASA report, Antarctica ozone hole is smallest in the past few months since 1982.
- ~~When the sun marches southwards in spring,~~ In late winter, Antarctica gets sunshine which accelerate the reaction of sunlight on ozone depleting substances.
- However, due to warming, there is absence of stratospheric clouds which limit the process of reaction of ozone depleting substances.
- It is positive as it doesn't expand the ozone and protects the UV layer from entering the earth.  
However, this is not due to global change but only due to SSW.

8. Explain the concept of volcanic winter giving examples. (150 words) 10

उदाहरण प्रस्तुत करते हुए वोल्कैनिक विंटर की अवधारणा की व्याख्या कीजिए।

Volcanic winter is a reduction in the global temperatures caused by volcanic ash and sulphuric acid.

The reduction in temperatures raises the Earth's albedo i.e. the increasing the reflection of sun's rays. This would lead to further cooling. It influences the regional climate and over a time, global climate.



9. Bring out the prominent evidences that have been put forward in support of sea-floor spreading. (150 words) 10

सागरीय-अधस्तल विस्तार के समर्थन में प्रस्तुत किए गए प्रमुख साक्ष्यों का उल्लेख कीजिए।

Hess proposed 'sea floor spreading' after the analysis of the magnetic rocks. He argues that new oceanic crust is being formed continuously at mid-oceanic ridges.

The constant eruptions at the crest causes oceanic crust to rupture and new lava wedge out of it, pushing the oceanic crust on either side. The ocean floor thus spreads. The denser crust sinks and gets consumed.

Prominent evidences in support -

(i) The volcanic eruptions common in mid-oceanic ridges.

(ii) Analysis of rocks on either side of the crest - are similar in terms of chemical composition, physical properties.

(iii) The oceanic plate is thinner and much younger than continental plates.

(iv) Sediments of ocean crust are unexpectedly thin.

(v) Shallow earthquakes in the deep trenches of the mid-oceanic ridges.

Thus, the concept of sea floor spreading revived the interest of formation of continents and oceans and its distribution and led to further studies like plate tectonics.

10. Write a brief note on Earth's magnetism and its role in protecting the Earth from solar winds. (150 words) 10

पृथ्वी के चुंबकत्व तथा सौर पवनों से पृथ्वी की रक्षा में इसकी भूमिका पर संक्षिप्त टिप्पणी लिखिए।

Earth acts like a large spherical magnet, surrounded by a magnetic field that changes with time and location.

The field seems to be generated by a dipole magnet located at the centre. The axis is offset from axis of rotation by approximately 11°.

The most accepted theory of magnetism is that of dynamo effect. It links the magnetism with motion of metallic fluids in earth's outer core.

Earth's outer core is made up of molten iron and heavy elements in liquid form, while inner core solidifies under influence of gravity. The motion of fluids in outer core through convection causes an electric current leading to its creation of magnetic field.

Role in protecting from solar winds -

- The Earth's magnetic field strips away the charged particles of sun in the form of winds and saves the ozone layer.

- The lack of magnetic field in Mars highlights the impact of solar winds and its loss of atmosphere.

Thus, magnetism though varying spatially and temporally, protects the earth from solar winds which further helps in protection of ozone layer and curbing the impact of harmful ultraviolet rays of our sun.

11. Explaining the origin and mechanism of Indian monsoon account for the uneven distribution of monsoonal rainfall in India. **(250 words) 15**

भारतीय मानसून की उत्पत्ति और क्रियाविधि की व्याख्या करते हुए, भारत में मानसूनी वर्षा के असमान वितरण का विवरण प्रस्तुत कीजिए।





12. How does climate change affect the process of desertification?

(250 words) 15

जलवायु परिवर्तन मरुस्थलीकरण की प्रक्रिया को किस प्रकार प्रभावित करता है?

Desertification is land degradation in arid, semi-arid and dry sub-humid areas due to various factors like climate variations and human activities.

Affect of climate change on desertification :

- (i) Climate change leads to extreme variability of rainfall and temperature leading to extreme hot/dry spells which accentuates desertification.
- (ii) The extreme hot spell may lead to rise in forest fires due to dryness and high temperature leading to wiping out large tracts of land.
- (iii) Loss of fertility, loss of nutrients and organic matter.
- (iii) Change in rainfall pattern may change vegetation cover and composition.
- (iv) Lead to more erosion in case of extreme rainfall.

(v) Climate change may lead to rise in sea level. This combined with scarcity of water in rivers will lead to intrusion of highly saline seawater → ↑ salinity → degradation.

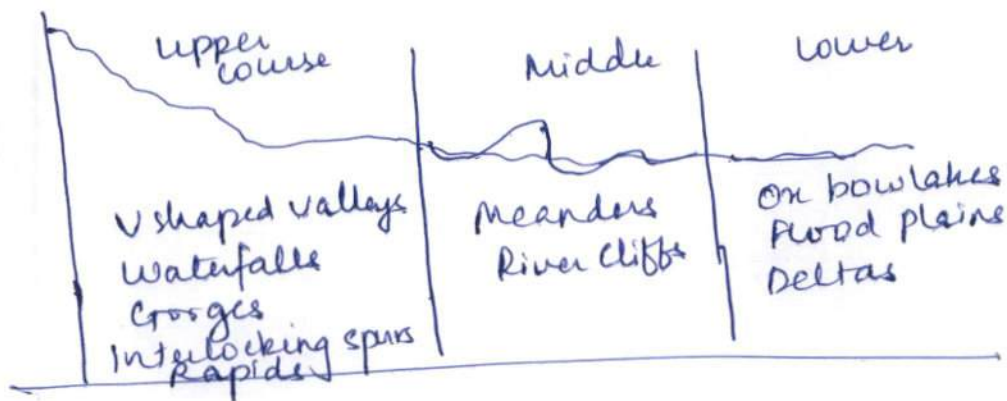
Therefore, measures to control the menace of climate change like use of renewable energy, prohibiting deforestation, etc. is need of the hour.



13. Give an account of landforms that are shaped by running water as it erodes, transports and deposits sediments. (250 words) 15

प्रवाहित जल द्वारा अपरदन, परिवहन और तलछटों के निक्षेपण के कारण निर्मित भू-आकृतियों का ब्यौरा प्रस्तुत कीजिए।

Running water produces various landforms from its upper course to lower course where it erodes, transports and deposits sediments.







14. India is vulnerable to a large number of natural as well as man made disasters on account of its geo-climatic and socio-economic conditions. Elaborate. (250 words) 15

भारत अपनी भू-जलवायु एवं सामाजिक-आर्थिक परिस्थितियों के कारण वृहद संख्या में प्राकृतिक के साथ-साथ मानव-निर्मित आपदाओं के प्रति सुभेद्य है। सविस्तर व्याख्या कीजिए।

India is one of the worst disaster prone countries in the world.

Vulnerability :

- ↳ 58.6% of landmass - prone to earthquakes
- ↳ 40 million hectare land - prone to floods
- ↳ 68% of cultivable area - vulnerable to droughts

- ↳ Hilly areas risk from landslides
- ↳ 5700 km coastline prone to cyclones & tsunamis.

- ↳ disasters/emergencies of chemical, biological, radiological and nuclear.

Vulnerability due to geo-climatic conditions :

- (i) The Himalayan region - the young fold mountains ~~region~~ are highly susceptible to landslides, earthquakes due to the movement of tectonic plates and its instability.

(ii) Coastal region - States like Odisha, Andhra Pradesh highly prone to cyclones due to its location being close to Bay of Bengal where various cyclones emerge and warmer temperature.

(iii) The western region - due to low precipitation, faces disasters like drought and heatwaves.

(iv) Peninsular India - faces risk of floods due to high rainfall, poor urbanisation (urban floods), climate change leading to erratic and unpredictable monsoons.

### Socio-economic vulnerability

(i) States like Kerala are more prepared due to high literacy level, better governance than Bihar due to lack of governance, proper early warning systems, etc.

(ii)



15. Discuss the need for mainstreaming disability perspective in the efforts towards disaster risk reduction. Also, suggest some measures that can be taken towards Disability-inclusive Disaster Risk Reduction. **(250 words) 15**
- आपदा जोखिम न्यूनीकरण के प्रयासों की दिशा में निःशक्तता संबंधी परिप्रेक्ष्य को मुख्यधारा में समाविष्ट करने की आवश्यकता पर चर्चा कीजिए। साथ ही, निःशक्तता-समावेशी आपदा जोखिम न्यूनीकरण की दिशा में अपनाए जा सकने वाले कुछ उपायों का सुझाव दीजिए।

Disability inclusive disaster risk reduction (DIDRR) makes disabled people active decision makers rather than passive and helps to reduce their vulnerability.

Need for mainstreaming disability perspective :

- i) Vulnerability - The actual vulnerability depends upon the socio-economic conditions, rather than the similar level of exposure.
- ii) Mortality - Disabled people's mortality is 3-4 times higher during a disaster.
- iii) Underpreparedness - of disaster management personnel to understand their need and of disabled to take action during disaster due to lack of information.

Civ) Social discrimination - The impact of disaster is accentuated by discrimination due to their disability.

(v) Commitments under Sendai Framework, Right to Disabled Persons Act.

Civ) High <sup>large</sup> number of people involved - 2.1% of India's population includes disabled people, thus there is a need to transform from DRR to DiDRR.

Measures that can be taken towards disability disaster risk reduction

Ci) Involvement of disabled in strengthening and implementation process of Disaster Management plans and policies.

Cii) For intellectual disability people, repeated signals, audio messages, etc. can be used for informing and providing warning.

Ciii). Sensitising people at large to discourage discrimination during disaster.

- (iv) Training of disaster management personnel in order to prepare them to handle the disabled community
- (v) Use of technology to disseminate information - audio speakers, easy visuals like colours used for warnings, etc.
- (vi) Universalise the implementation process for awareness generation.

Thus, a holistic approach is required to include all vulnerable communities during a disaster.

16. Explain the causes and consequences of sea level rise. (250 words) 15

समुद्र के जल स्तर में वृद्धि के कारणों एवं परिणामों की व्याख्या कीजिए।

According to IPCC 5th Assessment Report, sea level rise has been 8mm/year and is projected to rise further.

Causes of sea level rise :

(i) Thermal expansion →

↳ Rise in temperature and accelerated emission of greenhouse gases → Global warming

↳ ~~Global warming has accelerated~~

↳ Oceans act like carbon sink and prevent earth from heating more.

↳ This leads to rise in temperature of oceans and warming leading to its expansion.

↳ It is due to anthropogenic causes like developmental interventions, dumping of hot water from industries, etc.

(ii) Melting of Arctic ice sheets

- (ii) Melting of ice from Greenland
- (iv) Increased warming → reduced albedo and melting of ice → rise in sea level.

### Consequences of sea level rise

#### (i) Human loss -

- ↳ Coastal cities like Mumbai are vulnerable to sea level rise and flooding
- ↳ cities like Alexandria, Ho Chi Minh City, islands of Maldives, are likely to be submerged due to rising sea level.
- ↳ sea water intrusion to agricultural land leading to loss of crops and food insecurity.

#### (ii) Ecological crises -

- ↳ Make soils saltier
- ↳ sea level rise has led to extinction of Bramble Cray in the Great Barrier Reef
- ↳ impact biodiversity of terrestrial species

↳

Measures needs to be adopted to keep the rise in temperature to  $1.5^{\circ}\text{C}$  as intense warming will increase sea levels and cause an ecological crisis and a human tragedy.

17. Highlight the factors responsible for occurrence of heat waves and its effects on life and economy. In the light of recent guidelines given by NDMA, describe measures to reduce the negative impact of heat waves.

(250 words) 15

हीट वेव की घटना हेतु उत्तरदायी कारकों तथा जीवन एवं अर्थव्यवस्था पर इसके प्रभावों को रेखांकित कीजिए। NDMA द्वारा हाल ही में जारी किए गए दिशा-निर्देशों के आलोक में, हीट वेव के नकारात्मक प्रभाव को कम करने के उपायों का वर्णन कीजिए।

Heatwave is an abnormal high temperature above the normal maximum temperature. In India, temperature above 40° in plains, 30° in hilly regions, 37° in coastal states is criteria for declaring heatwave.

Factors responsible:

- (i) Anticyclone formations - low cloud cover and no precipitation
- (ii) Hot dry winds with no moisture
- (iii) Urban heat island effect due to unplanned urbanisation.
- (iv) Shift in the pressure belts.
- (v) Jet streams.

Effect on life and economy:

- (i) Human health ⇒  
↳ Heat strokes, dizziness, headaches, nausea.

- ↳ Rise in body temperature due to less sweating
- ↳ Rise in chemical based diseases.
- Cii) Loss of infrastructure - infrastructure is tested when the pressure and temperature rise.
- Ciii) Loss of efficiency - According to Lancet Report, more than 153 billion hours were lost due to heatwaves.
- Civ) More incidence of forest fire which leads to catastrophic impact on livelihoods of forest dwellers.
- Cv) Drought like conditions → loss to farmers and their income, food insecurity, damage to crops, etc.

Recently, NDMA issued guidelines for addressing heatwaves. ~~Heatwaves~~ There have been 32 heatwaves affecting 23 states in 2019. Thus, to reduce its impact, adopting various measures is need of the hour.

Measures :

- vi) Government engagement - mandating participation from state and district leaders, municipal health agencies.
- vii) Building green cover and belt
- viii) Drafting and developing Heat Action Plans for the most vulnerable areas.
- ix) Information, communication and education to communities, establishing guidelines of DO's & don'ts and disseminating via platforms like social media, radio, etc.
- x) Vulnerability assessment and establish heat-health threshold temperature.
- xi) Coordination of department and ministry with IMD.
- xii) Strategies to reduce extreme heat exposure and adapt to climate change - long term for mitigation.

Thus, due to its widening geographical expanse, vulnerability of marginalised sections, it is highly essential to prioritise heatwave as a hazard and take measures to mitigate.

18. Discuss the increasing need of 'disaster resilient infrastructure' in India. Mention the steps taken in this direction with specific reference to the Global Coalition for Disaster-Resilient Infrastructure. (250 words) 15

भारत में 'आपदा-प्रत्यास्थ अवसंरचना' की बढ़ती आवश्यकता पर चर्चा कीजिए। ग्लोबल कोएलिशन फॉर डिजास्टर-रेजिलिएंट इन्फ्रास्ट्रक्चर के विशेष संदर्भ में इस दिशा में उठाए गए कदमों का उल्लेख कीजिए।

Disaster Resilient Infrastructure (DRI) is infrastructure that can withstand any damage during a disaster. It encompasses —

- |                                                                                                                                                                                    |                                                                                                                                                                            |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><u>Structural Measures</u></p> <ul style="list-style-type: none"> <li>- adjustment in engineering techniques, retrofitting of buildings, flood control systems, etc.</li> </ul> | <p><u>Non-structural</u> —</p> <ul style="list-style-type: none"> <li>Hazard mapping</li> <li>Disaster risk financing</li> <li>Ecosystem based management, etc.</li> </ul> |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Need of DRI in India:

- i) Disaster related losses — India suffered \$80 billion loss during 20 year period due to disaster. Globally, 26 million people pushed into poverty due to disaster.
- DRI will lead to better preparedness during disasters and mitigate the impact.
- ii) Step up investment — India needs more than \$1.5 trillion investment to build resilient infrastructure.

iii) International Commitments -

- ↳ SDF goal 9 - recognises DRI as crucial for growth
- ↳ Sendai Framework (2015-2030) for disaster risk reduction identifies investing in DRR for resilience and to build back better.

iv) National Agenda - PM 10 point Agenda stresses upon development of institutions and mechanisms built upon concept of DRI.

v) DRI will promote better preparedness, less impact on infrastructure, property and human lives.

Global Coalition of Disaster Resilient Infrastructure was recently formed with efforts of India. It is an agency involving multiple stakeholders.

The ~~coalition~~ coalition will -

- i) Better research in field of infrastructure
- ii) Promote best practices and standards from across the world.
- iii) Lead to coordination among countries

(iv) Fill the gaps of funding and technology. Developing countries face the dilemma of economic development vs DRI due to scarce resources. The coalition will fill the gap.

(v) Promote social cohesion of people.

(vi) Inclusion of best models - like Japan model of disaster resilient infrastructure.

Steps taken by India to promote DRI -

(i) Green Building Codes

(ii) National Green Mission

(iii) Building of strong shelters in coastal states where risk of cyclone is high.

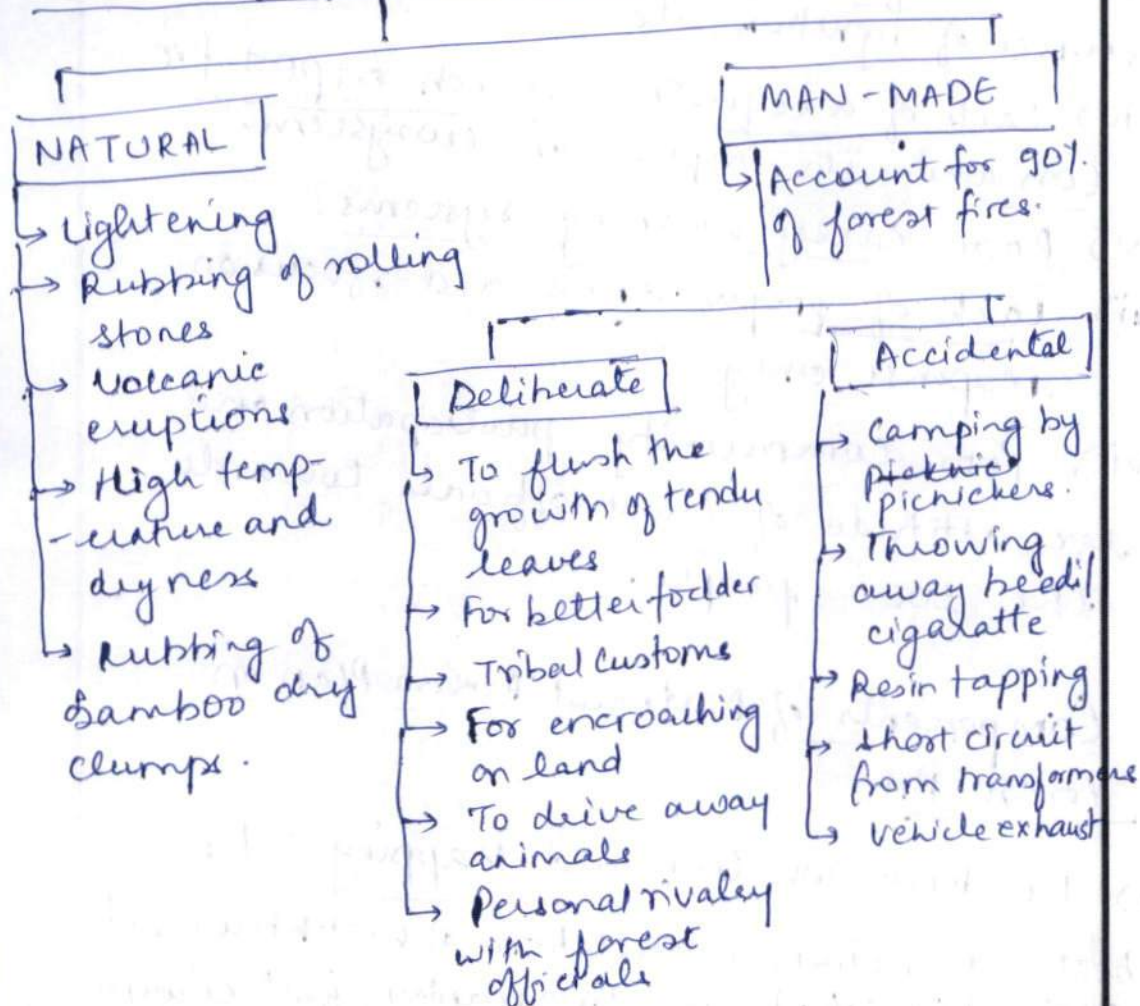
Therefore, there is an increasing need to promote DRI through disaster risk assessment, use of technology and more research on building better before disaster strikes.

19. Give an account of the natural and man-made causes of forest fires. Highlighting the challenges associated with forest fire management in India, mention the different components of the National Action Plan on Forest Fire. (250 words) 15

दावानल के प्राकृतिक एवं मानव जनित कारणों का विवरण प्रस्तुत कीजिए। भारत में दावानल प्रबंधन से संबद्ध चुनौतियों पर प्रकाश डालते हुए, दावानल पर राष्ट्रीय कार्य योजना के विभिन्न घटकों का उल्लेख कीजिए।

Forest fires wipe out large field and land. The primary factors that influence fires - weather, topography and fuel.

Causes of forest fires -



In India, more than 50% of forests are fire prone and 6% of forests are prone to severe fires according to Forest Survey of India. Forest fires have a significant impact on climate, ecology & human lives. Thus, needs to be controlled.

### Challenges with forest fire Management:

- (i) Piecemeal approach to handling fires.
- (ii) Lack of manpower.
- (iii) Lack of research on the pre-wildfires, its sources of ignition, etc.
- (iv) Lack of adequate research on post fire loss and its impact on ecosystem.
- (v) Poor early warning systems.
- (vi) Lack of preparedness and focus on response only.
- (vii) Poor community participation and lax attitude of forest officials towards the local people.

### Components of National Action Plan on Forest Fire -

- (i) Fire Risk Zonation and Mapping - for better planning, installation of watchtowers, etc.  
Risks identified like topography, fuel, ecology, etc.

- (ii) Prevention of Fire - through increase community participation, capacity building, etc.
- (iii) Increase resilience of forests - through weed management, water and soil conservation measures, forest floor biomass management.
- (iv) Protection and preparedness - leaf litter blowers, training to fire fighters, providing equipments, protective clothing, etc.
- (v) Suppression of Fire - fire mock drills, training and development of fire fighters, involvement of local community.
- (vi) Post fire - assessment of loss, restoration and rehabilitation measures, vegetation management, etc.
- (vii) Inter-agency and department coordination
- (viii) Development of National Centre for Excellence on forest fires.

Thus, forest fires need to be controlled through a holistic and, multi-faceted and multi-stakeholder approach as it has catastrophic impact on environment and a cause for human tragedy.

20. What is the global ocean conveyor belt? Discuss its significance for marine ecosystem. (250 words) 15

वैश्विक महासागर कन्वेयर बेल्ट क्या है? समुद्री पारिस्थितिकी तंत्र के लिए इसके महत्व की विवेचना कीजिए।

Global ocean conveyor belt is the constant moving system of deep ocean circulation driven by temperature and salinity.

The belt gets its start in the Norwegian sea where warm water from Gulf Stream heats atmosphere in the cold latitudes.

This leads to cold water to sink. The cold water further moves south of the equator all the way to Antarctica. Eventually, the cold water returns to surface through upwelling, continuing the conveyor belt.

The belt is mainly driven by thermohaline circulation and has significant impact for marine ecosystem.

(a) The upwelling leads to replenishment of nutrients to the surface.

Q15 The place where cold and warm currents meet is rich ground for fishing and provides rich nutrients for phytoplankton.

