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GENERAL STUDIES (TEST CODE : 1232)

Name of Candidate	APRAJIT		
Medium Eng./Hindi	English	Registration Number	149136
Center	Delhi	Date	17/06/2019

INDEX TABLE

Q. No.	Maximum Marks	Marks Obtained
1	10	
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3	10	
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5	10	
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9	10	
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18	15	
19	15	
20	15	

Total Marks Obtained:

Remarks:

INSTRUCTIONS

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 that 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।

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. Give an account of the direct and indirect sources which help in deciphering information about earth's interior. **(150 Words) 10**

पृथ्वी की आंतरिक संरचना के विषय में जानकारी प्राप्त करने में सहायता करने वाले प्रत्यक्ष और अप्रत्यक्ष स्रोतों का विवरण प्रस्तुत कीजिए।

Interior of the Earth is crust has been a mystery for scientists since ages. The technological and scientific advancements have led to following progress :

① Direct Sources

(a) Deep sea oil wells

(b) Mining

(c) Variation in Temperature and Pressure with depth

However, these sources are not as useful as indirect sources as the maximum that humans have reached below the earth is only 50 km out of total radius of about 6000 km.

(2) Indirect sources

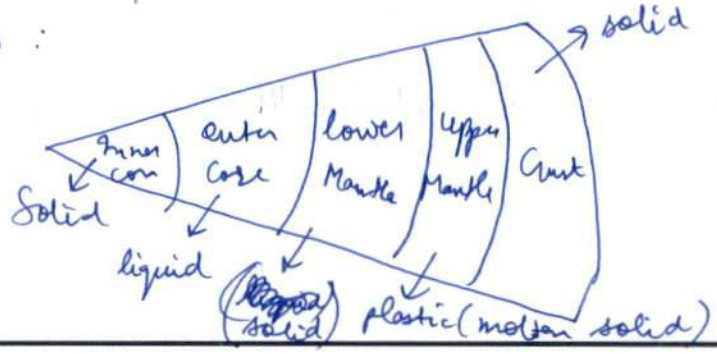
(a) Other celestial bodies
↳ Eg. meteors, moon, Juno sent to Jupiter, etc.

(b) Gravitional anomaly: different force at different places

(c) Magnetic force/field variation

(d) Earthquake (most important)
↳ S and P waves
↳ S waves flow through only solid. (not liquid or gas).
↳ P waves flow through all the mediums.
↳ Capturing the S and P wave shadow zones, it can be concluded that

- density increases downwards
- 5 layers:



2. With adequate examples, explain how ocean currents influence the formation of fishing grounds across the world. **(150 words) 10**

यथोचित उदाहरणों के साथ, व्याख्या कीजिए कि किस प्रकार महासागरीय धाराएं विश्व भर में मत्स्यन क्षेत्रों के निर्माण को प्रभावित करती हैं।

Ocean currents can be defined as uni-directional long range movement of ocean water on the surface of the ocean as well as below the depths.

They are useful for formation of fishing grounds in following ways:

★ The places where warm and cold currents meet are the best fishing grounds.

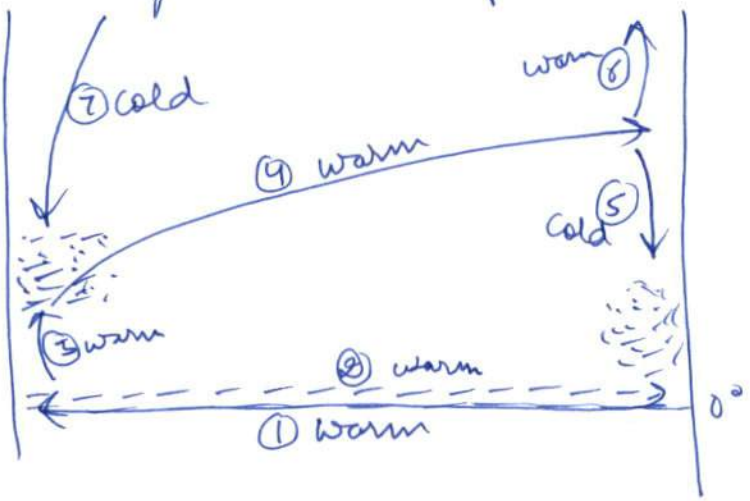
★ This is because it provides suitable temperature and salinity for a wide diversity of fish and aquatic life.

★ For example:

- The Oyashio (cold) (7 in figure below) and Kuroshio (3 in figure below)

(warm) current meet in the Eastern side of Japan which makes it the best fishing ground.

Figure: Movement of ocean currents



★ The currents where ② and ⑤ meet as well as ~~were~~ where ③ and ⑦ meet are the ~~pro~~ best fishing grounds. ★ The quality of ~~nutrients~~ water due to current movements and leading to coming up of lot of nutrients also help in increasing the aquatic life.

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3. Assess the feasibility of introducing two time zones in India in the wake of recent proposal made by Council of Scientific and Industrial Research (CSIR). **(150 words) 10**

वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद (CSIR) के हालिया प्रस्ताव के आलोक में भारत में दो टाइम ज़ोन लागू करने की व्यवहार्यता का मूल्यांकन कीजिए।

The current time zone of India passes through 82°5' through Mirzapur in Uttar Pradesh. However, there has been a demand for introduction of 2 time zones due to following reasons:

(1) Huge longitudinal expanse of India
↳ Time difference between west and east most points is more than 2 hours.

(2) Other countries with comparable expanse have 2 time zones or more. Eg. France.

(3) The productive time utilisation is less in the East as it becomes dark very early (@ about 5PM) while in the central part of India, it is not dark even till 7:30 PM specially during summers. Thus, it will enhance the

economic productivity as well.

④ Pre independence, India had 2 time zones

⑤ Assam has already moved to another time zone due to tea gardens requirements.

However, there are also issues such as:

① Illiteracy: people will not understand

② Europe is trying to abandon the practice due to lot of confusion.

③ Difficulty in administration

Assam has already moved ahead of adopting a separate time zone for tea gardens and thus, before going any further, it is best that this programme is monitored carefully as a pilot project to understand all the difficulties that India might face, if at all two time zones are adopted.

4. Giving examples, explain how land topography affects the regional and planetary wind systems. Also, differentiate between the westerlies of the northern and southern hemisphere. **(150 words) 10**

सोदाहरण व्याख्या कीजिए कि धरातलीय स्थलाकृति क्षेत्रीय और ग्रहीय पवन प्रणालियों को किस प्रकार प्रभावित करती है। साथ ही, उत्तरी और दक्षिणी गोलार्ध की पछुवा पवनों के मध्य अंतर स्पष्ट कीजिए।

Land topography plays a crucial role in determining the strength and direction of regional and planetary winds. For example:

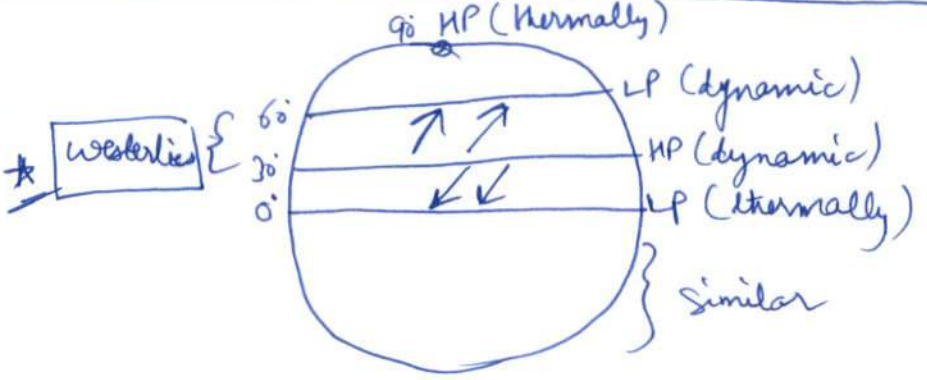
① South Westerly Jet stream: divided into 2 parts when passing through the Himalayas

② Northern Tropical Easterly Jet stream: due to Tibetan plateau getting very hot.

③ Land breeze and Sea breeze: due to difference in Temp./Pressure over land/sea.

④ Monsoons: occurred by the Himalayas

⑤ Local winds such as foehn, blizzards, pampero, etc. are majorly outcome of the either glacial formations on land or due to nearby deserts.



Northern Westerlies

★ Due to high continentality in summer, the dynamically created high pressure at 30° breaks and in winter, the dynamically created low pressure at 60° breaks. This leads to weakening of northern westerlies throughout the year.

★

Southern Westerlies

★ Due to less continentality, the pressure belts remain intacts and thus, they flow strongly throughout the year.

★ They are called
- roaring fourties
- furious fifties
- shrieking sixties

due to their strong nature in the S-hemisphere.

5. Mention the conditions responsible for occurrence of Temperature Inversion in atmosphere. Elaborating on its various types, highlight its effects on the biosphere. **(150 words) 10**

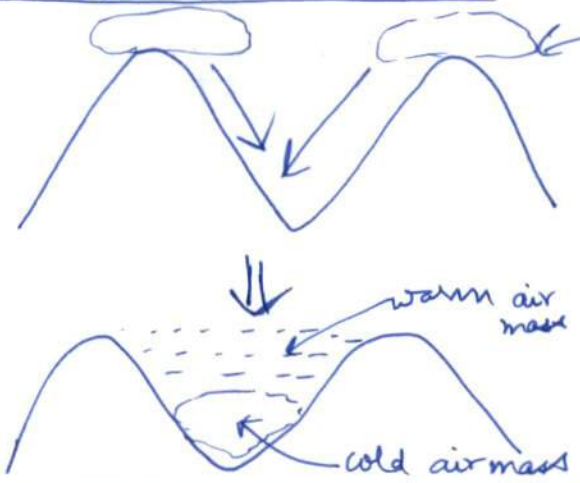
वायुमंडल में तापमान व्युत्क्रमण की घटना हेतु उत्तरदायी परिस्थितियों का उल्लेख कीजिए। इसके विभिन्न प्रकारों का सविस्तार वर्णन करते हुए, इसके द्वारा जैवमंडल पर पड़ने वाले प्रभावों पर प्रकाश डालिए।

Temperature decreases with altitude in normal circumstances. However, it sometimes increases before eventually decreasing at height increases. This is called temperature inversion.

Conditions in plains:

* long cold nights so that land becomes cold
* minimum winds horizontally
* As land becomes cold, the nearby air also becomes cold and upper remains warm. This leads to temperature inversion

Conditions in hills:



High altitude, cold air mass but it becomes dense and hence moves down. This leads to warm air moving up and leads to temp. invert-

Impact of temperature inversion on biosphere

① In hills, as the warm air moves up, it causes rainfall on the slopes of the hills. This is why orchids are grown on the slopes and not in valleys.

② When the warm air mass is above the cold air mass, it does not allow dew to be formed over the orchids and hence, protecting them.

③ The foggy conditions are formed near by the ground and in the valleys. This leads to dew formation and frost formation on the crops grown in plains such as wheat, etc. This leads to adverse impact on the crop.

6. Explain how ISRO's Chandrayaan 1 mission has improved our scientific understanding of moon. How will Chandrayaan 2 be different from its predecessor in terms of technology and objectives? **(150 words) 10**

व्याख्या कीजिए कि किस प्रकार ISRO के चंद्रयान 1 मिशन से चंद्रमा के प्रति हमारी वैज्ञानिक समझ में सुधार आया है। चंद्रयान 2 प्रौद्योगिकी और उद्देश्यों के संदर्भ में अपने पूर्ववर्ती से किस प्रकार भिन्न होगा?

India became only the 4th country to send a space mission to the moon. It was named Chandryaan - 1 and has helped us in following ways :-

① Discovery of water particles in the moon's atmosphere.

② Discovery of frozen water layers near the poles of the moon.

③ It has conducted various experiments in moon's atmosphere. Eg. its very less gravitional force and formation of large craters

Chandrayaan 2 has been planned to be launched in 2019. It is different from Chandrayaan 1 in following terms :-

① It will not only orbit the moon but

will land a rover (Vikram) and a lander, on the moon's surface.

(2) It will use NASA's technology to collect some samples and perform experiments to decode the evolution of moon.

(3) It will be targeted at 600km from the South pole of moon — the Atiken basin where no country has reached yet. The exploration of new spaces will disclose more about the materials which make up the moon and also try to get an interference from it about the possibility of life on moon.

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7. Identify different factors that trigger Glacial Lake Outburst Floods. Also, suggest certain measures that need to be taken to minimize their impact.
(150 words) 10

उन विभिन्न कारकों की पहचान कीजिए जो हिमनदीय झील प्रस्फोट जनित बाढ़ (ग्लेशियल लेक आउटबर्स्ट फ्लड) को प्रेरित करते हैं। साथ ही, इनके प्रभावों को न्यून करने हेतु किए जाने वाले कुछ आवश्यक उपायों का भी सुझाव दीजिए।

The recent floods of Uttrakhand (2016) were a result of glacial lake outburst. They have increased in frequency in recent times due to following reasons :-

① Global warming
- ↳ increase in glacier melting
- ↳ lakes are unable to withstand such large amount of water

② Cloud burst
↳ sudden addition of huge amount of water leads to instability of lake.

③ Accumulation of pollutants in lakes
↳ E.g. by tourists, urban sewage dumping and industrial waste, etc.

Measures to minimize the impact:

① Prevent the natural endemic hazards from turning into disasters
↳ E.g. • land zoning
• Continuous level monitoring of lakes
• closing of tourist/pilgrimage spots in case of threat
• strengthening of lake boundaries.

② Early warning systems
↳ not only about clouds burst but about additional calamities that it might bring. E.g. landslides, etc.

③ Urban planning to increase the level of water absorption/percolation capacity by rainwater harvesting etc.

④ channelizing excessive lakes water before the monsoons specifically to agriculture, rejuvenation of other wetlands, etc.

⑤ Trained human resource and well planned evacuation

8. What is palaeomagnetism? Explain how it serves as a bridging evidence for Plate Tectonics Theory. **(150 words) 10**

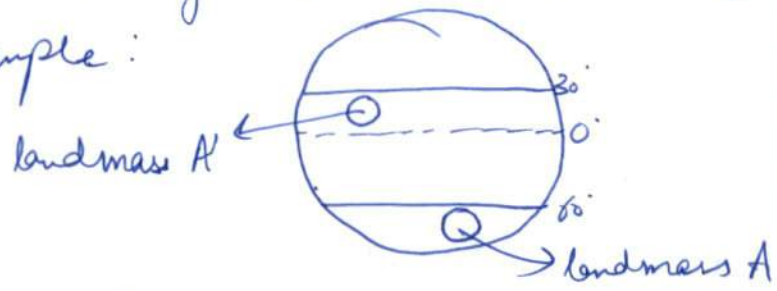
पुराचुम्बकत्व क्या है? व्याख्या कीजिए कि यह किस प्रकार प्लेट विवर्तनिकी सिद्धांत के प्रमाण हेतु एक सेतु के रूप में कार्य करता है।

Paleo magnetism can be defined as the study of climate change over a long period of time. For example, Alfred Wegner in 1912 found out that the climatic conditions of a land/region in the present times are very different from what it used to be thousands of years ago.

Wegner used it as a evidence his theory of continental drift and was also used by Morgan in 1967 when he gave his theory of plate tectonics as follows :-

① The variation of climatic conditions by such large extent is possible only

if the the region considered is moving. For example:



The landmass A was highly cold climate region (tundra) where as the same land mass now experiences equitorial climate. This is possible only if the landmass is moving. This proved the movement of plates in the plate tectonic theory.

★ Another evidence given was of change of the magnetic polarity in various random directions. But because the N-pole and S-poles are fixed (at least for millions of years), it's random direction is possible only if the landmass has also moved randomly due to the convectional forces of the mantle.

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9. Discuss the significance of phytoplankton in marine ecosystem. Also, explain the causes and consequences of the phytoplankton blooms.

(150 words) 10

समुद्री पारिस्थितिकी तंत्र में पादपप्लवकों के महत्व पर चर्चा कीजिए। साथ ही, पादपप्लवक प्रस्फुटन (फाइटोप्लैंकटन ब्लूम) के कारणों और परिणामों की भी व्याख्या कीजिए।

Phytoplanktons can be defined as the the marine organisms which can prepare there own food by the process of photosynthesis, eg. sea grass, sea weeds, etc.

Significance of phytoplanktons:

① Food for other organisms (herbivorous aquatic)

② Shelter for small fish / zooxanthelle

③ Absorption of CO_2 and releasing O_2 by photosynthesis.

④ Maintaining an ecological balance in the marine ecosystem.

Causes of boom:

① Anthropogenic activities (Eutrophication)
↳ overflow of nutrient rich water from

agricultural fields with fertilizers, household drainage and industrial wastes.

② Natural upwelling of nutrients by ocean currents eg. volcanic activities or land slides below water.

Consequences: ① Increase in Biological oxygen demand will lead to death of marine organisms.

② water becomes non-transparent. Sunlight does not reach lower levels.

③ Death of organisms will further increase the oxygen demand as bacteria will need O_2 for decomposition.

④ Disrupt the whole ecosystem by formation of dead zones.

★ Prevention of Eutrophication is the key. The nature is well endowed with carrying capacity to counter any natural changes. But, it is our duty to prevent the anthropogenic activities from accelerating these natural changes. Eg. use drip irrigation, waste water treatment, etc.

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10. Discuss India's vulnerability to chemical disasters. In this context, mention safety initiatives taken to address chemical risk in India. **(150 words) 10**

रासायनिक आपदाओं के प्रति भारत की सुभेद्यता पर चर्चा कीजिए। इस संदर्भ में, भारत में रासायनिक जोखिम से निपटने हेतु की गई सुरक्षा पहलों का उल्लेख कीजिए।

The Bhopal gas tragedy of 1984 still persists in the minds of people and the recent uprising of people in Tamil Nadu against the Vedanta Chemical plant is a proof of it.

Chemical industry is a major and significant industry for economic growth of any country. However, as per the UN report, the developing countries such as India are at much higher risks because:

① Land pattern Usage
   ↳ due to high population, industrialised areas are very near the residential areas.

② Poor labor
   ↳ try to get accomodation as near the plant as possible to save the money on transportation.

③ High population
④ Low safety measures by irresponsible industrialists.
⑤ Old technology used in plants
⑥ Low monitoring mechanism by the governments. Continuous easing of rules to ↑ ease of doing business.

Steps taken to address chemical risks:-

① Compulsory mock drills and training to the workforce/ nearby villagers/ residents about using the safety equipments
② Environment Impact Assessment: includes the safety measures, safety of social capital, etc.
③ Compulsory constitution of 'Emergency Response Team' in each industrial area.
④ National Disaster Management Plan has listed it under 1 of the 15 disasters listed by it.
⑤ Continuous and strict monitoring, upgrading of technology and safety as per global standards.

11. Comment on the variability of ocean bottom topography. Also, give an account of formation of the mid-oceanic ridge system. **(250 words) 15**

महासागरीय नितल की स्थलाकृति की परिवर्तनशीलता पर टिप्पणी कीजिए। साथ ही, मध्य महासागरीय कटक प्रणाली के निर्माण का भी विवरण दीजिए।

Upto 1920s, it was believed that the ocean surface is plain without any topographical features. However, that was proven false by the sea floor spreading theory and later ocean expeditions. It has following features :-

(1) Continental side consists of the shelf, slope and the rise with continental side of the trench.

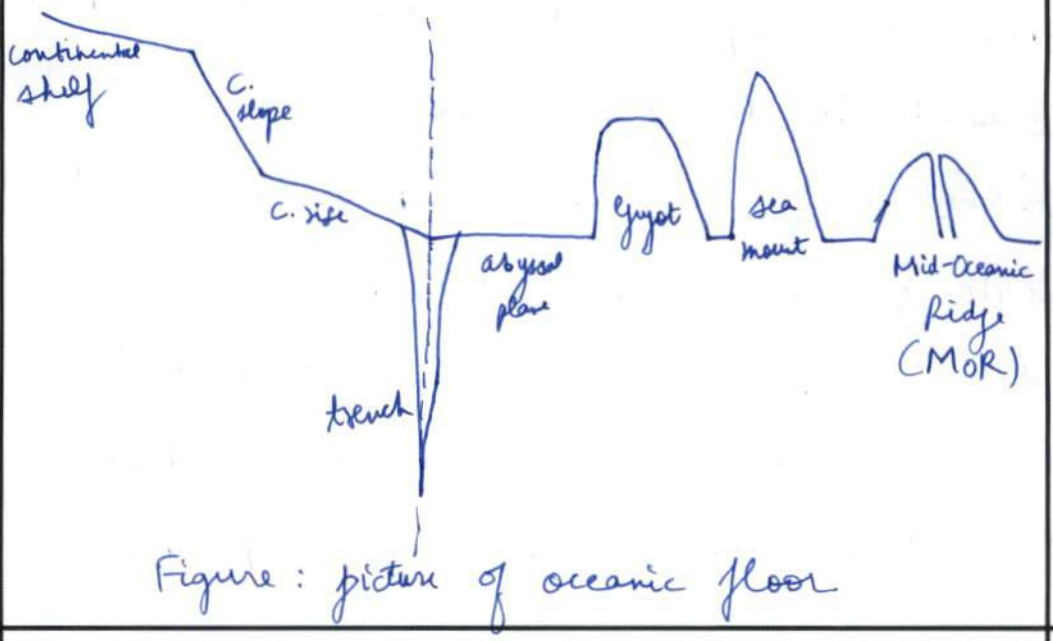


Figure : picture of oceanic floor

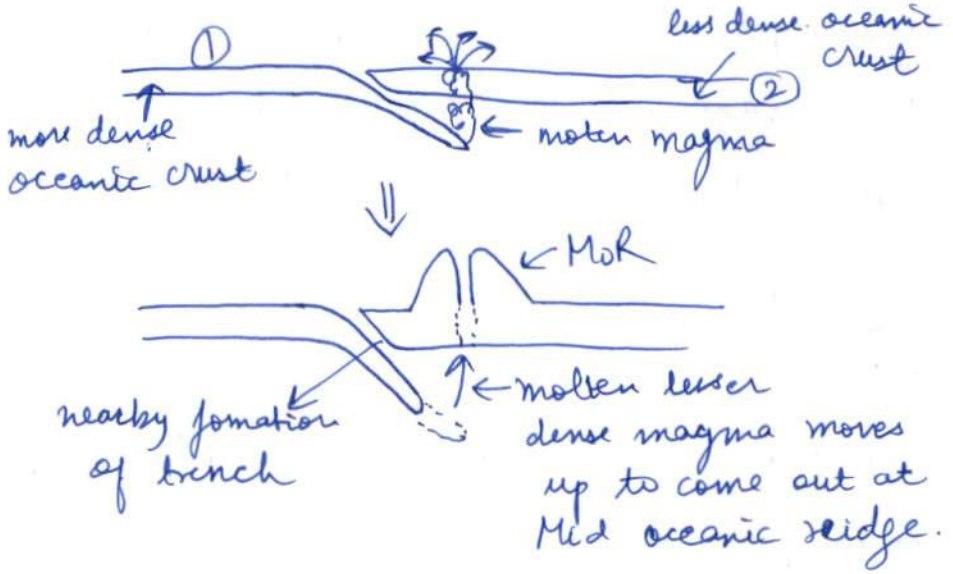
* Slope has an inclination of more than 50° where as the shelf has 1-2° inclination only.
* The trench are usually deeper than the tallest mountains over earth's surface.

② Oceanic side

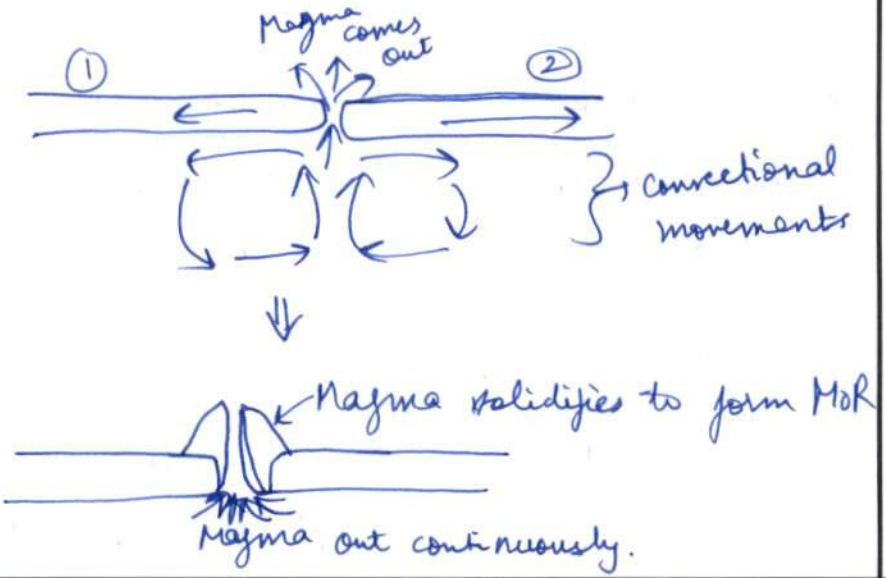
- Abyssal plane
- MoRs may rise above to form islands
- Guyot: sea mountain with a flat top due to erosion
- Sea mounts
- Mid Oceanic Ridge: These are the long ranges of mountains below the ocean formed due to the oceanic-oceanic convergence. The plate ① (given below) and plate ② converge to subduct the more denser plate. The magma is formed due to the melting of subducted which comes out of the other plate forming MOR.

Formation of Mid oceanic Ridge

(★) Oceanic - Oceanic Convergence



(★) MORs can also be formed by the Oceanic - oceanic divergence as shown below :-



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12. What is the impact of rising ocean temperature on biosphere? Provide an account of the measures that can be taken to address its causes as well as effects. **(250 words) 15**

महासागरों के बढ़ते तापमान का जैवमंडल पर क्या प्रभाव पड़ता है? इसके प्रभावों के साथ-साथ इसके कारणों को दूर करने के लिए किए जा सकने वाले उपायों का विवरण प्रदान कीजिए।

The anthropogenic activities has led to global warming which has caused instability in Earth heat budget and thus, there is a continuous increase in the oceanic temperature.

The increase in oceanic temperature has following impacts on biosphere:

① Positive feedback for global warming
- The absorbed CO_2 will be released accelerating global warming and climate change.
- The metabolism of aquatic life will increase and they will also release more CO_2 and demand more O_2

② Impact on aquatic life
- dissolved O_2 will decrease in water and this will lead to mass deaths

of marine organisms

③ Corals and Kelp forests
↳ coral bleaching : 99% of corals will die with increase in 2°C (IPCC)

④ Melting of polar ice caps
↳ this will lead to increase in sea level and large parts of coastal ecosystems will be disrupted.
↳ The polar ice caps will also release CH_4, etc from gas hydrates on melting to further accelerate the problem.

Measures that can be taken to address the rising ocean temperature:—

① Countries must take responsibility to achieve and upgrade their Nationally Determined Contributions (NDCs) under the Paris agreement.

② Use of Green Climate Fund and other such mechanisms for technology transfer, joint green projects and sustainable development.

③ The proposed high-tech measures such as mirrors in space, cloud seeding/thinning, etc must be launched on pilot basis.

④ The targets of Kigali Agreements and launching of Cooling Action Plans where India can emerge as a new world leader.

⑤ Energy resource and production should be diversified with full thrust on renewable and green energy.

13. Explain the reasons behind earthquakes in Himalayas being more intense and frequent than the ones occurring in Alps region. Why are scientists predicting a largescale earthquake in northern India? Also, elaborate upon some prominent earthquake forecasting techniques. **(250 words) 15**

आल्प्स क्षेत्र में आने वाले भूकंपों की तुलना में हिमालय में आने वाले भूकंपों के अधिक तीव्र होने और बारंबार आने के पीछे उत्तरदायी कारणों की व्याख्या कीजिए। वैज्ञानिक उत्तर भारत में उच्च तीव्रता वाले भूकंप के आने की भविष्यवाणी क्यों कर रहे हैं? साथ ही, भूकंप पूर्वानुमान संबंधी कुछ प्रमुख तकनीकों का सिवस्तार वर्णन कीजिए।

Himalayas account for the 3rd highest number of earthquakes every year where as the nearby Alps are much more stable due to following reasons :-

(1) Himalayas are young fold mountains but Himalayas are much younger as Alps are old fold mountains.

(2) The Himalayas still experience huge force especially on the eastern sides while Alps lie on the western side.

(3) This is because the movement of Indo-Australian plate is upwards as well as counter clockwise.

(4) Material of Himalayas is much loosely packed.

⑤ High number of rivers
⑥ High amount of rainfall
} high number of dams

- These 2 reasons lead to solifluction and further loosens up the material of Himalayas.
- Himalayas are also much higher than the Alp which increase the intensity when an earthquake takes place.
- Dams induce Reservoir Seismicity also.

⑧ The scientists have predicted a large-scale earthquake in northern India due to following reasons:

① Recent earthquake swarms
↳ continuous but low intensity earthquakes.

② Extensive degration of natural balance by dams built on almost all rivers.

* Some prominent earthquake forecasting techniques are as follows :-

(1)

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14. Highlighting India's vulnerability to droughts, discuss the major guidelines of National Disaster Management Authority (NDMA) for management of droughts. **(250 words) 15**

सूखे के प्रति भारत की सुभेद्यता पर प्रकाश डालते हुए, सूखा प्रबंधन के लिए राष्ट्रीय आपदा प्रबंधन प्राधिकरण (NDMA) के प्रमुख दिशा-निर्देशों पर चर्चा कीजिए।

More than 50% of India's land is drought prone. Reasons for it are :-

① Over dependence on Monsoon
↳ 67% of land is rainfed.

② Vagaries of Monsoon
↳ It is a complex phenomenon which depend on so many factors that an 100% accurate forecast is nearly impossible.
↳ Even IMD gives 2 predictions for monsoon every year.

③ Unsustainable water use
↳ Agriculture
• Over exploitation of ground water and canals.

- Flood irrigation
- Focus on paddy (water intensive) cultivation.

Households / Industries

↳ no sewage treatment

↳ directly disposing pollutants to rivers and contaminating fresh water.

④ Defective Urban Planning

↳ No rain water harvesting

↳ Over concretization

↳ Encroachment over wetlands

⑤ Deforestation

↳ Soil erosion and increased problems of rainfall variation.

⑥ 12% of world population but only 1% of fresh water resources.

⑦ Climate change has further accelerated the problem.

Guidelines given by National Disaster Management Authority (NDMA) to manage droughts:

(1) State governments can declare drought when some of the mentioned scientific criteria are fulfilled.

(2) Mitigation Measures:
- Insurance for farmers
- Encourage farmers to adopt scientifically proven irrigation practices eg. drip irrigation
- Recycling of waste water by households and industries.

(3) Rehabilitation Measures:
- Provision for water availability through tankers and pipelines.

(4) Structural changes
- Compulsory rainwater harvesting structures
- Scientific management of dams and reservoirs, before and after the monsoon

(5) Crop diversification by farmers and soil conservation techniques

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15. Describe the mechanism of formation, movement and dissipation of tropical cyclones. In this context, explain why the recent 'Titli' cyclone was termed as 'rarest of rare' by IMD. **(250 words) 15**

उष्णकटिबंधीय चक्रवातों के निर्माण, संचलन और क्षय की प्रणाली का वर्णन कीजिए। इस संदर्भ में, व्याख्या कीजिए कि हाल ही में आए 'तितली' चक्रवात को IMD द्वारा क्यों 'दुर्लभ में दुर्लभतम' (रेयरेस्ट ऑफ रेयर) कहा गया था।

Tropical cyclones are large scale weather phenomenon with 10% of India's land-mass and over 14 coastal states/Union territories vulnerable to them.

Mechanism of formation :

(*) Necessary conditions for its formations

(1) Warm sea water (> 27°C)

(2) Nearby low pressure region

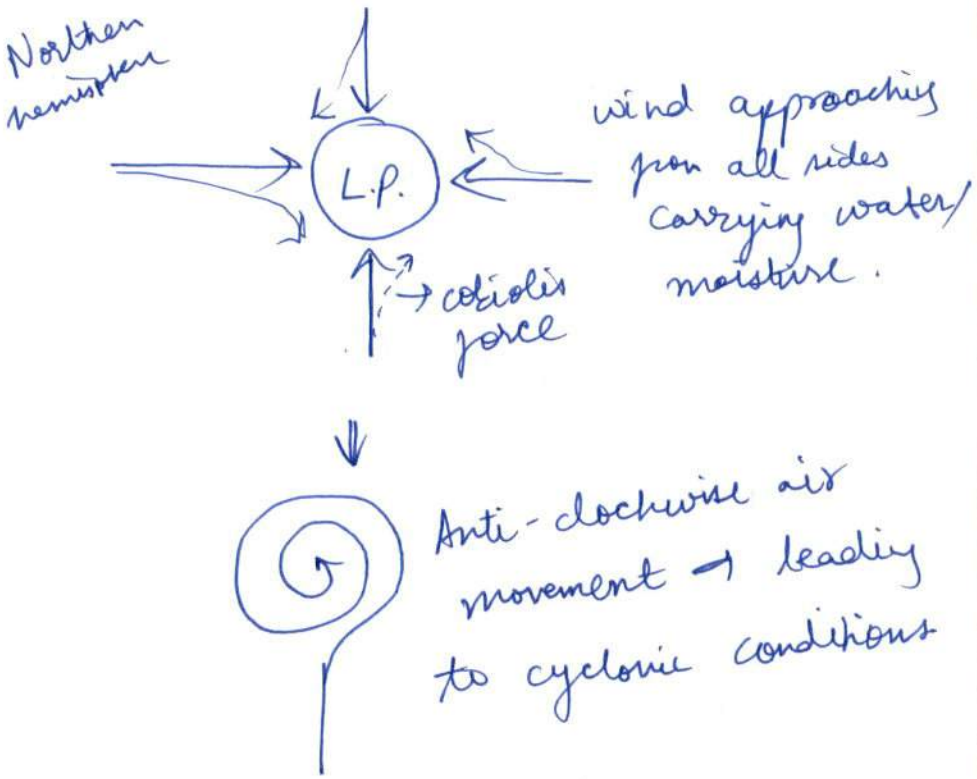
(3) Uniform vertical wind speed

(4) Presence of Coriolis force

(5) Upper air divergence should be allowed to take up more moisture from below.

(6) Formed only over oceans (not on land).

(★) The warm sea surface leads to formation of a depression (low pressure) region, creating cyclonic conditions.



(★) While coming in, the air accumulates the moisture over sea water further strengthening the walls of the cyclone. The cyclone becomes self sufficient.

(★) Movement of cyclone and dissipation

→ The near by low pressure area (usually the thermal equator or the ITCZ),

attracts the cyclone towards it and makes a landfall (region where cyclone touches the land). This area experience high destruction due to high winds speed. But, once the cyclone reaches land, the moisture which it was gaining from sea water stops. This finally leads to its dissipation.

(*) Sometimes, the cyclone may recurve due to the prevailing local winds / coriolis force. This is called recurvature of cyclone. This makes the cyclone even more destructive as it again acquires the self-sufficient capability by gaining moisture from sea surface. But it occurs very rarely.

It is because of this reason that 'Titli' was called rarest of rare cyclone by IMD because it followed the recurvature pattern and thus bringing higher destruction.

16. What are the forces that drive the movement of lithospheric plates? In this context, identify the different types of plate boundaries based on their nature of interaction with suitable examples of the characteristic features formed along them. **(250 words) 15**

स्थलमंडलीय प्लेटों को संचलित करने वाले बल कौन-से हैं? इस संदर्भ में, उनके किनारे निर्मित अभिलाक्षणिक विशेषताओं के उपयुक्त उदाहरणों के साथ उनकी अंतरक्रिया की प्रकृति पर आधारित विभिन्न प्रकार की प्लेट सीमाओं की पहचान कीजिए।

The plate tectonics theory in 1967 finally settled the debate about plate movements and their reasons/ forces responsible for it.

Before it, Alfred Wegner in 1912 proposed that the polyluncht (centripetal force) and movement of tides, due to movement of Earth in West to East direction, the landmass moves towards equator and to the Eastern direction. However, this was proven wrong by the sea floor spreading theory and finally by the Plate tectonics theory which proposed the following forces :—

- The convectional currents in the upper mantle perform 2 functions of

moving the plates and separation of magma on the basis of density.

⍟ Thus, it is not only the continental landmass that is floating over the molten mantle but also the oceanic landmass.

⍟ This is the most important force.

Different types of plate boundaries and their characteristic features :—

① Continental - Continental Convergence

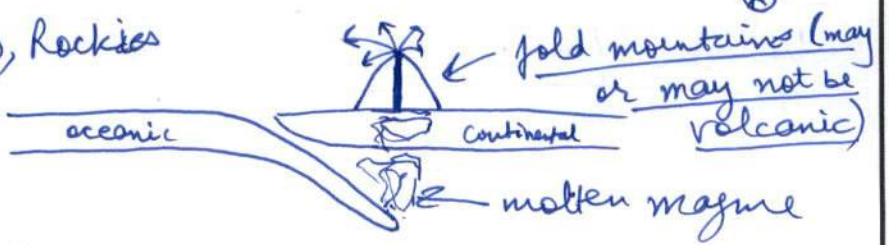
- no subduction
- fold mountains

Eg. → Himalayas, Alps, etc.

② Continental - Oceanic Convergence

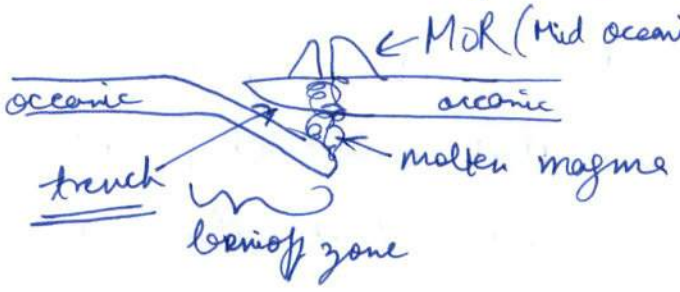
- oceanic (denser) plate gets subducted leading to following features :

Eg. Andes, Rockies



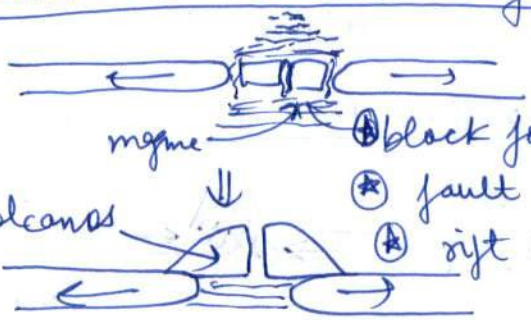
- fold mountains due to less dense and softer continental plate gets compressed.

③ Oceanic - oceanic Convergence: denser plate gets subducted but no folding take place.



④ Oceanic - Oceanic divergence

⑤ Continental - Continental divergence



Eg. Narmada, Tapi flowing through Vindhya, Satpura rifts.

⑥ Transform plate boundaries in Continental Continental: Eg. San Andreas fault, Chilean fault, etc.

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17. Explain the role of river as a geomorphic agent with suitable examples of landforms formed during its course of flow. **(250 words) 15**

नदी प्रवाह के दौरान निर्मित होने वाले भू-आकृतियों के उपयुक्त उदाहरणों सहित भू-आकृतिक कारक के रूप में नदी की भूमिका की व्याख्या कीजिए।

Rivers constitute the most important geomorphic agent for any ecosystem.

- It provides a huge helping hand for ecosystem balance to be maintained and achieved.
- But not only this, as a geomorphic agent also, it is extremely significant due to following reasons :-

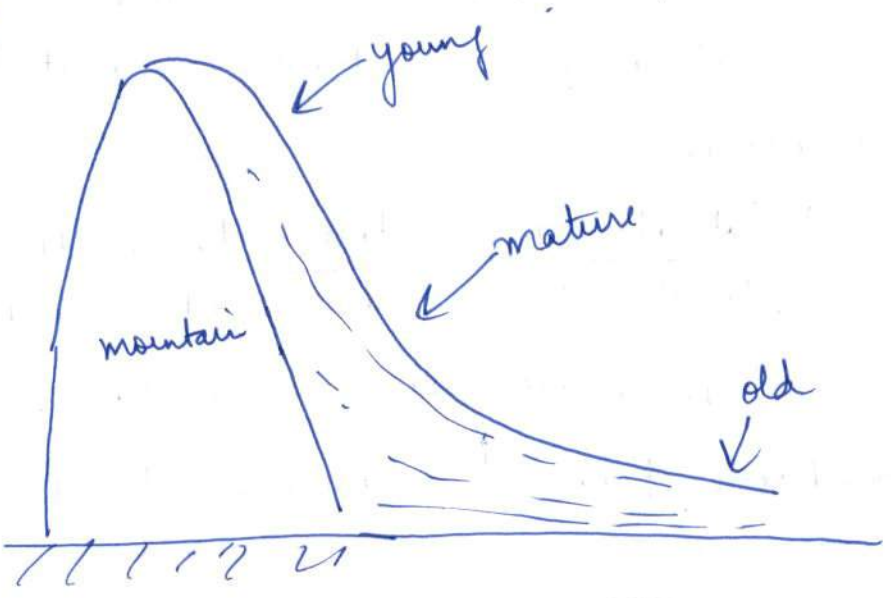


Figure : life of a river

★ Landforms formed in young phase:-

① Mostly erosional features:

E.g. Alluvial fans, deeper valleys, bajadas

- This is because the flow is strong and capable of eroding almost everything.

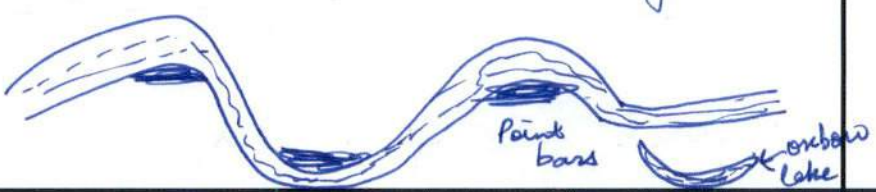
★ Land forms in mature phase:-

① Depositional
- big rocks are deposited under which river disappears.
- Oxbow lakes due to meandering
- at low part, kankars are deposited

② Erosional
- lateral erosion dominates as the plains/valleys become wider (not deeper unlike the young phase).

★ Meandering becomes a common feature

Meanders



(★) Landforms in old/phase :-

(1) Depositional
- ↳ everything is deposited: silt, clay, small rocks/pebbles.
- ↳ delta are formed and land moves towards the sea

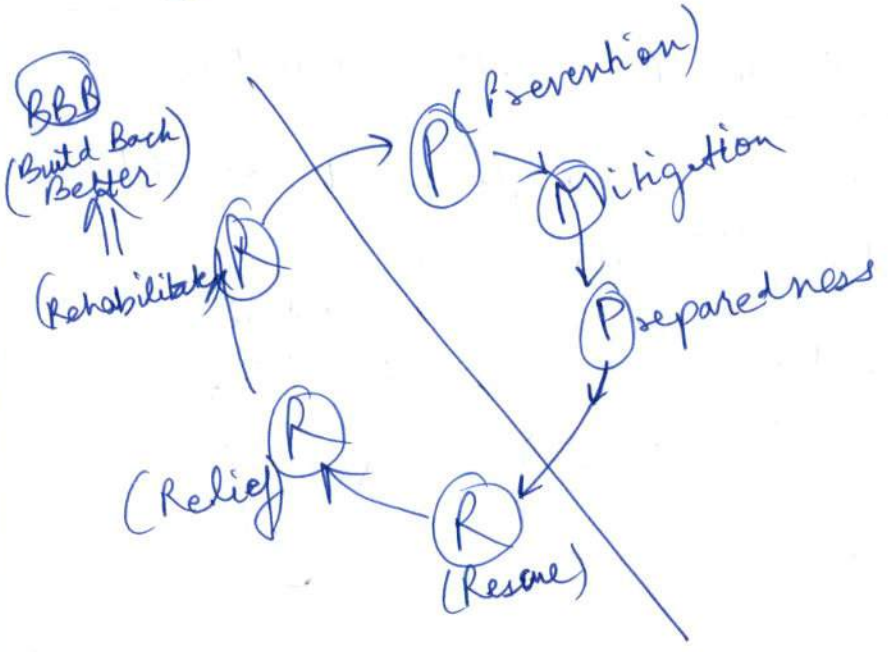
(2) Erosional
- ↳ not much erosion takes place.

(★) In this phase, flooding takes place regularly, this leads to the deposition of new soil/silt and hence increasing its fertility. Also, after few floods, natural levees are formed on the boundaries of the rivers.

18. What is Community Based Disaster Management (CBDM)? Highlight its main principles, features and significance for resilient disaster preparedness in India. **(250 words) 15**

समुदाय आधारित आपदा प्रबंधन (CBDM) क्या है? भारत में लचीली (रिज़िल्यन्ट) आपदा तैयारियों हेतु मुख्य सिद्धांतों, विशेषताओं और महत्व पर प्रकाश डालिए।

Community Based Disaster Management (CBDM) can be defined as involvement of the community, civil society, NGOs, local leaders, etc. in the process of disaster management. They must be considered as equal stakeholders in all the phases of disaster management namely :-



Thus, it main significance is :-

(1) Active civil society → equal partners

(2) social capital will increase

(3) No rumour mongering because the citizens will be involved at every step.

(4) Increased transparency → better and more effective results.

(5) Priority of rehabilitation will be decided by them
   - → increased effectiveness
   - → better knowledge of ground realities.

(6) Government will get a helping hand
   - → its economic resources are not unlimited
   - → human resources when cooperate

with the locals will prove to be much more efficient.

(7) Vulnerable sections will get due attention

→ The recent example of Kerala re-building (even without the much help of center) due to active citizenry has set a landmark and a glorious example to the world about what an effective partnership between
- a good political leadership
- trained human/economic resource
- public participation/active citizenry

can achieve together.

19. Differentiate between eustatic and isostatic type of sea-level changes. Also, discuss the resultant landforms which are likely to be formed as a result of sea-level fluctuations. **(250 words) 15**

सुस्थितिक और समस्थितिक प्रकार के सागर तल परिवर्तनों के मध्य अंतर स्पष्ट कीजिए। साथ ही, सागर-तल के उतार-चढ़ाव के परिणामस्वरूप निर्मित होने वाली संभावित परिणामी भू-आकृतियों की भी चर्चा कीजिए।

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20. Discuss the vulnerabilities of urban areas to disasters. What measures have been taken to minimise the losses in such areas during disasters? What further improvements would you suggest to make them more resilient?

(250 words) 15

आपदाओं के प्रति शहरी क्षेत्रों की सुभेद्यताओं पर चर्चा कीजिए। आपदाओं के दौरान ऐसे क्षेत्रों में होने वाली क्षति को न्यून करने के लिए क्या उपाय किए गए हैं? आप उन्हें और अधिक लचीला (रिज़िल्यन्ट) बनाने के लिए क्या उपाय सुझाएंगे?

Urbans area have become more vulnerable to disasters such as

- urban fires, • epidemics,
- urban flood
- Water scarcity
- Heat waves, etc.

This due to following reasons :—

① Inadequate urban planning

② Old building prone to collapse and fires

③ Ever increasing migration
   - ↑ population density
   - ↑ slums → unhygienic and unsafe
   - breeding ground for epedemics such as dengue, malaria, etc.

④ Water scarcity due to
   - over consumption
   - no- recycling.

- irresponsible consumption
- not following the rain-water harvesting technique.
- over-concretization has stopped water percolation and thus no ground water rejuvenation.
- encroachment of wetlands, etc.

Measures to be taken to minimize losses:

1. Build Back Better (World Bank's technique to retrofit the old buildings or infrastructure damaged in disasters).
2. Implementing the NDMA guidelines and 10 point Action Agenda given by the PM
3. Follow Building codes, 2016 and government officials should be trained to monitor them effectively.
4. Urban planning should be kept on priority.